

**BEFORE THE  
FEDERAL COMMUNICATIONS COMMISSION  
WASHINGTON, DC 20554**

In the Matter of	)	
	)	
Proposals from Entities Seeking to Be	)	DA 09-2479
Designated TV Band Device Database Managers	)	
	)	
Unlicensed Operation in the TV Broadcast Bands	)	ET Docket No. 04-186

**PROPOSAL BY GOOGLE INC. TO PROVIDE A  
TV BAND DEVICE DATABASE MANAGEMENT SOLUTION**

GOOGLE INC.

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**PROPOSAL BY GOOGLE INC. TO PROVIDE A  
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Google Inc. (“Google”) proposes that the Federal Communications Commission (“FCC” or “Commission”) designate Google to be administrator of a TV bands geolocation database. This proposal is submitted in accordance with applicable Commission rules and the Commission’s above-captioned Public Notice soliciting proposals from prospective database managers.<sup>1</sup>

**I. INTRODUCTION AND SUMMARY**

Google has long supported making available for unlicensed operations portions of unused spectrum in the television broadcast bands (“TV White Spaces” or “TVWS”). As a member of the White Spaces Coalition, Google was an early advocate for the efficient unlicensed use of this spectrum.<sup>2</sup> Google worked with coalition members, Commission staff, and other interested

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<sup>1</sup> Public Notice, ET Docket No. 04-186, Office of Engineering and Technology Invites Proposals from Entities Seeking to be Designated TV Band Device Database Managers, DA 09-2749 (Nov. 25, 2009).

<sup>2</sup> *See, e.g.*, ET Docket No. 04-186, Comments of Dell, Google, Hewlett-Packard, Intel, Microsoft, and Philips (Jan. 31, 2007).

parties to develop and test prototype devices to operate in the TV White Spaces.<sup>3</sup> We also proposed and supported key interference protections adopted by the Commission.<sup>4</sup> More recently, as a founder of the White Spaces Database Group, Google has committed its resources to the timely creation and operation of a geolocation database<sup>5</sup> within the parameters of the Commission's Second Report and Order.<sup>6</sup> The Commission's decisions permitting operations in the TV White Spaces have been important early steps towards providing broadband access to millions of Americans and enabling a wide range of innovative wireless devices and services. Google is pleased to be able to continue to support the Commission's efforts by submitting this proposal to serve as administrator of a TV White Spaces database.

As Google has previously stated,<sup>7</sup> we believe the Commission should endorse an appropriately flexible and market-driven approach, one that avoids either limiting the number of database providers or mandating a single database architecture. We continue to believe that allowing a significant number of retail database suppliers will best ensure a healthy and competitive ecosystem that promotes innovation and competition in both basic and enhanced data services. To that end, Google is prepared to provide an end-to-end TVWS database solution, preferably as one of several such suppliers competing in the market. We discuss our

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<sup>3</sup> See, e.g., ET Docket No. 04-186, *Ex Parte* Letter from Edmond J. Thomas to Marlene H. Dortch, FCC (Mar. 14, 2007).

<sup>4</sup> See, e.g., ET Docket No. 04-186, *Ex Parte* Letters from Richard S. Whitt, Google Inc., to Marlene H. Dortch, FCC (Mar. 21, 2008, Oct. 9, 2008, Oct. 14, 2008, and Oct. 27, 2008).

<sup>5</sup> See, e.g., ET Docket No. 04-186, *Ex Parte* Letter from Richard S. Whitt, Google Inc., to Marlene H. Dortch, FCC (Mar. 16, 2009).

<sup>6</sup> *In the Matter of Unlicensed Operation in the TV Broadcast Bands*, ET Docket No. 04-186, Second Report and Order, 23 FCC Rcd. 16807 (2008) ("TV White Spaces Second R&O").

<sup>7</sup> See ET Docket No. 04-186, *Ex Parte* Letters from Richard S. Whitt, Google Inc., to Julius P. Knapp, FCC (Mar. 16, 2009, Apr. 10, 2009).

proposed database (the “Database”), as well as our qualifications to serve as administrator of the Database, in Parts II-IV below.

