Attachment 3(a):
Diagram of Database System Architecture

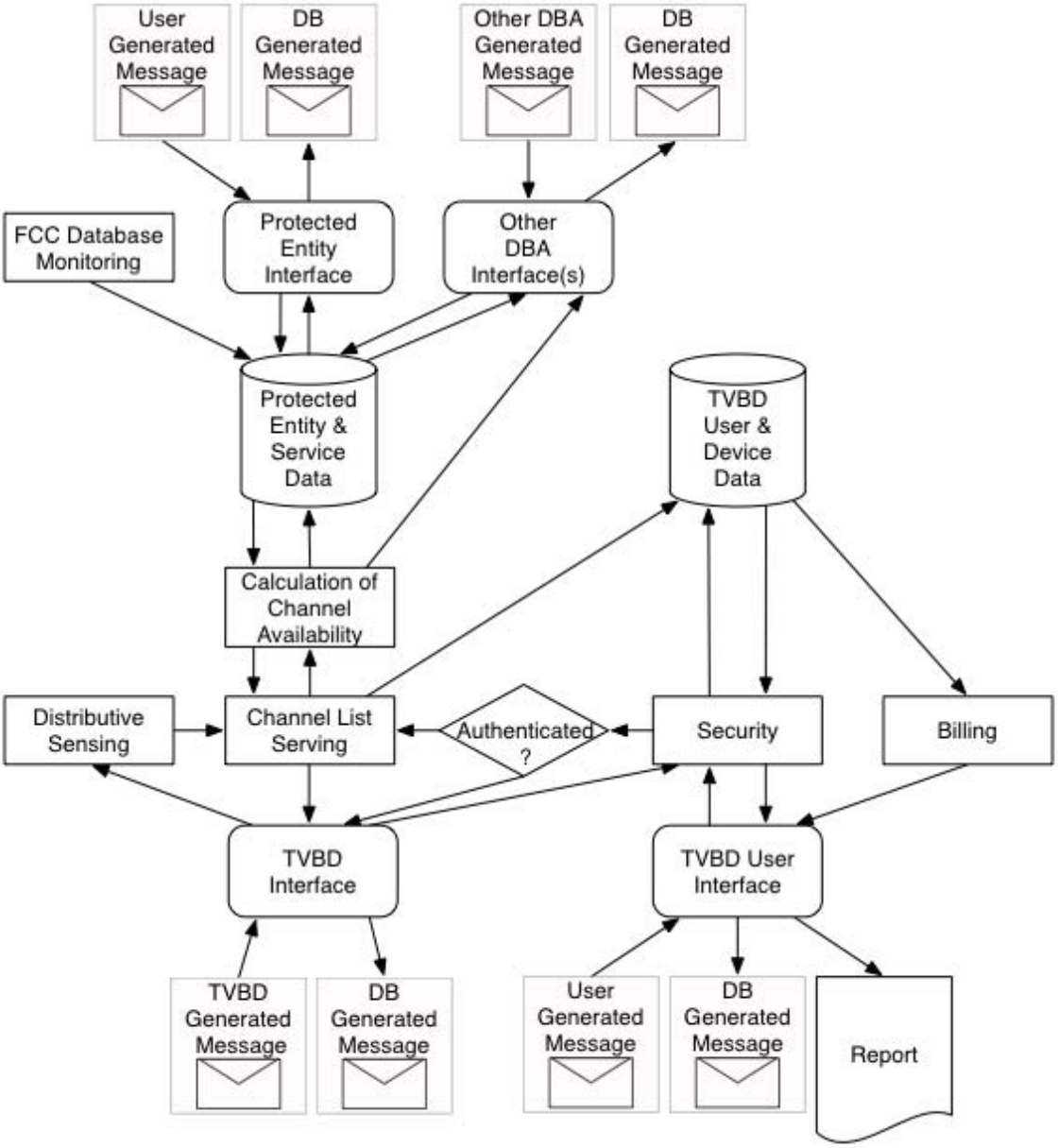

Figure 3(a): General Architecture of WSdb's Database System

Attachment 3(b):
Operation and Interaction of Database Functions

DB-1: DATA REPOSITORY

As described in Attachment 2(a) at DB-1, WSdb's Data Repository will store and maintain (a) all information required by Section 15.713(b) of the FCC's rules, as further detailed in Section 15.713(h) of the FCC's rules ("***Required Data***") and (b) any additional information that WSdb believes could be beneficial to the operation of an efficient and scalable white spaces databases ("***Additional Data***"). Figure DB-1 below highlights the specific components of WSdb's general database system architecture that will be used to implement the Data Repository, regardless of the nature of the information stored and maintained therein. Details relating to the information flow and processing and functional dependencies for both Required Data and Additional Data follow Figure DB-1.

Attachment 3(b):
Operation and Interaction of Database Functions

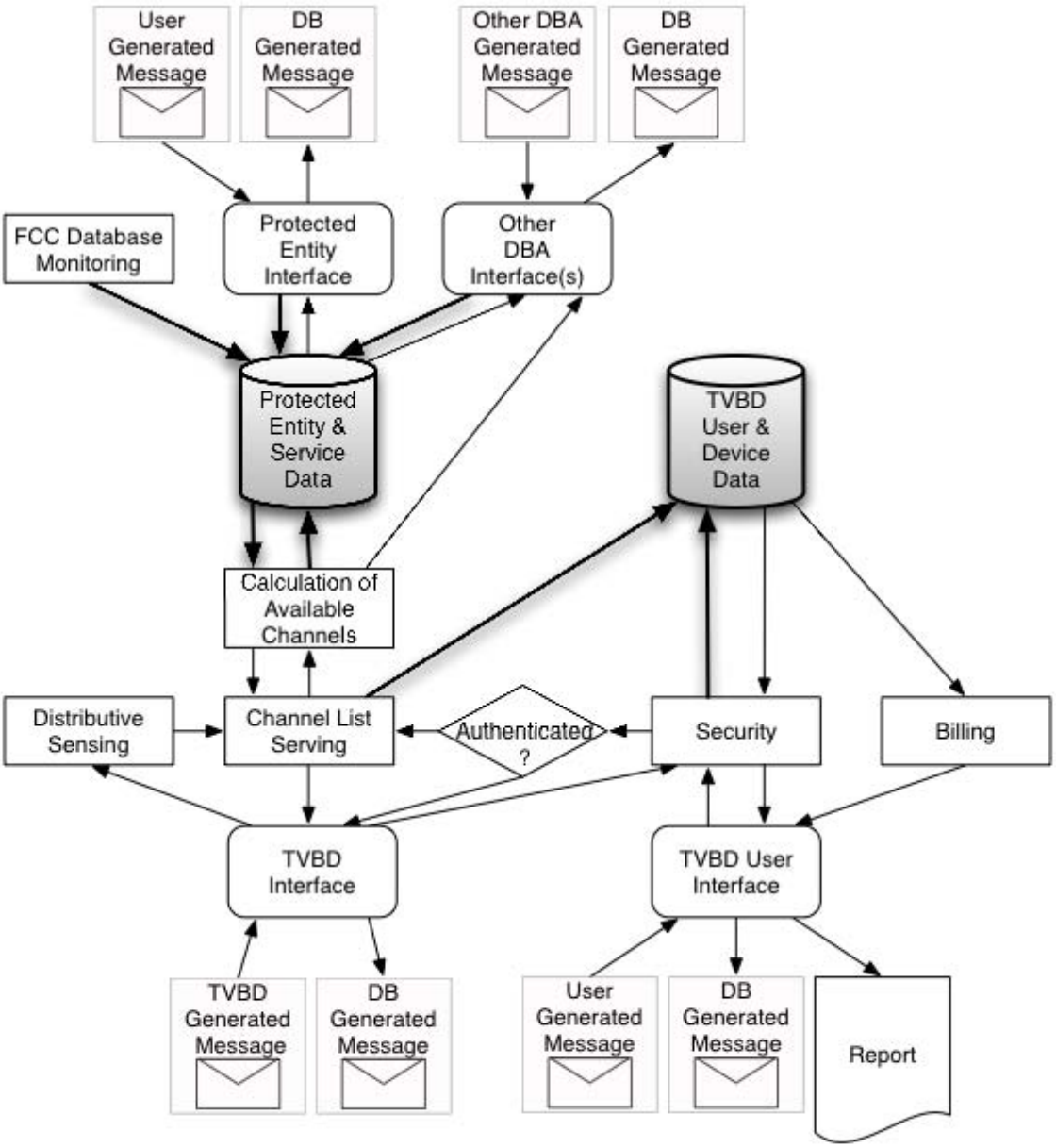

Figure DB-1: Architecture Utilized for Data Repository

Attachment 3(b):
Operation and Interaction of Database Functions

A. Required Data

1. Information Flow and Processing

Required Data will flow into the Data Repository for storage from the following modules identified on Figure DB-1 above: FCC Database Monitoring Interface; Protected Entity Interface; Other DBA Interface(s). The aforementioned interfaces are both automated and web-based. In addition, the Data Repository will store information passed to it by the Specialized Security Module depicted in Figure DB-1. WSdb will obtain information from the aforementioned interfaces and modules as follows:

(1) FCC Database Monitoring Interface. WSdb's database system will monitor the FCC's databases in accordance with Section 15.715(b) of the FCC's rules and will automatically update the Data Repository via the Internet to reflect any changes to such databases.

(2) Protected Entity Interface. The Protected Entity Interface will enable licensees of protected services to enter into the Data Repository information regarding such protected services, as well as to receive any information maintained in the Database Repository regarding such services.

(3) Other DBA Interface(s). The Other DBA Interface will enable synchronization of Required Data with other Authorized Database Administrators to and from the Data Repository.[1]

(4) Specialized Security Module. The Specialized Security module will enable WSdb to authenticate itself to TVBDs before such TVBDs submit FCC identifiers ("***FCC ID***") and serial numbers. Likewise, WSdb will be able to authenticate a TVBD before such a TVBD is provided service from WSdb's database.[2]

If information presented to WSdb's database by the interfaces and Specialized Security Module described above cannot be processed by the Data Repository or other modules of WSdb's system for any reason (*e.g.*, errors, omissions or inconsistencies), such information will be stored

[1] See Attachment 3(b) at DB-5. To the extent authorized by the FCC, WSdb intends to operate the Data Repository described herein even if the FCC ultimately authorizes a single Registrar, together with one or more White Space Service Providers. WSdb believes that operation of the full Data Repository will improve performance of its database system. In this case, WSdb likely would synchronize its Data Repository against data maintained by the single Registrar via an automated download of the shared database repository provided by such single Registrar. See Letter to Julius Knapp from Richard S. Whitt, Google Inc. (April 10, 2009) for definitions of the terms Registrar and White Space Providers as used in this footnote.

