


TV Bands Database Administrator Workshop

March 10, 2010


Office of Engineering and Technology
FCC



Agenda


- Introduction
- Welcome (Knapp)
- Overview (Doshi)
- Database Records - Data Input (Stillwell)
 - FCC Database Access
 - Non-FCC Data Registration
 - Data Error Management
 - Overall Administrator Responsibilities
- Database Access - Data Output (Keltz)
- Industry Presentations
- Determination of Available Channels (Weller)
- Database Coordination and Synchronization (Doshi)
- Database Security and Device Access (Van Tuy)
- Database Trial, Testing and Approval (Hurst)
- Discussions and Questions

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Overview


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Scope and Purpose

- Commission is interested in ensuring consistent, reliable and secure implementation of database functions
- Commission intends to exercise significant oversight and testing
- Administrator workshops are intended to
 - Address implementation issues
 - Provide consistent guidance and clarification of requirements
 - Identify tasks for implementation
 - Establish plan for trials including milestones


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Information Sharing

- Information Sharing
 - New webpage has been established for general information:
www.fcc.gov/oet/whitespace/twppdda.html
 - Additional information including guidelines will be published as finalized on the webpage.
- Inquiries and questions
 - A special email address has been established to submit inquiries, questions and other database related issues:
 - TVWSinfo@fcc.gov


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Interpretations and Guidance

- Interpretations and Guidance
 - Interpretations of general interest will be published on the Laboratory Division Knowledge DataBase (KDB) page at:
 - www.fcc.gov/labhelp
 - General RSS feeds are available for this webpage
 - Commission may seek comments on certain guidance prior to finalizing them. Such draft guidance will be published on the Laboratory Division KDB Draft Guidance Page at:
 - <https://apps.fcc.gov/oetcf/kdb/reports/PublishedDocumentList.cfm>
 - The website will allow for comments and questions to be posted on the draft document – see Draft Publication Moderation Policy on the page
 - Comments can be submitted by any party
 - Parties may subscribe to RSS Feed for this page


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Future Workshop Plans


- Currently plans for three more workshops
 - Numbers may be adjusted based on the implementation issues and trials
 - Expect to be scheduled about four weeks apart
- Future workshop topics
 - Review and address interpretation issues
 - Address questions from implementation considerations
 - Preliminary trial experiences

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Questions/Comments?


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Database Records – Data Input

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FCC Database Team
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James Brown, Rashmi Doshi



TVWS Devices Must Protect TV and Radio Operations

- Wide variety of services to be protected (broadcast TV, land mobile, BAS point-to-point, off-shore radio telephone, wireless microphones, etc.)
- Databases must include records and procedures for protecting those services
- Data records must be obtained from a number of different sources


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Sources of Data Records for Protected Operations

- FCC databases
 - Consolidated Database System (CDBS)
 - Universal Licensing System (ULS)
 - Equipment Authorization (EAS)
 - Others
- Registrations of protected facilities with database administrators
- Specific protection measures defined in the rules


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FCC Records

- CDBS
 - U.S. full power TV stations
 - U.S. TV low power, translator and Class A stations
 - Canadian and Mexican full power TV stations
 - Canadian and Mexican TV low power and TV translator stations
- ULS
 - Broadcast auxiliary fixed links – not all records specify receive sites; can disregard records without receive sites; FCC has procedure for licensees to add receive sites where missing


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Notes on CDBS and ULS Records

- CDBS is updated continuously as changes occur at <http://www.fcc.gov/mb/elecfile.html>; the downloadable files are updated each night at <http://www.fcc.gov/mb/databases/cdbs>
- ULS provides daily incremental updates at <http://wireless.fcc.gov/uls/index.htm?job=transaction&page=daily>; the downloadable complete files are updated weekly on Monday nights at <http://wireless.fcc.gov/uls/index.htm?job=transaction&page=weekly>
- Databases must obtain updates of FCC records at least once per week. If updating from FCC records weekly, recommend Tuesday


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Notes on CDBS and ULS Records

- All CDBS and ULS records are in relational databases with "pipe-delimited" fields
- Information on how to access CDBS and ULS data is provided in "read-me" files available on the respective websites
- Canadian call signs begin with "C"; Mexican call signs begin with "X"; protect Canadian and Mexican stations only on their side of the border
- FCC staff is available to help with understanding the downloadable files – send message to TVWSinfo@fcc.gov


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FCC Records

- **Equipment Authorization System (EAS)**
 - Certified TWWS device (FCC IDs)
 - Database is updated continuously as products are approved
 - Two specific web services have been created to support FCC ID validation:
 - 1) Simple check to see if FCC ID is valid
 - 2) List of approved TV Bands devices over a given period of time
 - Specification for these two services published as a draft [KDB 95346](#)
 - Temporary data populated in EAS with “dummy” devices for testing purposes