In the event the Commission decides to limit the number of database providers, and/or to mandate a specific architecture to manage the required collection and dissemination of data, Google submits that the Commission should consider an open architecture model within a clearinghouse to provide the data repository functions. A clearinghouse could serve as the aggregated point of entry for protected entity information, and would disseminate that information to multiple TVWS database services providers. While Google is not requesting that the FCC mandate any specific architecture, we believe the clearinghouse model has many benefits, including solving the traditionally burdensome requirement of syncing with multiple parties. Google believes there is and will be a desire among industry participants, including Google, to form such an entity as the market develops, and the Commission should leave flexibility for approved database administrators to partner and organize a clearinghouse service. We discuss a clearinghouse model in Section V below.

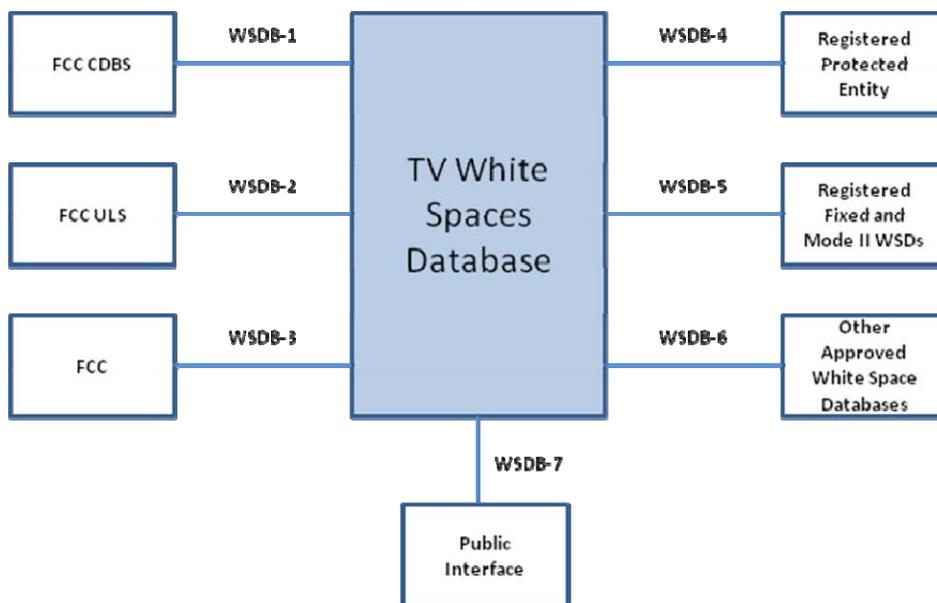
**II. GOOGLE WILL PROVIDE AN END-TO-END SOLUTION THAT ENCOMPASSES ALL REQUIRED FUNCTIONALITIES**

**A. Scope of Functions**

Google proposes to provide all of the basic functional architecture for the Database, including data repository, registration, and determination of available channels/query process. Set forth below is a description of how each of these key functions will operate and interact, including the interfaces and protocols to be used by TV white spaces devices (“WSDs”) to

communicate with the Database. The proposed Database system architecture is depicted in Figure 1.<sup>8</sup>

**Figure 1: Proposed TV White Spaces Database Architecture**



Repository and Registration Functions. In accordance with FCC requirements, the proposed Database will serve as a repository of three primary categories of information needed to execute its geolocation purposes: (1) information about protected facilities, as recorded in FCC databases;<sup>9</sup> (2) information about facilities that are not recorded in FCC databases but are otherwise entitled to protection provided they register with the Database; and (3) identification and location information of registered Fixed and Mode II WSDs. Specifically, information stored in the Database will include:

<sup>8</sup> The Database architecture is based on the requirements set forth in the TV White Spaces Second R&O. Although the architecture is specifically designed to accommodate regulatory requirements established by the Commission, it should be transferable to other regulatory frameworks, including international frameworks.

<sup>9</sup> See 47 C.F.R. § 15.713(b)(1).