[2] See Attachment 3(b) at DB-6. See also Attachment 5(b) (explaining the security methods that WSdb proposes to deploy for its database system).

Attachment 3(b):
Operation and Interaction of Database Functions

temporarily in the Data Repository and will be coded with an internal system message for follow-up by a WSdb staff member. To the extent necessary, WSdb then will contact the appropriate entity or the FCC for clarification of the information.

2. Functional Dependencies

DB-2: Licensed Registration Function
DB-3: Unlicensed Registration Function
DB-5: Synchronization Function

B. Additional Data

1. Information Flow and Processing

Additional Data will flow into the Data Repository for storage from the following interfaces and modules identified on Figure DB-1 above: FCC Database Monitoring; Protected Entity Interface; Other DBA Interface(s); Calculation of Channel Availability Module; Billing Module; and Channel List Serving Module. The aforementioned interfaces and processing modules are both automated and web-based. In addition, the Data Repository will store information from the Specialized Security Module depicted in Figure DB-1.

(1) FCC Database Monitoring Interface. WSdb's database system will monitor the FCC's equipment authorization database for equipment registered in classes TVF (Unlicensed TV Band Fixed Devices) and TVP (Unlicensed TV Band Personal/Portable Device) and will automatically update the Data Repository via the Internet to reflect any changes to such database.[3]

(2) Protected Entity Interface. The Protected Entity Interface will enable an operator of a wireless microphone to provide the requisite information for both Polygon Microphone Registrations and Dynamic Microphone Registrations.[4]

(3) Other DBA Interface(s). The Other DBA Interface will enable synchronization of Additional Data with other Authorized Database Administrators to and from the Data Repository. The specific Additional Data to be shared by WSdb with other Authorized Database Administrators will depend upon the database system implemented by such other Authorized Database Administrators.

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[3] Information culled from the FCC's equipment authorization database will be used to determine the FCC IDs assigned to FCC-approved TVBDs in order to authenticate such TVBDs. See also Attachment 5(b) (explaining the security methods that WSdb proposes to deploy for its database system).

[4] See Attachment 2(a) at DB-2.

Attachment 3(b):
Operation and Interaction of Database Functions

(4) Specialized Security Module. The Specialized Security Module will enable WSdb to authenticate P/P TVBDs before any information regarding such P/P TVBDs is stored in the Data Repository.

(5) Calculation of Channel Availability Module. WSdb will process the contours of protected services in accordance with the requirements set forth in Section 15.712 of the FCC's rules at the time the appropriate information (*e.g.*, geographic coordinates) is presented to the Data Repository, as well as whenever such information is modified.

(6) Channel List Serving Module. The Channel List Serving Module will store logs and/or statistics regarding channel availability queries to the Data Repository for use by other functions of the system, *e.g.*, the need to execute the Billing Function.

2. Functional Dependencies

DB-2: Licensed Registration Function
DB-3: Unlicensed Registration Function
DB-4: Calculation of Channel Availability Function
DB-5: Synchronization Function
DB-7: Channel List Serving Function

DB-2: LICENSED REGISTRATION FUNCTION

As described in Attachment 2(a) at DB-2, WSdb's database system will include a Licensed Registration Function to collect information regarding Unrecorded Licensed Services ("***Collection of Information***") and to store and maintain any such information ("***Storage of Information***"). Figure DB-2 below highlights the specific components of WSdb's general database system architecture that will be used to implement the Licensed Registration Function for both Collection of Information and Storage of Information. Details relating to the information flow and processing and functional dependencies for both the Collection of Information and Storage of Information follow Figure DB-2.

Attachment 3(b):
Operation and Interaction of Database Functions

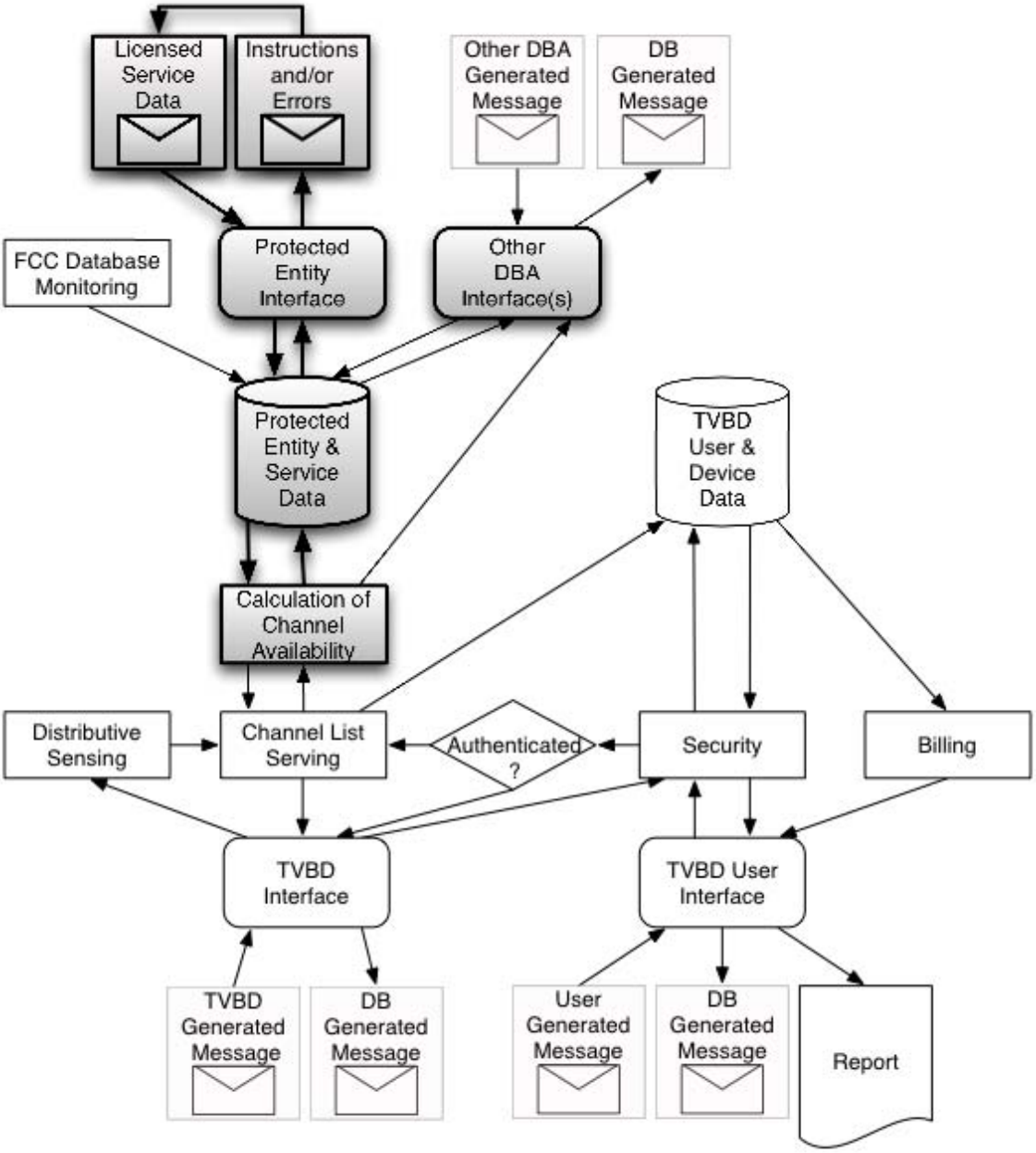

Figure DB-2: Architecture Utilized for Licensed Registration Function

Attachment 3(b):
Operation and Interaction of Database Functions

A. Collection of Information

1. Information Flow and Processing

Information regarding Unrecorded Licensed Services will flow into WSdb's database system from the following interfaces identified on Figure DB-2 above: Protected Entity Interface and Other DBA Interface(s).

(1) Protected Entity Interface. WSdb will provide a secure web interface for operators of protected licensed services not listed in the Commission's databases to register with its database system. Through the Protected Entity Interface, the operator will present information to the system. At the Protected Entity Interface level, the operator will be prompted to correct certain errors and omissions of data (*e.g.*, a letter entered as a geographic coordinate, missing information such as fields for contact information that are not completed by the operator, etc.). The operator will continue to be prompted to correct such errors and omissions until the information provided is deemed sufficiently "clean" to be processed by the Protected Entity Interface.

(2) Other DBA Interface. WSdb also will receive information about Unrecorded Licensed Services from other Authorized Database Administrators through synchronization.[5] WSdb anticipates that such information will be communicated through an automated process such that it will not implement an error detection/correction function at the Other DBA Interface.

Any information collected through the Protected Entity Interface or the Other DBA Interface through the Collection of Information process of the Licensed Registration Function will be maintained as a temporary record in the Data Repository until such records are further processed as described in "Storage of Information" immediately below.

2. Functional Dependencies

DB-1: Data Repository
DB-5: Synchronization Function

[5] It is WSdb's intention to work with all Authorized Database Administrators to integrate into its database design the methods used by such Authorized Database Administrators to make their respective data available to WSdb for synchronization. The exact method(s) for obtaining other Authorized Database Administrators' data is dependent upon a discussion with such other Authorized Database Administrators (as well as any requirements that may be adopted by the FCC) and therefore is still to be determined.

Attachment 3(b):
Operation and Interaction of Database Functions

B. Storage of Information

1. Information Flow and Processing

Temporary records of information received through the Collection of Information process of the Licensed Registration Function will be processed by the Data Repository. Specifically, the Data Repository will attempt to determine whether a temporary record relates to (a) a protected service that already has been registered in WSdb's database ("***Existing Protected Service***") or (b) a protected service that has not yet been registered in WSdb's database ("***New Protected Service***"). The Data Repository will make the determination as to whether a temporary record relates to an Existing Protected Service or a New Protected Service regardless of whether or not the entity that submitted the data indicated the status of the service (*i.e.*., new or existing) to which the data relates.

(1) New Protected Service. If the Data Repository determines that a temporary record relates to a New Protected Service, it will convert the temporary record to a permanent record in the Data Repository. The protected contour of such New Protected Service will be calculated by the Calculation of Channel Availability Function and appended to the permanent record for such New Protected Service.

(2) Existing Protected Service. If the Data Repository determines that a temporary record modifies a permanent record maintained in the Data Repository for an Existing Protected Service, it will copy such temporary record to such permanent record. At this time, the temporary record will be removed from the Data Repository to eliminate duplicate entries for an Existing Protected Service. To the extent necessary, new protected contours will be calculated by the Calculation of Channel Availability Function and appended to the permanent record for Existing Protected Service.