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EAS Database

- **Authorization Search**
 - Provides information on all certified products
 - <https://apps.fcc.gov/oetcf/eas/reports/GenericSearch.cfm>
- **Database Elements**
 - FCCID: GGGPPPPPPPPPPPPPP
 - G=Grantee code-Three characters assigned by FCC
 - P=Product code-One to fourteen characters chosen by the applicant
 - Equipment Class
 - Three characters used by FCC to categorize equipment types
 - WSS – White Space Device with sensing-only
 - WSG – White Space Device with geo location

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EAS Database

- Return Data
 - Application Purpose
 - Original equipment
 - Class II Permissive Change
 - Change in FCCID
 - Status
 - GI – Grant issued
 - IP – Permissive change grant issued
 - IM-Modification grant issued
 - Grant Date
 - Grantee
 - Grantee Address
- Web Application Description Language (WADL)
 - <http://apps.fcc.gov/OETLabServices/application.wadl>

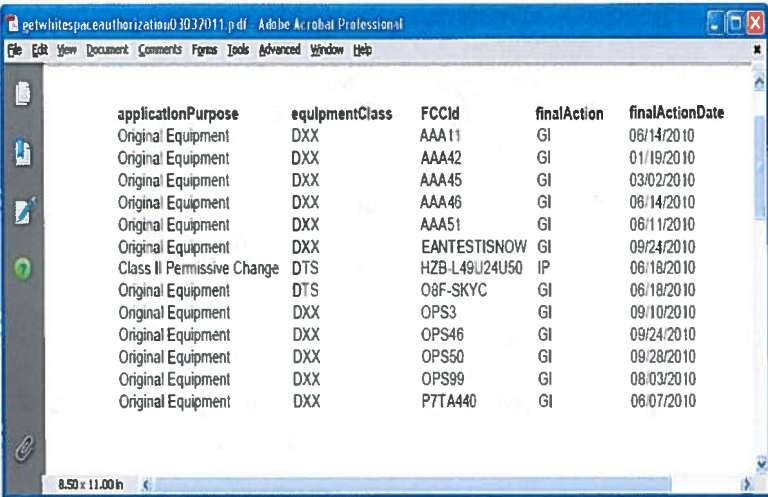
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GetWhiteSpaceAuthorizations Web Service

- getWhitespaceauthorizations
 - Returns list of granted white space authorization over specified date range
 - Production API Call
<http://apps.fcc.gov/OETLabServes/getWhiteSpaceAuthorizations?beginDate=<parameter1>&endDate=<parameter2>>
 - API Call example
<http://apps.fcc.gov/OETLabServices/getWhiteSpaceAuthorizations?beginDate=01-01-2010&endDate=01-01-2011>
 - Set to return all white space equipment classes
 - WSG and WSS current White Space Equipment Classes
 - Begin and End Dates can be modified to search different date range

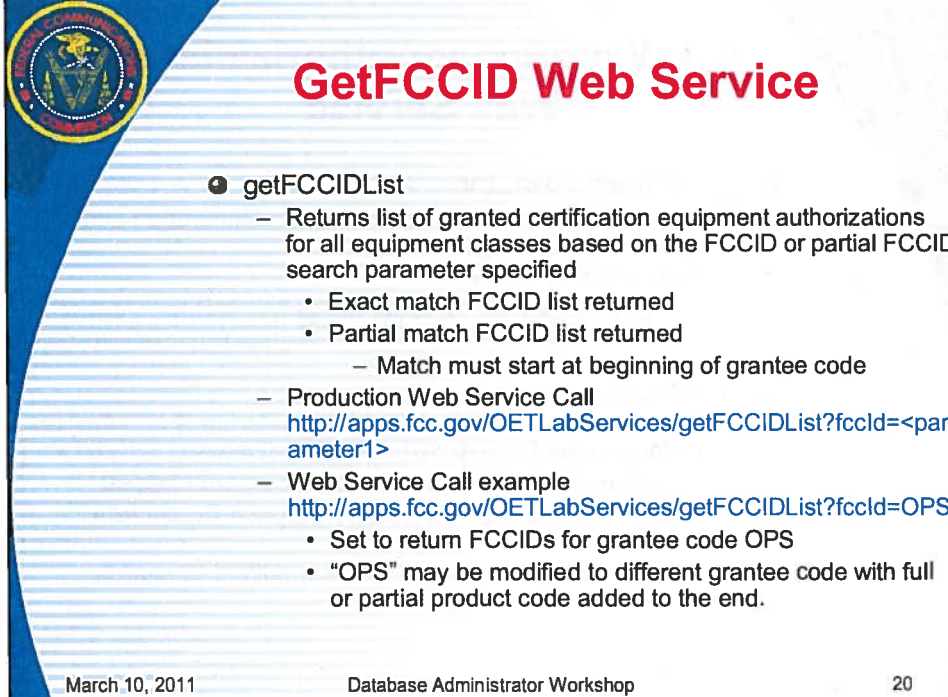
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View of Search Results