- The protected locations and channels of facilities recorded in the Commission’s Consolidated Database System (CDBS) and Universal Licensing System (ULS). Such facilities are limited to digital television (DTV) stations; digital and analog Class A television stations; low power television (LPTV) stations; television translator and booster stations; broadcast auxiliary service (BAS) stations (including receive only sites) other than low power auxiliary stations; private land mobile radio service (PLMRS) stations; commercial mobile radio service (CMRS) stations, and offshore radiotelephone service (ORS) stations.<sup>10</sup> This information will be downloaded via WSDB-1 (for CDBS) and WSDB-2 (for ULS) as shown in Figure 1.
- Locations and channels of facilities that are not recorded in CDBS or ULS but are otherwise entitled to protection and are properly registered with the Database.<sup>11</sup> The registration interface is shown as WSDB-4 in Figure 1. Such “registered protected entity” (RPE) facilities are limited to cable TV headends; TV translator receive sites; and licensed wireless microphones and other low power auxiliary stations.<sup>12</sup>
- The geographic location information, identification information (FCC ID, serial number), and owner/responsible person information of Fixed WSDs,<sup>13</sup> and the geographic location information and identification (FCC ID, serial number) of personal/portable WSDs operating in Mode II.<sup>14</sup> This registration interface is shown as WSDB-5 in Figure 1.

The Database will have three interfaces with the FCC. WSDB-1 and WSDB-2 directly connect the Database to CDBS and ULS, respectively. Google will download the CDBS (which the FCC updates weekly) and ULS (which the FCC updates daily) databases, and also download

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<sup>10</sup> Specifically, the Database will contain the information downloaded from CDBS or ULS, and required by 47 C.F.R. § 15.713(h)(1) for each DTV station, digital and analog Class A, low power, translator and booster station; by 47 C.F.R. § 15.713(h)(2) for each BAS station; by 47 C.F.R. § 15.713(h)(3) for each metropolitan area listed in 47 C.F.R. § 90.303(a); by 47 C.F.R. § 15.713(h)(4) for each protected PLMRS/CMRS base station; and by 47 C.F.R. § 15.713(h)(5) for each region where the ORS operates.

<sup>11</sup> See 47 C.F.R. §§ 15.713(a)(3), 15.713(b)(2).

<sup>12</sup> Specifically, the Database will contain the information registered as required by 47 C.F.R. § 15.713(h)(6) for each cable TV headend; by 47 C.F.R. § 15.713(h)(7) for each TV translator and low power TV station receive site; and by 47 C.F.R. § 15.713(h)(8) for each low power auxiliary station.

<sup>13</sup> See 47 C.F.R. §§ 15.713(a)(2), 15.713(b)(2)(D), 15.713(f).

<sup>14</sup> See 47 C.F.R. § 15.713(g).

any changes to them on a weekly basis. WSDB-3 is intended to be used for other communications between the Commission and the Database administrator, including notifications from the FCC to respond, when queried by a specific FCC ID or serial number, that no channels are available.<sup>15</sup> Each of the WSDB-1, WSDB-2, and WSDB-3 interfaces will use IP security.

When an RPE, Fixed WSD, or Mode II WSD enrolls with the Database, the Database will prompt the registrant to enter all required location and contact information<sup>16</sup> into the Database using the applicable interface.

#### Query Functions

A core function of the Database is to provide a list of channels available for operation at a registered WSD's location.<sup>17</sup> Upon query by a Fixed or personal/portable Mode II WSD (through WSDB-5), the Database first will establish that the device is registered with the Database,<sup>18</sup> and then determine the available channels at the WSD's location, using the applicable interference protection requirements<sup>19</sup> and the information contained in the Database described above.<sup>20</sup> The Database then will return a list of available channels with allowed power levels to the WSD.<sup>21</sup> Protected contours for TV stations can be calculated based on TV

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<sup>15</sup> See 47 C.F.R. §§ 15.715(j).

<sup>16</sup> See 47 C.F.R. § 15.713.

<sup>17</sup> 47 C.F.R. § 15.713(a)(1).

<sup>18</sup> If the Fixed WSD is not registered, the Database will prompt it to register before returning available channel information.

<sup>19</sup> See 47 C.F.R. § 15.712.

<sup>20</sup> See 47 C.F.R. § 15.713(d)(1).

<sup>21</sup> See 47 C.F.R. §§ 15.715(e), 15.713(e)(1), 15.713(f), 15.713(c)(3).

transmitter parameters obtained from CDBS. The FCC's R-6602 (F-) curves can then be utilized to compute the exact TV station protected contour. Alternatively, FCC contour data (obtained from [http://www.fcc.gov/ftp/Bureaus/MB/Databases/tv\\_service\\_contour\\_data/](http://www.fcc.gov/ftp/Bureaus/MB/Databases/tv_service_contour_data/)) may be utilized to determine TV station protected contours.