To the extent the Data Repository cannot determine whether a temporary record relates to an Existing Protected Service or a New Protected Service, it will flag such record as an ambiguous service ("***Ambiguous Protected Service Data***"). To the extent permitted by the FCC, WSdb will use Ambiguous Protected Service Data to calculate available channels for TVBDs and will maintain such Ambiguous Protected Service Data in the Data Repository until (a) WSdb receives the information necessary to enable it to classify the services as either an Existing Protected Service or a New Protected Service or (b) the FCC instructs WSdb that the Ambiguous Protected Service Data can be discarded.[6]

[6] Alternatively, WSdb can retain Ambiguous Protected Service Data without including such data in its channel availability calculations.

Attachment 3(b):
Operation and Interaction of Database Functions

2. Functional Dependencies

DB-1: Data Repository
DB-4: Calculation of Channel Availability Function

DB-3: UNLICENSED REGISTRATION FUNCTION

As noted in Attachment 2(a) at DB-3, WSdb will implement an Unlicensed Registration Function, which will operate in the same manner as the Licensed Registration Function described above. Figure DB-3 below highlights the specific components of WSdb's general database system architecture that will be used to implement the Unlicensed Registration Function.

Attachment 3(b):
Operation and Interaction of Database Functions

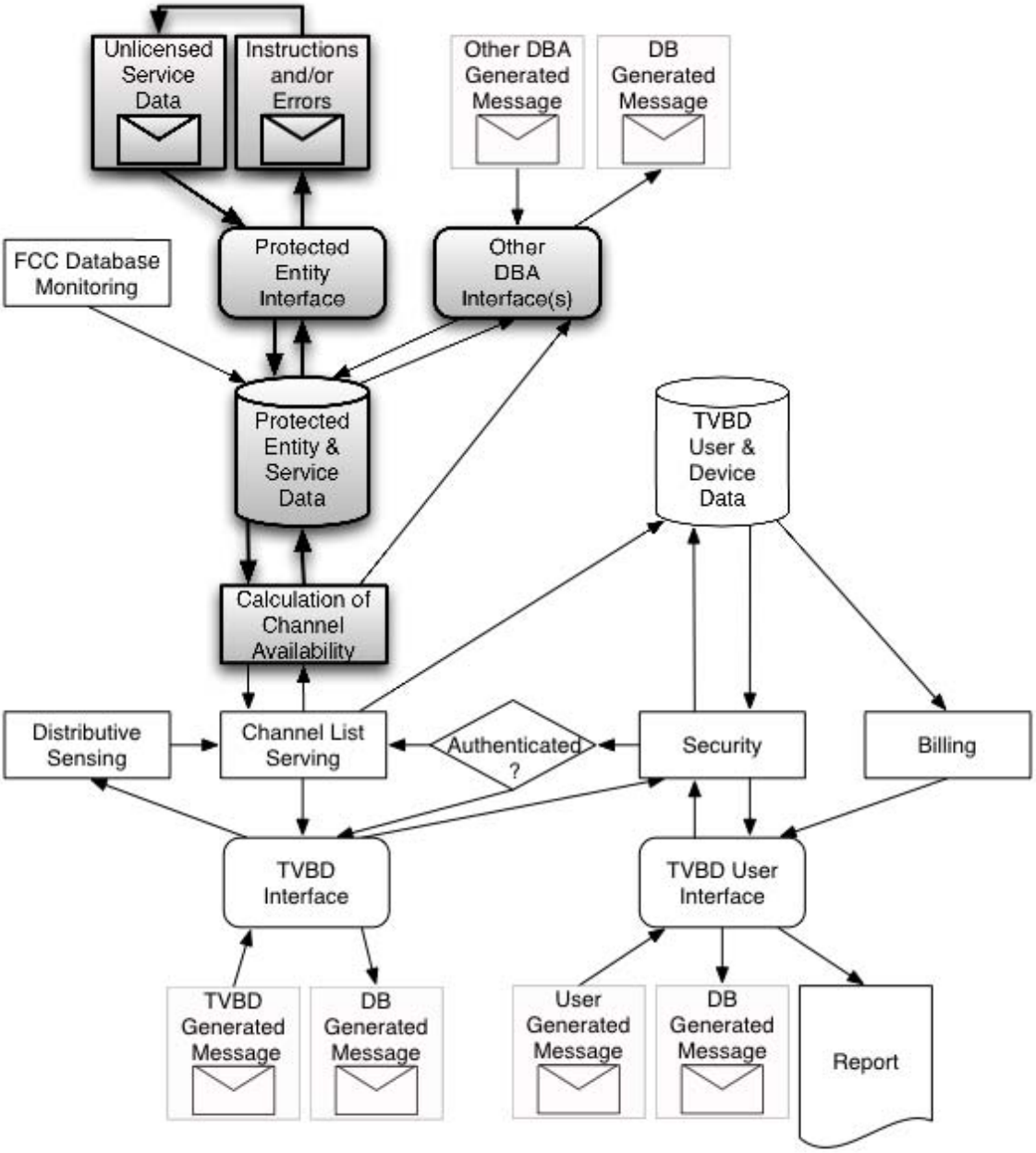

Figure DB-3: Architecture Utilized for Unlicensed Registration Function

A. Information Flow and Processing

The information flow and processing for the Unlicensed Registration Function is the same as described above for the Licensed Registration Function.

Attachment 3(b):
Operation and Interaction of Database Functions

B. Functional Dependencies

The functional dependencies for the Unlicensed Registration Function are the same as described above for the Licensed Registration Function.

DB-4: CALCULATION OF CHANNEL AVAILABILITY FUNCTION

As described in Attachment 2(a) at DB-4, WSdb will implement the Calculation of Channel Availability Function to determine the channels that can be used by TVBDs for the transmission and/or reception of data without causing harmful interference to a protected service in accordance with the interference protection requirements set forth in Section 15.712 of the FCC's rules. The Calculation of Channel Availability Function will operate in Asynchronous Calculation Mode and Real-Time Calculation Mode. Figure DB-4(a) below highlights the specific components of WSdb's general database system architecture that will be used to implement the both modes of the Calculation of Channel Availability Function. Details relating to the information flow and processing and functional dependencies for both the Asynchronous Calculation Mode and the Real-Time Calculation Mode of the Calculation of Channel Availability Function follow Figure DB-4(a).

Attachment 3(b):
Operation and Interaction of Database Functions

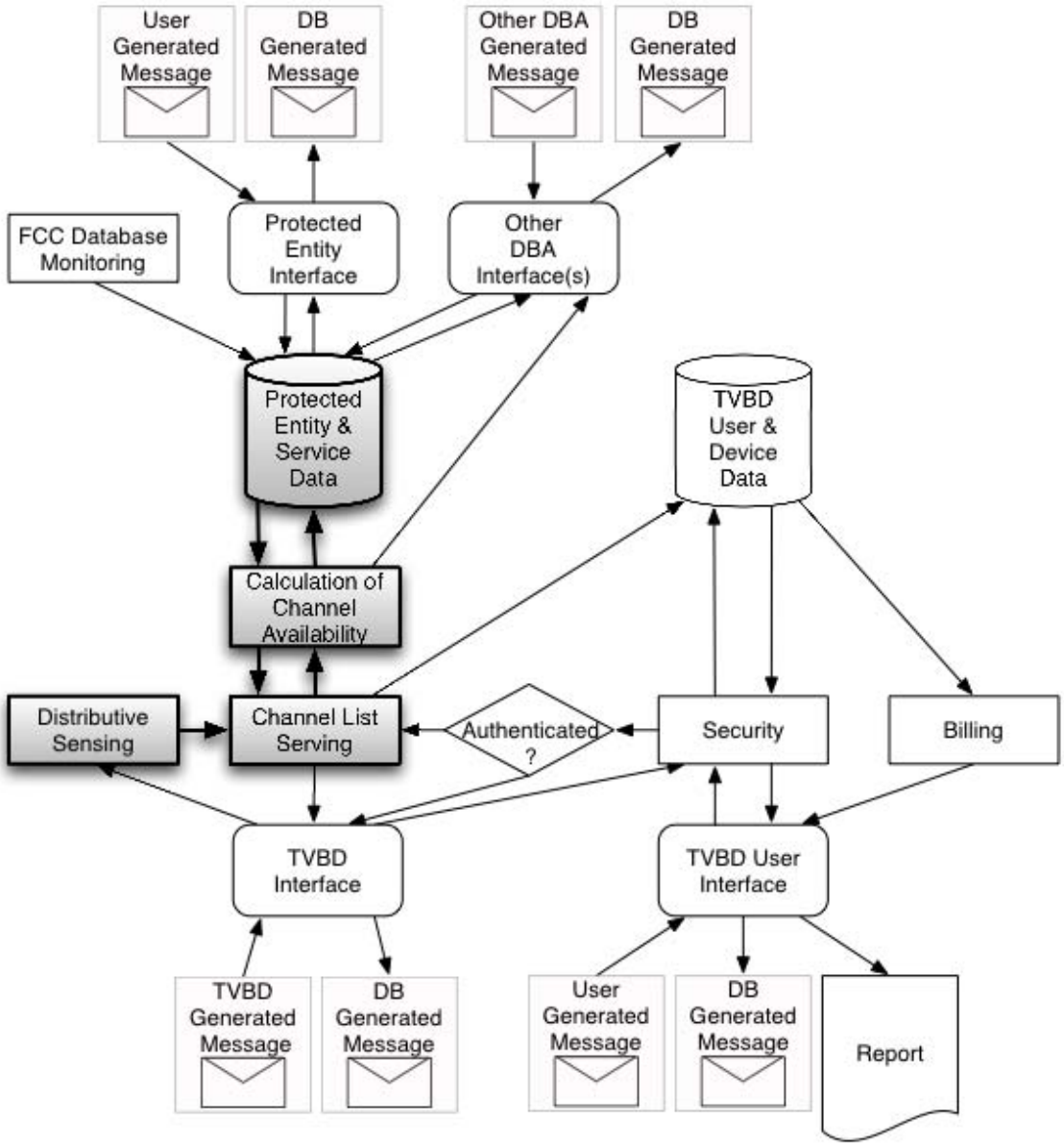

Figure DB-4(a): Architecture Utilized for Calculation of Channel Availability Function

Attachment 3(b):
Operation and Interaction of Database Functions

A. Asynchronous Calculation Mode

1. Information Flow and Processing

The Asynchronous Calculation Mode will calculate channel availability for TVBDs operating in the vicinity of an FCC-protected service. In addition, the Asynchronous Calculation Mode will calculate channel availability for TVBDs operating in the vicinity of a wireless microphone registered in WSdb's database with a Polygon Microphone Registration (to the extent Polygon Microphone Registrations are permitted by the FCC). In each case, to calculate channel availability while in Asynchronous Calculation Mode, the Calculation of Channel Availability Function will access the Data Repository and perform the necessary mathematical calculations through the Calculation of Channel Availability Module.[7]

The Calculation of Channel Availability Function will determine protected contours in accordance with the interference protection requirements set forth in Section 15.712 of the FCC's rules any time (A) a New Protected Service is registered to the Data Repository; (b) a modification of an Existing Protected Service is submitted to the Data Repository; or (c) a Polygon Microphone Registration is submitted to the Data Repository. Protected contours will be calculated by the Calculation of Channel Availability Function as points along 360 azimuths from the geographic location of the protected service. Figure DB-4(b) below depicts the computational complexities involved in calculating channel availability.