Consistent with FCC requirements, the Database will check for proximity of a registered WSD to the Canadian and Mexican borders where operations may be prohibited.<sup>22</sup> In addition, as noted above, when queried by blacklisted WSDs the Database will return a “no channels available” response.

Database functions will not include resolution of claims of interference from WSDs. Only the Commission may require that the party responsible for any WSD causing interference take corrective actions or cease operating the device until the interference is resolved.<sup>23</sup> In the event that a protected entity that is properly registered with the Database or whose facility information is accurately reflected in CDBS or ULS makes a claim of interference to the Commission, Google will provide WSD identifying information upon request by the Commission.<sup>24</sup>

#### **B. Synchronization with Other Databases**

In the event the Commission designates more than one database administrator, Google will cooperate with other administrators to develop a process for databases to provide to one another, on a daily basis, information about registered cable TV headends, TV translator station receive sites, operating sites of wireless microphones and other low power auxiliary stations, and

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<sup>22</sup> 47 C.F.R. §§ 15.712(g), 15.713(d)(1).

<sup>23</sup> See TV White Spaces Second R&O, ¶212.

<sup>24</sup> *Id.*

Fixed WSDs.<sup>25</sup> We anticipate that this process ultimately will include a common interface among all TVWS database administrators, indicated as WSDB-6 in Figure 1.

Google anticipates engaging in a cooperative process with other database administrators to provide an efficient and effective syncing solution. Such a solution would involve each database making available on a set interval (e.g., daily) new, modified, and deleted records that other databases may poll or subscribe to. Each database operator would agree on or publish the data interchange format used to make the information available, and each database would publish its change list and subscribe to or poll other databases for their changes.<sup>26</sup>

We note that the obligation to cooperate in developing a process could have the unintended consequence of delaying database operations if no operations are permitted until such a process is in place, because a single database operator could withhold agreement and thereby prevent all other databases from beginning operations. The Commission should consider measures to preclude this possibility, for example, by requiring that a database operator have a functioning synchronization interface, with reasonable published application programming interface (“API”) specifications, prior to accepting any protected entity registrations and beginning operations. The Commission should reserve the right to audit each database provider to determine that it is providing minimum synchronizing functionality, but should not require that a particular interface be approved or agreed upon with other providers.

### **C. Public Access Interface**

Google believes that as a database manager, it should be able to manage the data for any person interested in finding available TVWS frequencies. Thus, consistent with a core Google

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<sup>25</sup> See 47 C.F.R. §§ 15.715(k), 15.713(b)(2).

<sup>26</sup> Another option would be to utilize a clearinghouse as described in Section V below.

mission of making publicly available information easily searchable, the proposed Database includes a public, automatic interface (shown as WSDB-7 in Figure 1) that would enable anyone to search the Database's non-confidential publicly available information. Making the Database generally accessible to the public will help ensure continued innovation in unlicensed spectrum. Any individual or entity would be able to access and review the data. The public interface would not impact the registration and query functions of the Database, but rather would complement the open and transparent nature of the unlicensed TVWS.

**D. Protecting the Database from Unauthorized Access and Other Security Measures**

The primary tasks of the security design are to ensure that a WSD is receiving accurate channel information from an authorized source, is not able to be spoofed or to receive invalid or altered channel information from someone impersonating a Database Administrator, and to avoid corruption of the operation of the Database in performing its intended functions. With this design, both WSDs and RPEs can be certain that they are communicating with a legitimate database and that information from the database cannot be altered during transmission. WSDs also can determine that they are receiving accurate channel availability information on which to base transmissions. The security design for the Database thus focuses on the Internet-facing interfaces by which RPEs and WSDs communicate with the Database, shown on Figure 1 as WSDB-4 and WSDB-5,<sup>27</sup> and encompasses several distinct mechanisms, discussed below.

**Public Key Infrastructure.** A public key infrastructure ("PKI") scheme will be used to authenticate with the Database. This is the same technology used on the Internet to perform transactions of all types including financial transactions. The database will present a certificate

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<sup>27</sup> We do not address interfaces that do not traverse the public Internet, such as FCC interfaces WSDB-1 and WSDB-2, which may be secured within an IPsec VPN.

signed by a well-known certificate authority. The WSD will be able to use that certificate to validate that it is talking with the database.

**Transport Security.** The interface between a WSD and the Database (WSDB-5), and the interface between an RPE and the Database (WSDB-4) will require transport-layer security to guarantee integrity and authentication of data. Because these interfaces may be defined as HTTP interfaces carrying XML documents, the same security used for the transport of web connections may be reused for the Database. This technology (Transport Layer Security or TLS, formerly referred to as Secure Sockets Layer or SSL) provides authentication, integrity, and confidentiality properties at the transport layer below HTTP. The Database will implement the TLS client and server functionality.

**Device Management.** We refer to the process of establishing an account or signing up with the Database as enrollment. In order to aid the Database's ability to manage enrolled devices, a WSD will support the capability to authenticate itself to the Database through a shared secret. This secret will be established between the WSD and the Database at time of enrollment. The exact process by which the Database and WSD arrive at a shared secret will be at the operational discretion of Google, although a common username and password type of system may be used. This shared secret may then be used to confirm that a device is enrolled with the Database.

Google agrees that industry and the database administrators should determine the appropriate enrollment and device interfaces for their database services. Allowing database administrators to specify a unique protocol for communicating with devices will drive innovation through the creation of a dynamic ecosystem of multiple databases competing to create the best database and receive the most usage.

The Public Notice soliciting TVWS database manager proposals asks “whether and how security methods will be used to verify that Mode I personal/portable devices that rely on another device for their geographic location information have received equipment authorization.”<sup>28</sup> We note that verification that any WSD has received equipment authorization is beyond the scope of TVWS database services contemplated by the Commission in the TV White Spaces Second R&O, and is not required by the rules adopted in that decision.<sup>29</sup> Rather, the Database need only provide available channel information to a fixed device or Mode II personal/portable device that has provided the required information to the Database; the Database has no contact with Mode I operation devices.<sup>30</sup>

**RPE Management.** The Database requires RPEs to enroll prior to providing registration services. As part of the enrollment process, there will be a verification of identity of the RPE and confirmation of contact information. Once validated, a login credential (shared secret) will be issued. The RPE will support the capability to authenticate itself to the Database through a mechanism such as a shared secret or PKI. As with device management, the exact process by which the RPE and Database arrive at a shared secret is at the operational discretion of Google.

**Other Security Measures.** Consistent with its long history of data reliability and a proven track record of high quality data operation, Google plans to implement additional security measures, including:

- Data replication across multiple secure locations to ensure uninterrupted access in the event of natural disaster, accident, or attack.

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<sup>28</sup> See Public Notice, DA 09-2749 (Nov. 25, 2009) at 3.

<sup>29</sup> See ET Docket No. 04-186, *Ex Parte* Letter from Richard S. Whitt, Google Inc., to Julius P. Knapp, FCC (Sept. 18, 2009).

<sup>30</sup> See 47 C.F.R. §§ 15.703(h), 15.713(f), 15.713(g).

- Database on backend server located within a secure Data Center, with limited personnel access.
- Intrusion detection and monitoring systems.
- Anti-malware detection software on file servers and personal computers.
- Denial of Service protections.

**E. Google Will Comply with All Other Applicable Rules**

In addition to compliance with requirements discussed above, Google will comply with all other applicable rules. Specifically, as the Database administrator, we will:

- Make the Database services available to all unlicensed WSD users on a non-discriminatory basis.<sup>31</sup>
- Upon request by the Commission, provide any information contained in the Database, and remove information from the Database.<sup>32</sup>

**III. GOOGLE POSSESSES THE TECHNICAL EXPERTISE TO ADMINISTER THE PROPOSED DATABASE**

Google is a global technology leader focused on improving the ways people connect with information. We have substantial engineering and technical experience and resources, and employ hundreds of engineers and technicians expert in Internet software and database design and engineering.

As noted above, Google has played an active role in this proceeding. Google was a founding member of both the White Spaces Coalition and the White Spaces Database Working Group, both of which have worked extensively with the Office of Engineering and Technology and other Commission staff to establish effective technical parameters for both WSD operation and White Spaces database functions. Consequently, Google has a comprehensive knowledge of

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<sup>31</sup> 47 C.F.R. § 15.715(f).

<sup>32</sup> 47 C.F.R. § 15.713(i).

the technical parameters the Commission has established for the TVWS operations, and is fully prepared to operate a TVWS database consistent with this Proposal.

**IV. GOOGLE WILL FINANCIALLY SUPPORT THE PROPOSED DATABASE FOR A FIVE-YEAR TERM**

Google is a large public company whose financial statements are a matter of public record. Google has sufficient funds and access to capital to develop and operate the proposed Database for a full five-year term.