[7] WSdb currently anticipates that the calculations executed by the Calculation of Channel Availability Function in Asynchronous Calculation Mode will be performed once per day. However, as testing and development progress, WSdb hopes to modify the Calculation of Channel Availability Function in Asynchronous Calculation Mode to perform real-time calculations.

Attachment 3(b):
Operation and Interaction of Database Functions

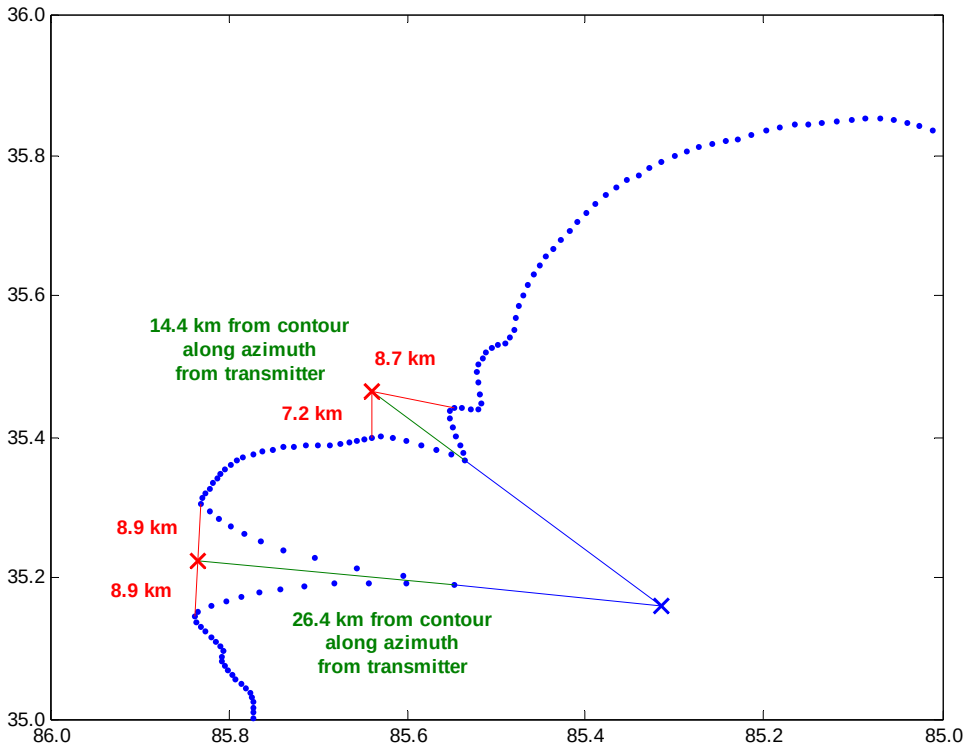

Figure DB-4(b): Computational Complexity of Calculation of Channel Availability

The Calculation of Channel Availability Function will calculate channel availability at a 1 arc second resolution for all permissible channels of operation (as defined by Section 15.707 of the FCC's rules) at each of (A) the three antenna height ranges of fixed TVBDs and (B) the two power levels permitted for P/P TVBDs operating in Mode II on channels 2-51. Specifically, for each 1 arc second × 1 arc second area ("***1 Arc Second Tile***"), the Calculation of Channel Availability Module will determine through mathematical calculations whether all points within the 1 Arc Second Tile are sufficiently spaced from geographic locations for protected services according to the FCC-mandated interference protection requirements. Each 1 Arc Second Tile is then classified by the Calculation of Channel Availability Module as "available" or "unavailable" and stored in the Data Repository for access by the Channel List Serving Module.[8]

[8] If the use of any channel on any portion of a 1 Arc Second Tile by a TVBD would result in impermissible interference to a protected service, then WSdb's database will classify that channel as "unavailable" to all TVBDs for the entire 1 Arc Second Tile.

Attachment 3(b):
Operation and Interaction of Database Functions

2. Functional Dependencies

DB-1: Data Repository
DB-2: Licensed Registration Function
DB-3: Unlicensed Registration Function

B. Real-Time Calculation Mode

1. Information Flow and Processing

As explained in Attachments 2(a) and 3(b), to the extent permitted by the FCC, WSdb's database design will include functions to enable real-time protection of Dynamic Microphones through Dynamic Microphone Registrations and the Distributive Sensing Function. To perform the mathematical calculations necessary for such real-time protection, the Calculation of Channel Availability Function will operate in Real-Time Calculation Mode as follows:

Upon receipt of information regarding either the location of a Dynamic Microphone or the occurrence of a Distributive Sensing Event, the Channel List Serving Function will pass such information to the Calculation of Channel Availability Module.[9] As is the case with Asynchronous Calculation Mode, when the Calculation of Channel Availability Function operates in Real-Time Calculation Mode, it will calculate channel availability at a 1 arc second resolution. While in Real-Time Calculation Mode, the Calculation of Channel Availability Module will calculate the specific 1 Arc Second Tile(s) that are within one kilometer of the location of a Dynamic Microphone or the Distributive Sensing Event. The Calculation of Channel Availability Module will classify any channels within the 1 Arc Second Tile(s) identified by the foregoing calculations as "unavailable" for use by TVBDs. The Calculation of Channel Availability Module then will pass a list of such "unavailable" channels to the Channel List Serving Module to TVBDs that have recently communicated with WSdb's database and are located with the vicinity of a Dynamic Microphone or the Distributive Sensing Event.

2. Functional Dependencies

DB-7: Channel List Serving Function
DB-10: Distributive Sensing Function

[9] These two uses are "piggy-backed" on the available functionality of the Channel List Serving Function.

Attachment 3(b):
Operation and Interaction of Database Functions

DB-5: SYNCHRONIZATION FUNCTION[10]

As described in Attachment 2(a) at DB-5, WSdb intends to enable synchronization with Authorized Database Administrators through a web service that will enable real-time access to (a) Required Information, (b) WSdb Calculated Contours, and (c) Polygon Microphone Registrations ((a)-(c) (collectively, "***Synchronization Data***"). In addition, WSdb intends to enable synchronization with Authorized Database Administrators through a real-time synchronization API that will be included in the Other DBA Interface and enable real-time access to (a) Dynamic Microphone Registrations and (b) Distributive Sensing Events. Figure DB-5 below highlights the specific components of WSdb's general database system architecture that will be used to implement the Synchronization Function. Details relating to the information flow and processing and functional dependencies for the Synchronization Data follow Figure DB-5. Details relating to the information flow and processing and functional dependencies for Dynamic Microphone Registrations and Distributive Sensing Events are set forth thereafter.

[10] This section of Attachment 3(b) describes the manner in which WSdb will enable Authorized Database Administrators to synchronize their respective databases against the information maintained in WSdb's Data Repository. It is WSdb's intention to work with all Authorized Database Administrators to integrate into its database design the methods used by such Authorized Database Administrators to make their respective data available to WSdb for synchronization. The exact method(s) for obtaining other Authorized Database Administrators' data is dependent upon a discussion with such other Authorized Database Administrators (as well as any requirements that may be adopted by the FCC) and therefore is still to be determined.

Attachment 3(b):
Operation and Interaction of Database Functions

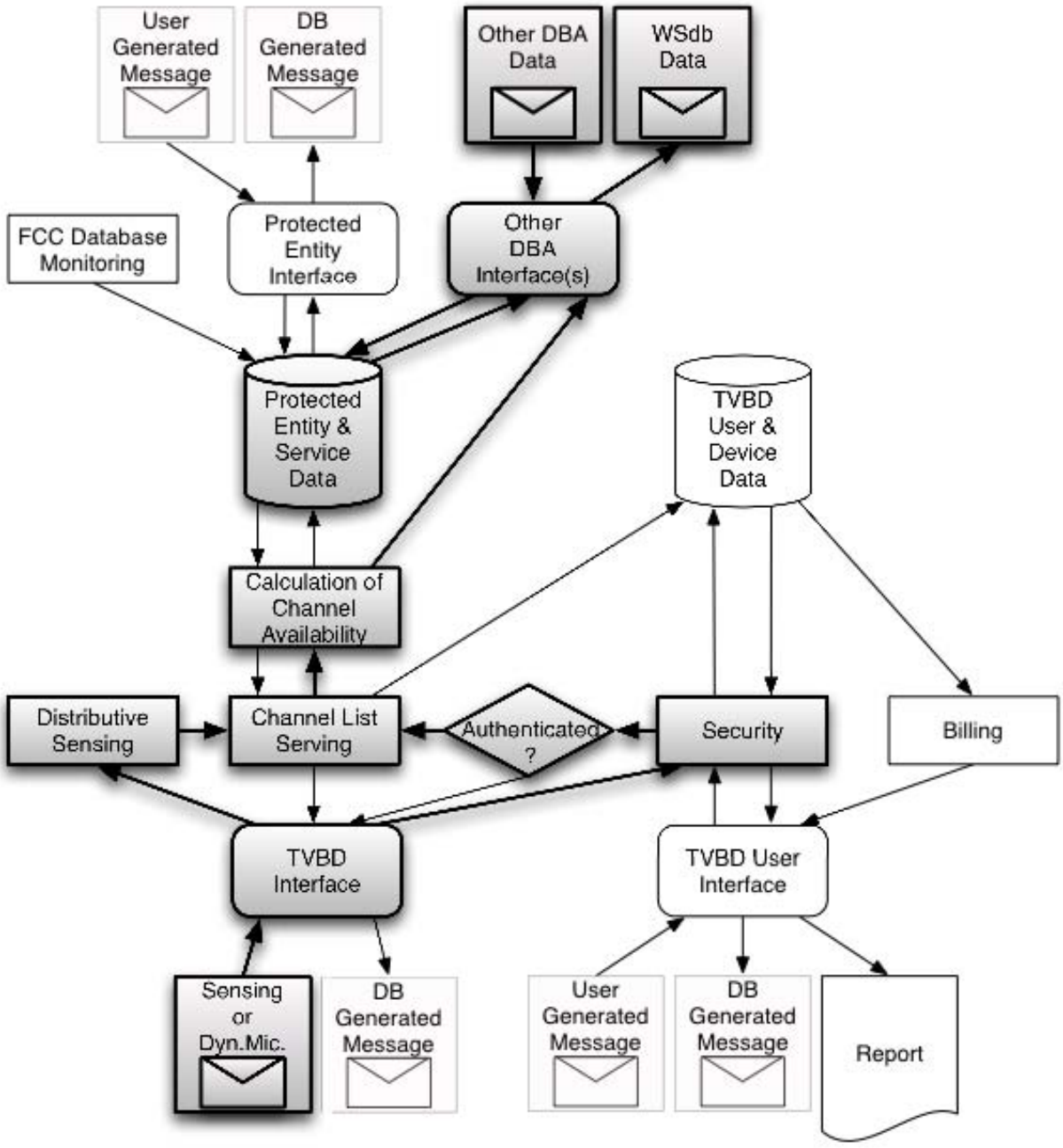

Figure DB-5: Architecture Utilized for Synchronization Function

Attachment 3(b):
Operation and Interaction of Database Functions

A. Synchronization Data

1. Information Flow and Processing

Through WSdb's web service, an Authorized Database Administrator can request access to Synchronization Data maintained in WSdb's Data Repository. Such a request for synchronization will be received by the Other DBA Interface and processed by the Data Repository. Once the request is processed, the Data Repository will then transmit to the requesting Authorized Database Administrator the requested Synchronization Data through the Other DBA Interface. WSdb will enable Authorized Database Administrators to customize its request for Synchronization Data. For example, an Authorized Database Administrator may elect to request (a) all current Synchronization Data, (b) changes to Synchronization Data since the date of the last request by a such Authorized Database Administrator or (c) any subset of Synchronization Data (*e.g.*, Required Information only).

2. Functional Dependencies

DB-1: Data Repository

B. Dynamic Microphone Registrations

1. Information Flow and Processing

WSdb will offer Authorized Database Administrators access to Dynamic Microphone Registrations maintained in WSdb's Data Repository through a real-time synchronization API that will be included in the Other DBA Interface. Specifically, through the Other DBA Interface, Authorized Database Administrators can receive real-time geographic location information for any Dynamic Microphone at the same time as WSdb receives such information, as follows:

(1) An automated device in close proximity to the Dynamic Microphone will transmit real-time information regarding the location of such Dynamic Microphone to the TVBD User Interface.

(2) The TVBD User Interface will receive the locations (through an automated transmit/receive method) and pass such location information to the Specialized Security Module for authentication.

Attachment 3(b):
Operation and Interaction of Database Functions

(3) Once authenticated, the location information will be received by the Channel List Serving Module.[11] The Channel List Serving Module will then pass the location information to the Calculation of Channel Availability Module.

(4) WSdb will proceed to perform calculations through the Calculation of Channel Availability Function to enable protection of the wireless microphone in accordance with the requirements set forth in Section 15.712 of the FCC's rules. Simultaneously, the Calculation of Channel Availability Module will send a copy of the location data to the real-time synchronization API that will be included in the Other DBA Interface.

(5) The Other DBA Interface will distribute the location information to Authorized Database Administrators via a real-time synchronization API that will be included in the Other DBA Interface for use in their respective calculations to protect the Dynamic microphone.

WSdb will provide Authorized Database Administrators with instructions to securely integrate the real-time synchronization API that will be included in the Other DBA Interface into their respective databases.

2. Functional Dependencies

DB-1: Data Repository
DB-4: Calculation of Channel Availability Function
DB-7: Channel List Serving Function

C. Distributive Sensing Events

1. Information Flow and Processing

WSdb will offer Authorized Database Administrators access to Distributed Sensing Events maintained in WSdb's Data Repository through a real-time synchronization API that will be included in the Other DBA Interface. Specifically, through the Other DBA Interface, Authorized Database Administrators can receive the real-time information for Distributed Sensing Events at the same time as WSdb receives such information, as follows:

(1) A TVBD that senses a signal above the detection threshold set forth in Section 15.711(c)(1) of the FCC's rules ("***Sensing TVBD***") will submit a message to the database

[11] If a TVBD is not authenticated, the location transmission will not be processed any further by the system. A record will be created and any necessary mitigation steps will be taken, e.g. if it appears to be a denial of service attack or if it appears to be a malfunctioning, but legitimate, microphone user, different procedures will be initiated.

Attachment 3(b):
Operation and Interaction of Database Functions

describing the Distributed Sensing Event, namely, its own FCC ID, its own serial number and the IP address of the device to which it is connected ("***Sensing Data***"). If a Sensing TVBD is linked to multiple TVBDs, it will submit multiple sensing event messages, one for each such linked TVBD.

(2) The TVBD User Interface will receive the Sensing Data from the Sensing TVBD and pass such Sensing Data to the Specialized Security Module for authentication as well as to the Distributive Sensing Module.[12]

(3) Once the Sensing TVBD has been authenticated, the Sensing Data will be received by the Channel List Serving Module.[13]

(4) The Sensing Data from the authenticated Sensing TVBD will then be forwarded to any Neighbor TVBDs.[14] Simultaneously the Calculation of Channel Availability Module will send a copy of the Sensing Data to the real-time synchronization API that will be included in the Other DBA Interface.

(5) The Other DBA Interface will distribute the information relating to the Distributed Sensing Event to other Authorized Database Administrators via a real-time synchronization API that will be included in the Other DBA Interface for use in serving their respective users to protect the wireless microphone.

WSdb will provide Authorized Database Administrators with instructions to securely integrate the streaming service described above into their respective databases.

2. Functional Dependencies.

DB-1: Data Repository
DB-4: Calculation of Channel Availability Function
DB-7: Channel List Serving Function
DB-10: Distributive Sensing Function

[12] In WSdb's current database design, authentication (through the Specialized Security Module) and the processing of Sensing Data (through the Distributive Sensing Module) will be done in parallel. It is possible, however, that based upon further development and testing of WSdb's database system, the Distributive Sensing Module may operate in a series with the Specialized Security Module.

[13] If the Sensing TVBD cannot be authenticated, the Sensing Data will not be processed any further by WSdb's database system. Instead, a record of the Distributed Sensing Event will be created in the Data Repository and any necessary mitigation steps will be taken.

[14] See Attachment 3 at DB-4 and DB-10. As used herein, a "***Neighbor TVBD***" means any TVBD to which a Sensing TVBD is linked.

Attachment 3(b):
Operation and Interaction of Database Functions

DB-6: FIXED TVBD REGISTRATION FUNCTION

As described in Attachment 2(a) at DB-6, WSdb's database system will include a Fixed TVBD Registration Function to enable the registration of fixed TVBDs. Figure DB-6 below highlights the specific components of WSdb's general database architecture that will be used to implement the Fixed TVBD Registration Function. Details relating to the information flow and processing and functional dependencies for each step of the Fixed TVBD Registration Function follow Figure DB-6.

Attachment 3(b):
Operation and Interaction of Database Functions

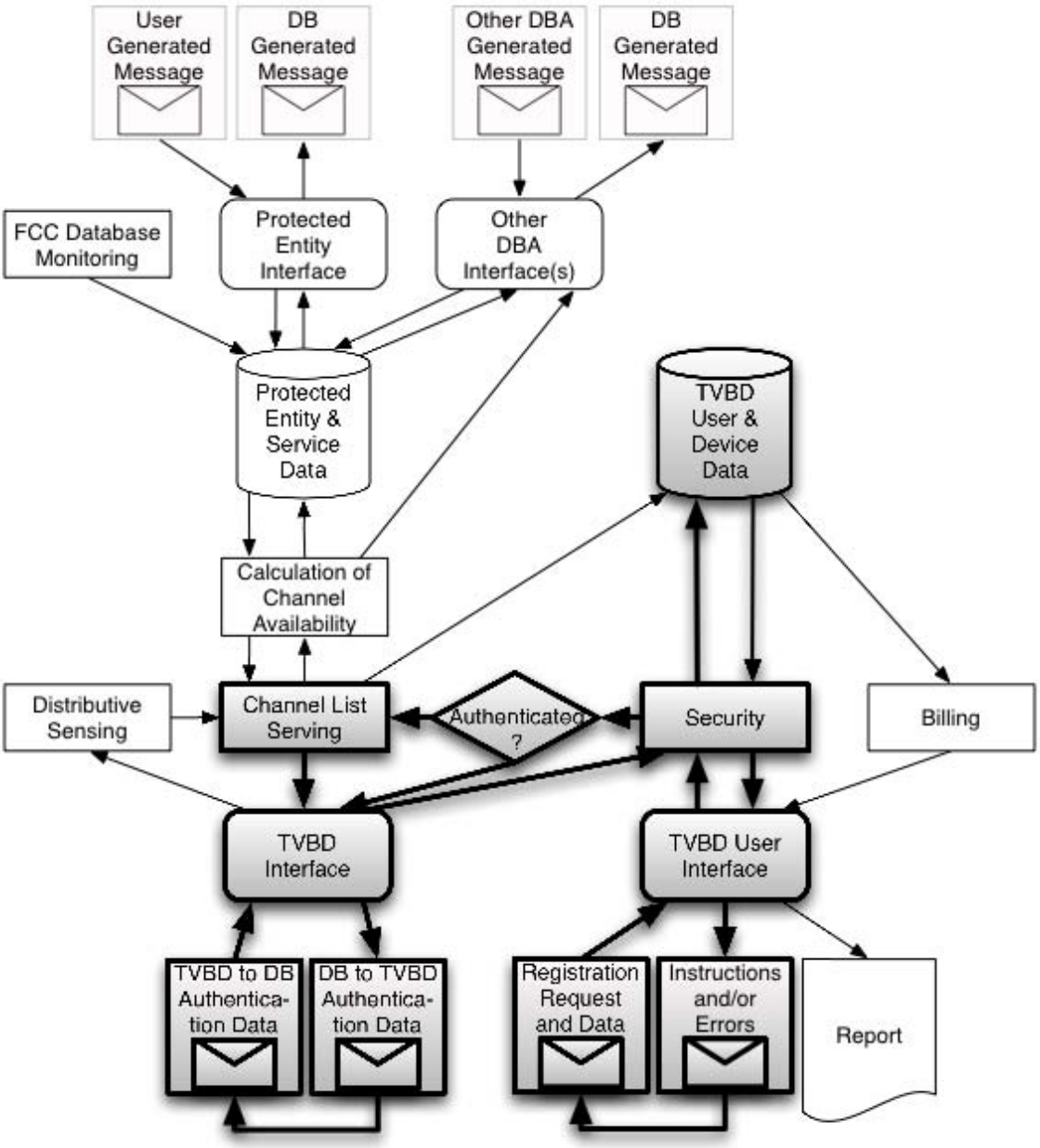

Figure DB-6: Architecture Utilized for Fixed TVBD Registration Function

Attachment 3(b):
Operation and Interaction of Database Functions

A. Information Flow and Processing

The Fixed TVBD Registration Function can be initiated by the owner or installer of a TVBD ("***Installer***").[15] Specifically, the Installer will contact WSdb's database through the TVBD User Interface via a website maintained by WSdb.[16] Subsequent to initiation of the Fixed TVBD Registration Function, the following will occur:

(1) *Authentication of the database to the Fixed TVBD.* To authenticate its database to a fixed TVBD that has initiated the Fixed TVBD Registration Function, WSdb's database first will send a registration initiation message to the IP address for the fixed TVBD as provided by the Installer using the Channel List Serving Module that will be most frequently used to receive and answer queries from TVBDs.[17] WSdb's database then will proceed to authenticate itself to the fixed TVBD using a reliable machine-to-machine authentication method.[18] The TVBD will deem the database authenticated if the evidence provided by the database indicates that the database system contacting the fixed TVBD is owned and operated by WSdb, an authorized DBA.