We intend to operate the Database for a minimum of five years after being designated an administrator, as contemplated by the Commission's rules.<sup>33</sup> In the event we do not complete a five-year term, we will transfer to a successor entity the Database, the IP addresses and URLs used to access the Database, and the list of registered Fixed WSDs, as required by the rules.<sup>34</sup>

The Commission's rules permit TVWS database administrators to charge fees for registering Fixed WSDs and temporary BAS links and providing query services.<sup>35</sup> Consistent with its history of keeping user costs as low (or free) as possible,<sup>36</sup> Google does not plan to implement per-query fees, which burden the user and would discourage database use. If any user fee were to be charged in connection with the Database, it probably would be more reasonable to adopt something akin to per-unit device registration fee. While Google has no current plans to rely on user fees, we will work with the Commission to develop an acceptable business model should it become necessary to do so.

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<sup>33</sup> 47 C.F.R. § 15.715(g).

<sup>34</sup> 47 C.F.R. § 15.715(i).

<sup>35</sup> 47 C.F.R. § 15.714(a).

<sup>36</sup> Google offers many services to the public at no charge, including Gmail, Google Docs, Chrome, and YouTube.

**V. CLEARINGHOUSE MODEL**

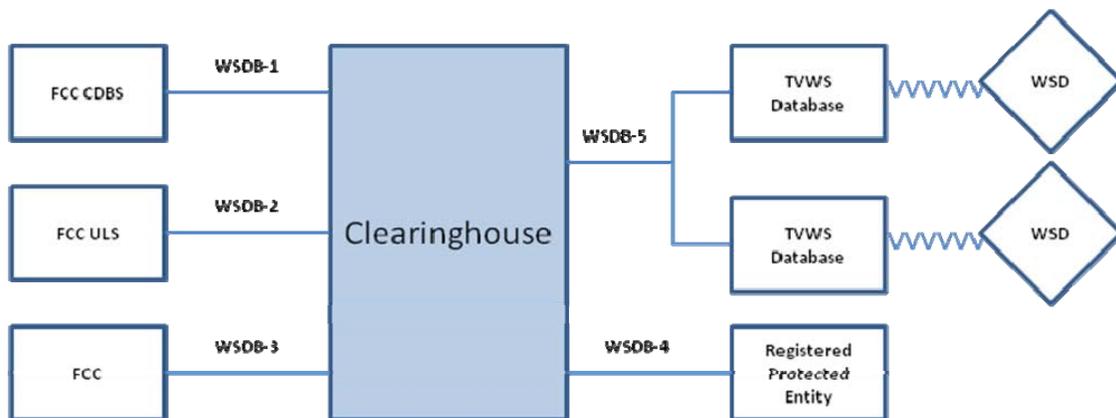
**A. Overview**

This section describes the formation and operation of an independent clearinghouse, functioning as a provider of repository services, to support the successful operation of one or more TVWS geolocation databases. Because such an arrangement may be a highly efficient structure for the provision of TVWS database services, Google asks the Commission to make clear that approved database administrators may cooperate to form voluntary clearinghouse arrangements as described here.

**B. Architecture and Functional Components**

A clearinghouse approach contemplates that a clearinghouse would serve as a single or aggregated point of entry for protected entity information, and disseminate protected information to multiple TVWS database service providers who would provide the core database functions and device interface (enroll devices, take registration information, and respond to queries). One form of clearinghouse system architecture is depicted in Figure 2; the role of each functional component is discussed below.

**Figure 2. Clearinghouse Model Architecture**



The clearinghouse as depicted in Figure 2 would aggregate the Commission data through FCC interfaces WSDB-1, WSDB-2, and WSDB-3. A protected entity would access the clearinghouse through WSDB-4. The clearinghouse also would share and receive updates of RPE data from other clearinghouses and databases, and distribute FCC database and protected entity data to TVWS database providers who access the clearinghouse through interface WSDB-5, and who register devices, calculate channel availability, and respond to queries.