(2) *Authentication of the fixed TVBD to the database*. Once WSdb's database is authenticated to the TVBD, the TVBD will transmit its FCC ID, serial number to the database and authenticate itself to the database using a reliable machine-to-machine authentication method. A TVBD will be deemed authenticated if (a) such TVBD

[15] As used herein, the term "Installer" refers to the owner or installer of either a fixed or P/P TVBD depending upon the context.

[16] In addition to initiating the Fixed TVBD Registration Function through the TVBD User Interface, WSdb will provide a telephone number for registration of fixed TVBDs. However, the Fixed TVBD Registration Function requires that the fixed TVBD to be registered will have been connected to the Internet before commencing the registration process and that such fixed TVBD therefore has an IP address.

[17] WSdb proposes that manufacturers of TVBDs enable TVBDs to (a) make the TVBDs IP address accessible to the Installer and (b) recognize automatically an incoming message from WSdb as part of the Fixed TVBD Registration Function. However, there could be many alternative methods to support the successful implementation of the Fixed TVBD Registration Function (*e.g.*, a USB port on a fixed TVBD to connect a computer to the fixed TVBD, an Internet connection, etc.). WSdb will make its database and appropriate registration functions (*i.e.*, the Fixed TVBD Registration Function, the P/P TVBD Registration Function available to manufacturers for testing and development.

[18] WSdb will make the source code of its implementation for the TVBD side of the database authentication process available to manufacturers at no charge. In the event that a TVBD manufacturer instead desires to purchase and implement third party machine-to-machine authentication hardware, WSdb will provide a list of vendors and products that manufacturers may use in their TVBDs in order to enable such TVBDs to access WSdb's website.

Attachment 3(b):
Operation and Interaction of Database Functions

possesses a valid FCC ID, *i.e.*, the FCC ID appears in the FCC's equipment authorization database; (b) the TVBD transmits to the database a digital signature that verifies the FCC ID and serial number were stored on the TVBD by the manufacturer; and (c) the manufacturer that stored the digital signature on the TVBD is the same manufacturer as indicated by the three-character grantee code.

(3) *Collection of information; Storage and maintenance of information*. Following authentication, the Fixed TVBD Registration Function will proceed to collect information about the particular fixed TVBD to be registered by providing methods for the Installer to submit to WSdb the information set forth in Section 15.713(f)(3)(D)-(H). Specifically, WSdb will enable Installers to register a password-protected user account via WSdb's website. Using this password-protected account, an Installer can enter the required information regarding its fixed TVBD.[19] The Fixed TVBD Registration Function will store and maintain any information collected from Installers about the registered fixed TVBD.

(4) *Self-cleaning*. Every night, the Fixed TVBD Registration Function will check for fixed TVBDs that have not contacted WSdb's database for three months and will remove any such fixed TVBDs from the Data Repository.

B. Functional Dependencies

DB-1: Data Repository
DB-7: Channel List Serving Function

DB-7: CHANNEL LIST SERVING FUNCTION

As described in Attachment 2(a) at DB-7, WSdb will implement a Channel List Serving Function to enable the provision of a list of available channels to TVBDs either in response to queries from TVBDs ("***Responses to Queries***") or through "push" updates to TVBDs that recently have communicated with WSdb's database ("***Push Updates***"). Figure DB-7 below highlights the specific components of WSdb's general database system architecture that will be used to implement the Channel List Serving Function. Details relating to the information flow and processing and functional dependencies for both Push Updates and Responses to Queries follow Figure DB-7.

[19] The Installer is not required to complete the registration process in a single session but rather may return to the process at any time using the unique session identifier provided to the Installer by WSdb. WSdb will maintain support staff, available by telephone, to assist in the resolution of any difficulties encountered during the registration process. In addition, an Installer can contact WSdb by telephone to provide the required information, which information will be entered into WSdb's database by WSdb's staff through the Fixed TVBD Registration Function.

Attachment 3(b):
Operation and Interaction of Database Functions

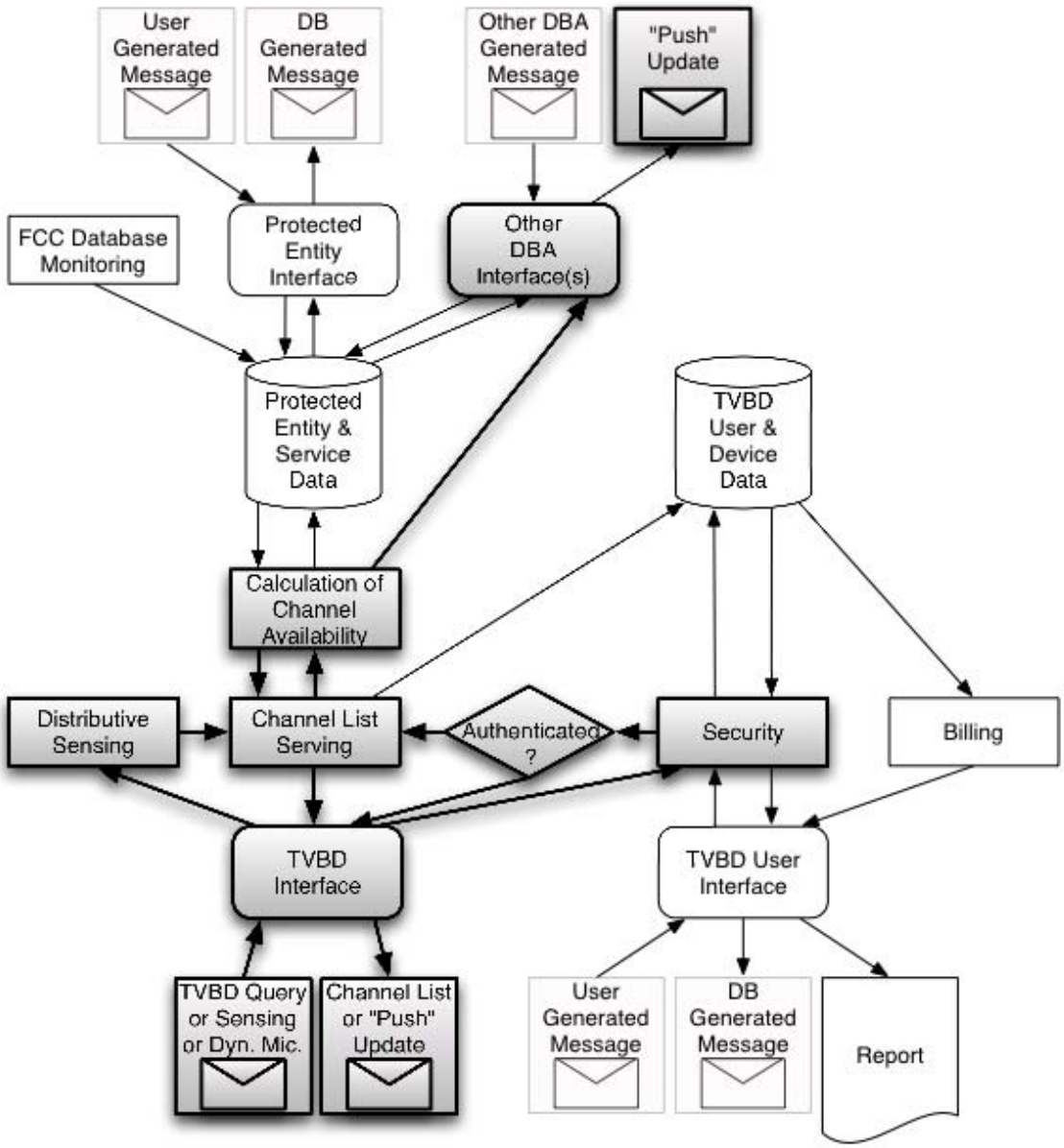

Figure DB-7: Architecture Utilized for Channel List Serving Function

Attachment 3(b):
Operation and Interaction of Database Functions

A. Replies to TVBD Queries

1. Information Flow and Processing.

The Channel List Serving Function will be initiated when a TVBD submits a query requesting a list of available channels ("***Channel List Query***") to WSdb's database system via the TVBD Interface. The TVBD Interface will then pass the Channel List Query to the Specialized Security Module to authenticate the TVBD using the most efficient authentication method available.[20] Upon authentication of the TVBD, the Channel List Query will be forwarded from the Specialized Security Module to the Channel List Serving Module.[21] Based upon information provided to the Channel List Serving Module from the Calculation of Channel Availability Module, the Channel List Serving Module will create a list of available channels for the specific location submitted by the TVBD. The Channel List Serving Module then passes the list of available channels to the TVBD Interface, which, in turn, passes the list to the TVBD that has made the Channel List Query.

2. Functional Dependencies

DB-4: Calculation of Channel Availability Function

B. "Push" Updates

1. Information Flow and Processing

The Channel List Serving Module will retain dynamic lists of previously authenticated TVBDs that have recently communicated with WSdb's database ("***Online TVBDs***"). If WSdb's database system receives information indicating that either the location of a Dynamic Microphone has changed or a Distributed Sensing Event has occurred, the database system will generate a message and pass this message to the Channel List Serving Module for transmission to all Online TVBDs located in the geographic area to which the message relates.

2. Functional Dependencies

DB-4: Calculation of Channel Availability Function
DB-10: Distributive Sensing Function

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[20] The method of authentication used will be based upon the history of communications between the TVBD making the Channel List Query and WSdb's database. See Attachment 5(b) for additional information regarding authentication.

[21] If a TVBD cannot be authenticated, the Specialized Security Module instructs the TVBD Interface to send a failure message (with no channel availability information) to the TVBD. The TVBD can then attempt to re-authenticate with WSdb's database.

Attachment 3(b):
Operation and Interaction of Database Functions

DB-8: FCC REQUEST FUNCTION

As described in Attachment 2(a) at DB-8, WSdb will implement the FCC Request Function to interaction between WSdb and the FCC. Figure DB-8 below highlights the specific components of WSdb's database system architecture that will be used to implement the FCC Request Function. Details relating to the information flow and processing and functional dependencies of the FCC Request Function follow Figure DB-8.

Attachment 3(b):
Operation and Interaction of Database Functions

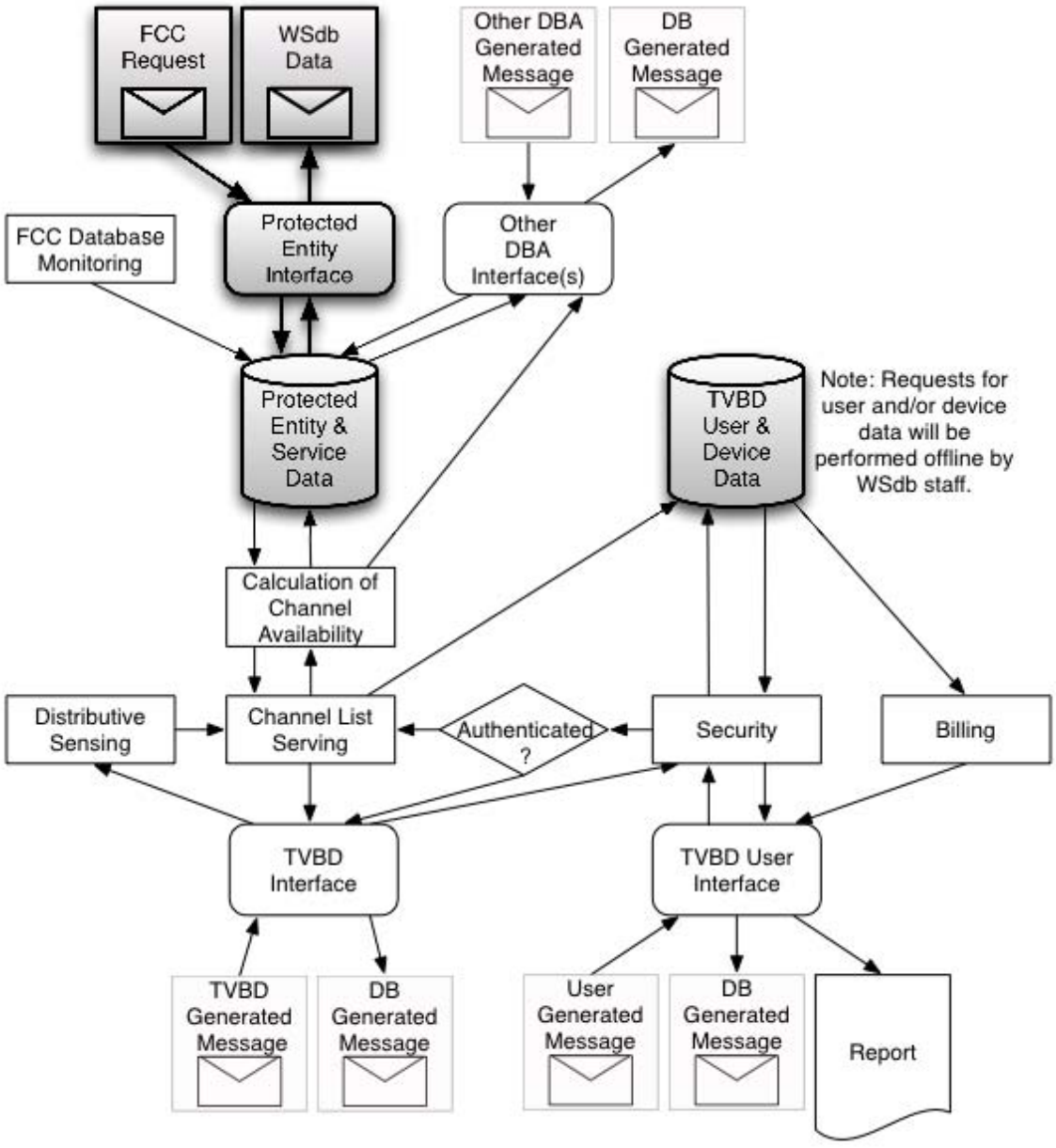

Figure DB-8: Architecture Utilized for FCC Request Function

A. Information Flow and Processing

The FCC Request Function will enable the FCC to use the Protected Entity Interface to access information contained in WSdb's Data Repository, or to request that certain information be

Attachment 3(b):
Operation and Interaction of Database Functions

removed from the Data Repository.[22] After logging into the Protected Entity Interface, the FCC will have access to the information maintained by WSdb relating to protected services and registered TVBDs.[23] In addition, through an interface implemented solely for use by the FCC, WSdb will enable the FCC to specify restrictions on access by TVBDs to certain channels by geography, FCC ID, and/or serial number.

B. Functional Dependencies

DB-1: Data Repository

DB-9: P/P TVBD REGISTRATION FUNCTION

The P/P TVBD Registration Function will operate in the same manner as the Fixed TVBD Registration Function, except that the P/P TVBD Registration Function (a) can be initiated by an Installer as well as by either the manufacturer of a P/P TVBD or a network operator that provides service to a P/P TVBD and (b) will only require the collection of information as specified in Section 15.713(g) of the FCC's rules from P/P TVBDs that operate in Mode II. Figure DB-9 below highlights the specific components of WSdb's general database system architecture that will be used to implement the P/P TVBD Registration Function.

[22] If the FCC contacts WSdb via email or telephone, the WSdb staff member that receives such contact will initiate the FCC Request Function through the Protected Entity Interface in order to respond to the FCC's request as appropriate. In other words, the FCC Request Function will operate in the same manner regardless of the means by which the FCC submits a request for information/action to WSdb.

[23] To the extent necessary, WSdb requests that the FCC clarify that Authorized Database Administrators are not required to share information that may impact a consumer's privacy (*e.g.*, billing-related data).

Attachment 3(b):
Operation and Interaction of Database Functions

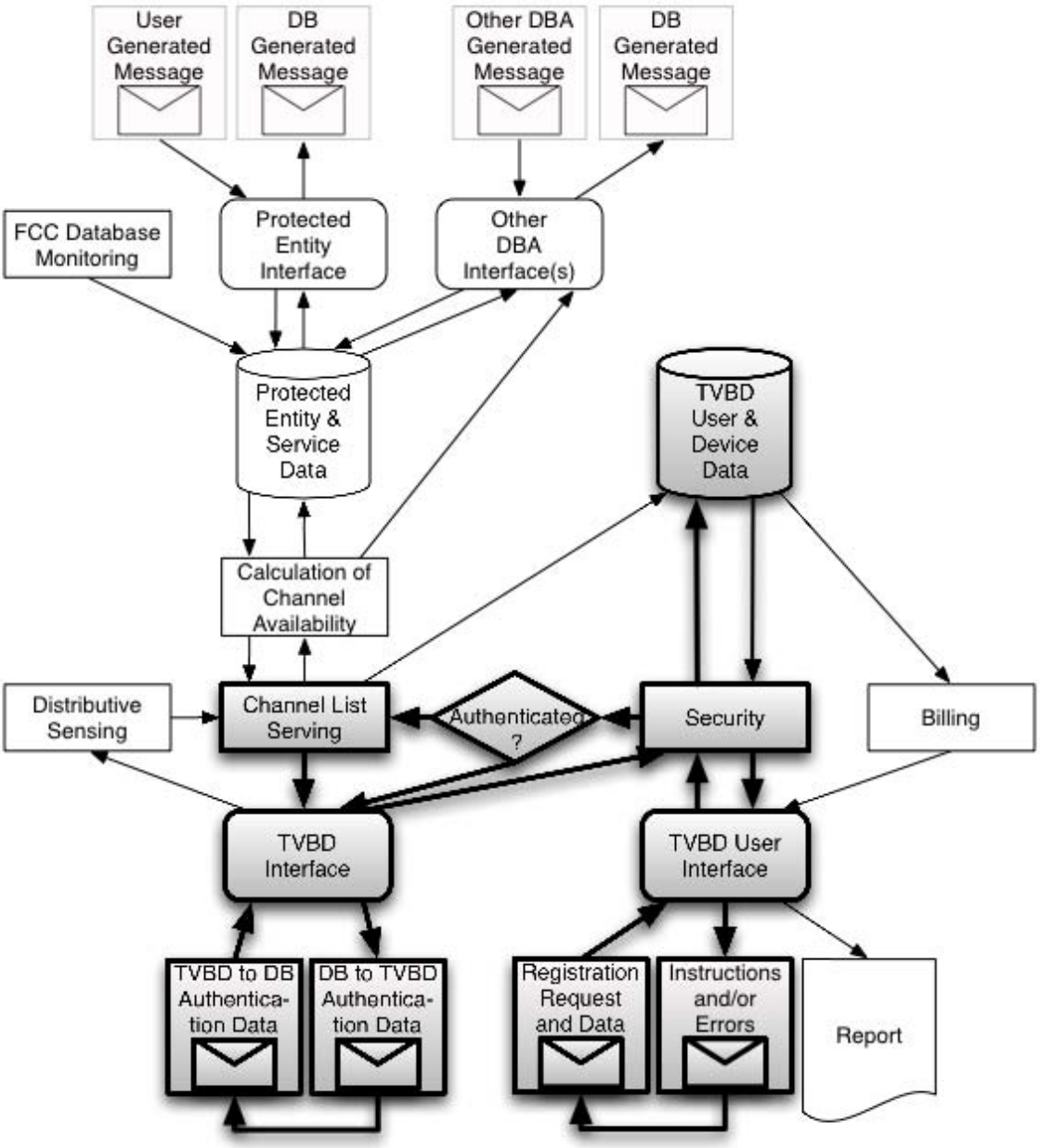

Figure DB-9: Architecture Utilized for P/P TVBD Registration Function

DB-10: DISTRIBUTIVE SENSING

As described in Attachment 2(a) at DB-10, WSdb's proposes to implement the distributive sensing requirement set forth in Section 15.711(c) of the FCC's rules through its

Attachment 3(b):
Operation and Interaction of Database Functions

Distributed Sensing Function. Figure DB-10 below highlights the specific components of WSdb's general database system architecture that will be used to implement the Distributed Sensing Function. Details regarding the information flow and processing and functional dependencies of the Distributed Sensing Function follow Figure DB-10.