Google believes a clearinghouse model as described herein, with functional separation of data repository services, on the one hand, and registration and query services on the other hand (referred to as TVWS Database Services), would provide substantial benefits, including enabling a competitive ecosystem of databases, managing data integrity, scaling query volume, facilitating greater choice in service providers, and minimizing the burden of syncing with multiple parties. The clearinghouse model as envisioned by Google and others<sup>37</sup> would leave open the possibility of approving quickly other clearinghouse and TVWS Database Service proposals, leading to more robust market forces and promoting innovation and competition in basic and enhanced database services.

### **C. Additional Database Services**

In order to drive innovation, TVWS Database Service providers should be allowed to receive other data inputs that add value to the channel availability information. Rather than providing a closed function that simply responds to queries with mandatory information, a database could perform a variety of functions that add value and utility to querying devices and

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<sup>37</sup> The White Spaces Database Group has worked toward developing pieces of the proposed model, with data repository functions provided by one entity and registration and query services provided by one or more other entities or databases. See ET Docket No. 04-186, *Ex Parte* Letter of Richard S. Whitt, Google Inc., to Julius P. Knapp, FCC (Apr. 10, 2009).

to others. A TVWS Database Service provider could, for example, combine location-based information with detailed information in the database such as transmitter locations, and use propagation algorithms to produce a ranking of available channels. A Database Service provider also could incorporate other information in order to respond to queries with channel information based on current spectrum usage by other unlicensed devices. The ability to rank channels, estimate the likelihood of other users on a channel at a given time, add location-based information, and incorporate other raw data will distinguish database administrators and drive competition and innovation. In order to have the flexibility to provide these useful value-added services, the database must have access to all the fundamental data from the clearinghouse, and not merely a pre-determined listing of available channels. Innovation should not result in misinformation, however, and no TVWS Database should return inaccurate channel availability information that could compromise its core purpose and functionalities.

**D. Security**

Security mechanisms in a clearinghouse model likely would be comparable to those discussed above in connection with Google's proposed Database. However, a clearinghouse could provide a second layer of security, with the clearinghouse acting as a certificate authority to TVWS Database Service providers.

**E. Industry Association Manager**

As stated above, Google encourages the Commission to approve multiple providers and multiple architectures including the clearinghouse architecture. Other parties favor a limited number of providers. While a system with numerous independent clearinghouse/repository service providers potentially brings many benefits, Google acknowledges that it also may present challenges with synchronizing, strain Commission resources in managing multiple points of

contact, and drive innovative database service providers out of the market. Should the Commission conclude that it needs to limit the number of providers, one structure for an open architecture clearinghouse would be the formation of a non-profit industry association to manage the clearinghouse. Google suggests that such a structure should be governed by the following principles:

- A clearinghouse should be managed by a non-profit industry association (“Association”) representing proponents of unlicensed uses of TVWS, similar to entities such as the North American Portability Management LLC (NAPM) and the American Society for Healthcare Engineering (manager of the Wireless Medical Telemetry Service).<sup>38</sup>
- A clearinghouse should allow flexibility in the overall system architecture to avoid technology/market choke points and allow future adaptability, and should be extensible to foreign regulatory models.
- Clearinghouse services should be provided on a non-discriminatory basis.
- A clearinghouse should ensure that incumbents are protected in a manner consistent with the TVWS operating rules.
- A clearinghouse should provide a clearing function for the entire database with ALL non-confidential information. All databases should have equal access to all raw information, and databases should be permitted to perform calculations.
- The clearinghouse should be permitted to authorize additional TVWS databases to participate in the system (e.g., in a yearly FCC-approved fast-track process).
- The clearinghouse should provide common open and non-proprietary non-discriminatory interfaces for any entity that wishes to provide TVWS Database Services.

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<sup>38</sup> The primary function of the Association would be management of a contract with the clearinghouse services vendor, comparable to the role of the NAPM in managing contracts with NeuStar, and potentially funded through member dues. The clearinghouse vendor could be supported by non-discriminatory fees to database providers, and/or by dues, proceeds from device sales, or other method determined by the Association. The exact nature of any fees charged to database providers would be part of the contract negotiations during the vendor selection process between the Association and entities seeking to become the clearinghouse administrator.

**VI. CONCLUSION**

Over the past three years, Google has invested substantial resources toward the development and market success of the TV White Spaces. This unused spectrum has enormous potential to provide a variety of affordable broadband services to millions of Americans, and we are pleased that the Commission, through the database manager proposal process, is coming one step closer to turning that potential into reality. We urge the Commission to make its database manager selection consistent with this proposal.

Respectfully submitted,



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