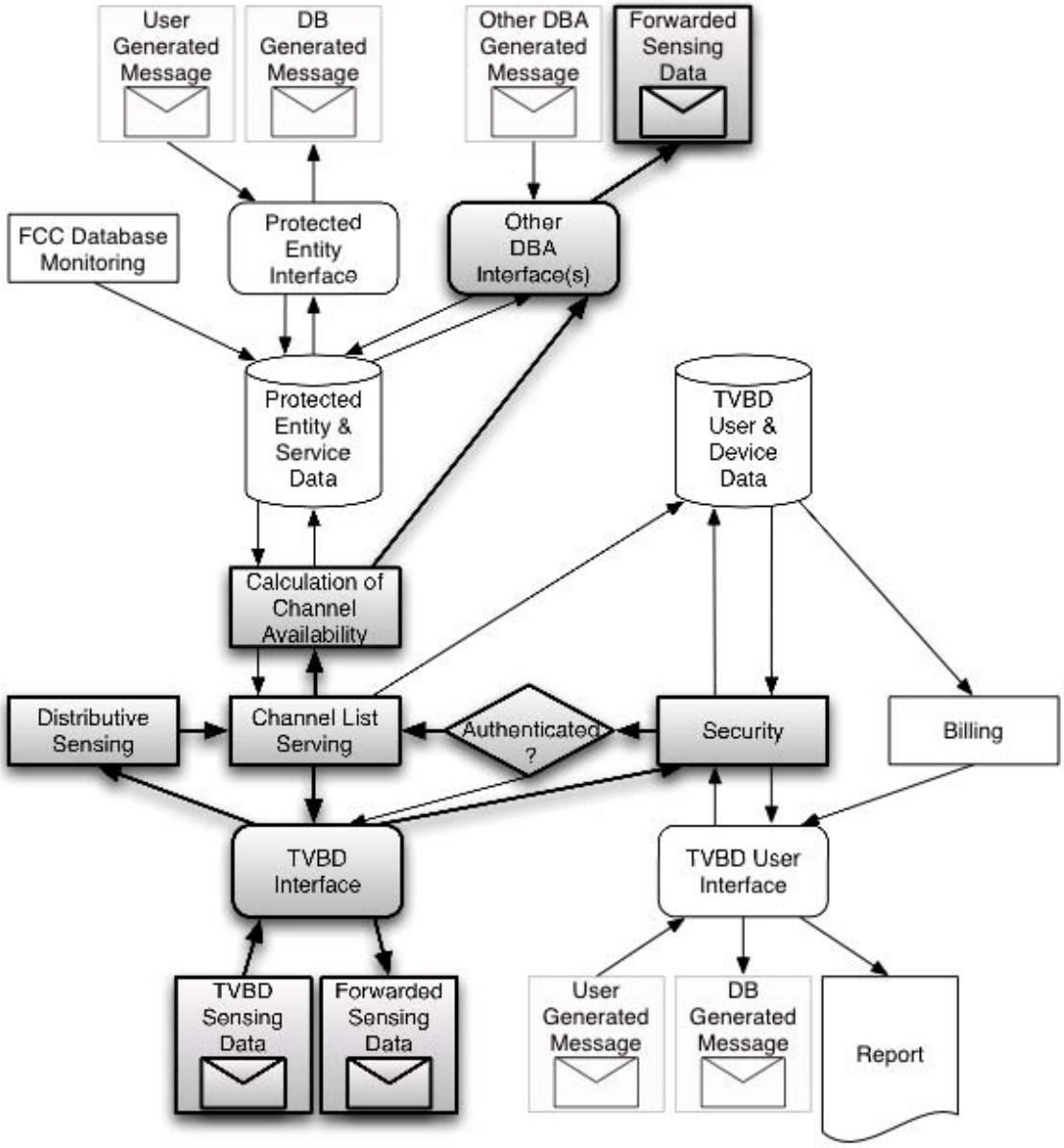

Figure DB-10: Architecture Utilized for Distributive Sensing Function

Attachment 3(b):
Operation and Interaction of Database Functions

A. Information Flow and Processing

The Distributed Sensing Function is initiated when a Sensing TVBD transmits Sensing Data to the TVBD Interface.[24] The TVBD Interface then passes information (including information about the channel on which the sensed signal was above the FCC-defined detection threshold and the IP address for any Neighbor TVBD about the Sensing TVBD to the Specialized Security Module for authentication.[25] Upon authentication of the Sensing TVBD, the Channel Serving Module relays the Sensing Data to the Neighbor TVBD via the Internet. The Channel Serving Module also copies the Sensing Data to the Calculation of Channel Availability Module for distribution via a real-time synchronization API that will be included in the Other DBA Interface to other Authorized Database Administrators as described above.

B. Functional Dependencies

DB-7: Channel Serving Function
DB-5: Synchronization Function
DB-4: Calculation of Available Channels Function

DB-11: BILLING FUNCTION

As set forth in Attachment 2(a) at DB-11, WSdb's Billing Function will maintain logs of database interactions, create/issue bills and support collections for fees for services provided by WSdb. Figure DB-11 below highlights the specific components of WSdb's general database system architecture that will be used to implement the Billing Function. Details relating to the information flow and processing and functional dependencies for the Billing Function follow Figure DB-11.

[24] The Sensing Data need not be transmitted on the channel for which the signal was sensed, nor directly to a Neighbor TVBD (as defined in the text).

[25] See Attachment 3(b) at note 20.

Attachment 3(b):
Operation and Interaction of Database Functions

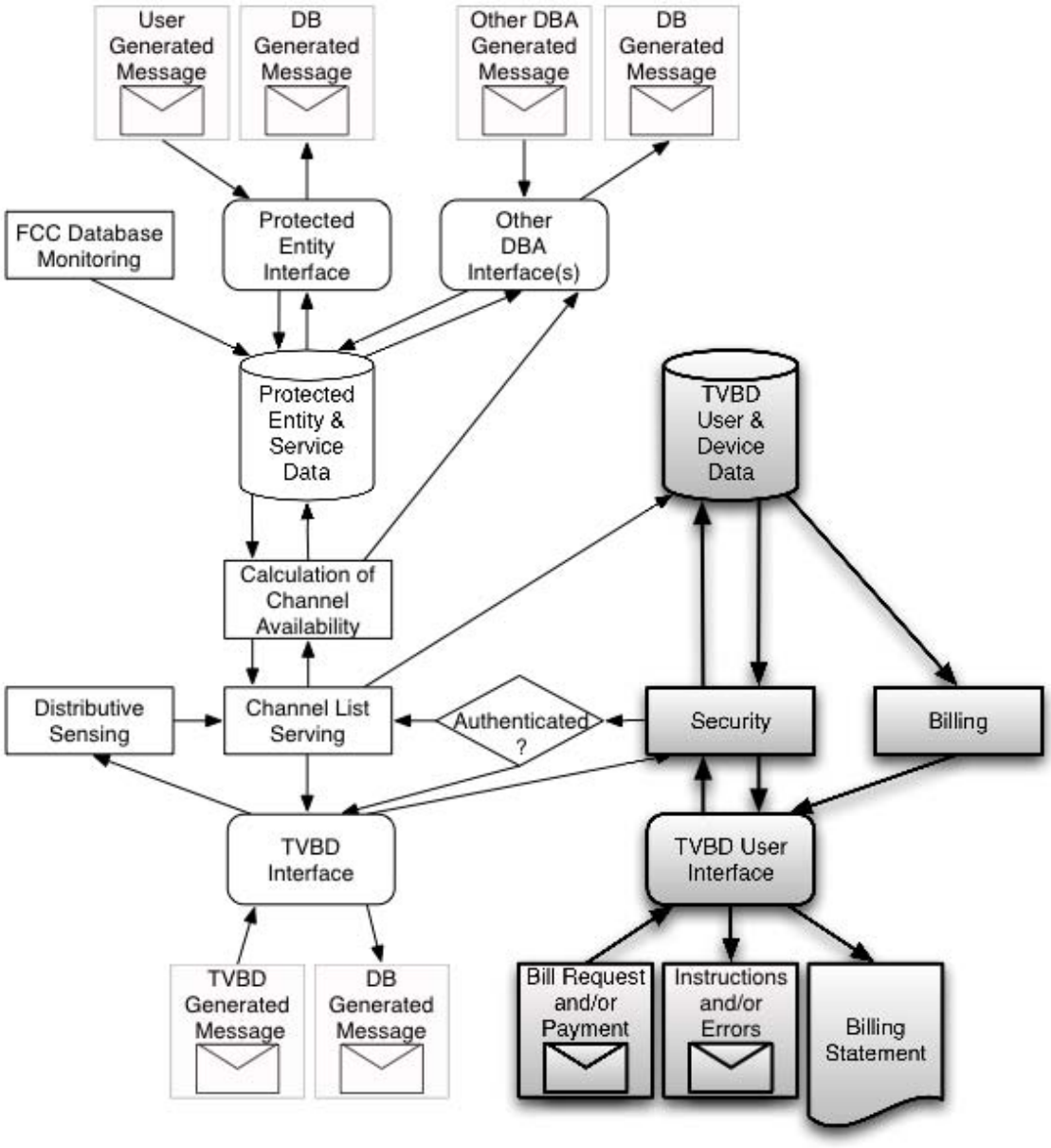

Figure DB-11: Architecture Utilized for Billing Function

A. Information Flow and Processing

To initiate the Billing Function, an individual or entity (*e.g.*, a manufacturer, network operator, or consumer) that wishes to view or pay a bill from WSdb can access WSdb's website to log-in to the secure Billing Module through the TVBD User Interface. The Billing Module will then

Attachment 3(b):
Operation and Interaction of Database Functions

aggregate any relevant information from the Data Repository (*e.g.*, Channel List Queries from a single TVBD or grouped by multiple TVBDs, etc.) and return such information to the TVBD User Interface, where it can be viewed by the requesting party.[26] The Billing Function also will enable a party to pay bills (either automatically or manually) through the TVBD User Interface.

B. Functional Dependencies

DB-1: Data Repository
DB-7: Channel List Serving Function

[26] Complete logs of Channel List Queries will not be available through the TVBD User Interface due to the potentially large size of such logs.