applicationPurpose	equipmentClass	FCCId	finalAction	finalActionDate
Original Equipment	DXX	AAA11	GI	06/14/2010
Original Equipment	DXX	AAA42	GI	01/19/2010
Original Equipment	DXX	AAA45	GI	03/02/2010
Original Equipment	DXX	AAA46	GI	06/14/2010
Original Equipment	DXX	AAA51	GI	06/11/2010
Original Equipment	DXX	EANTESTISNOW	GI	09/24/2010
Class II Permissive Change	DTS	HZB-L49U24U50	IP	06/18/2010
Original Equipment	DTS	08F-SKYC	GI	06/18/2010
Original Equipment	DXX	OPS3	GI	09/10/2010
Original Equipment	DXX	OPS46	GI	09/24/2010
Original Equipment	DXX	OPS50	GI	09/28/2010
Original Equipment	DXX	OPS99	GI	08/03/2010
Original Equipment	DXX	P7TA440	GI	06/07/2010


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GetFCCID Web Service

- getFCCIDList
 - Returns list of granted certification equipment authorizations for all equipment classes based on the FCCID or partial FCCID search parameter specified
 - Exact match FCCID list returned
 - Partial match FCCID list returned
 - Match must start at beginning of grantee code
 - Production Web Service Call
<http://apps.fcc.gov/OETLabServices/getFCCIDList?fccid=<parameter1>>
 - Web Service Call example
<http://apps.fcc.gov/OETLabServices/getFCCIDList?fccid=OPS>
 - Set to return FCCIDs for grantee code OPS
 - "OPS" may be modified to different grantee code with full or partial product code added to the end.

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View of Sample Search Results


ge:FCCID03032011.pdf - Adobe Acrobat Professional

File Edit View Document Comments Forms Tools Advanced Window Help

applicantAddress	applicantCity	applicantName	applicant	applicant	applicationPurpose	FCCId	grantDate
7435 Oakland Mills Rd	Columbia	FCC Laboratory Test Grantee	MD	21044	Original Equipment	OPS3	09/10/2010
7435 Oakland Mills Rd	Columbia	FCC Laboratory Test Grantee	MD	21044	Original Equipment	OPS46	09/24/2010
7435 Oakland Mills Rd	Columbia	FCC Laboratory Test Grantee	MD	21044	Original Equipment	OPS50	09/28/2010
7435 Oakland Mills Rd	Columbia	FCC Laboratory Test Grantee	MD	21044	Original Equipment	OPS78	04/26/2010
7435 Oakland Mills Rd	Columbia	FCC Laboratory Test Grantee	MD	21044	Original Equipment	OPS850	10/09/2009
7435 Oakland Mills Rd	Columbia	FCC Laboratory Test Grantee	MD	21044	Class II Permissive Change	OPS855	10/09/2009
7435 Oakland Mills Rd	Columbia	FCC Laboratory Test Grantee	MD	21044	Original Equipment	OPS855	10/09/2009
7435 Oakland Mills Rd	Columbia	FCC Laboratory Test Grantee	MD	21044	Original Equipment	OPS856	10/09/2009
7435 Oakland Mills Rd	Columbia	FCC Laboratory Test Grantee	MD	21044	Original Equipment	OPS88	04/23/2010
7435 Oakland Mills Rd	Columbia	FCC Laboratory Test Grantee	MD	21044	Original Equipment	OPS99	08/03/2010

1100 x 8.50 in


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Other FCC Records

- PLMRS waiver sites: These records are available at: <http://www.fcc.gov/oet/whitespace>
- Any MVPD (cable/satellite TV) and LPTV/TV translator receive sites for which the Commission has granted waivers of the 80 km distance limit (OET will provide such lists on the TVWS website)
- LPTV/TV translator receive channels are available for some stations; are carried on CDBS with the station records; working to complete records; ignore if no channel present
- Event sites with large numbers of wireless microphones/LPAS devices: FCC/MTB is developing a system for collecting these registrations


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Unlicensed Wireless Microphone Registrations Information to be Collected

- Information required by rules
 - Name of wireless microphone holder
 - Contact address, phone & email
 - Coordinates
 - Channel/Number of microphones
 - Venue & Time
- Additional information
 - More complete information on holder & contact
 - Certification regarding use of available channels
 - Attachments


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Unlicensed Wireless Microphone Registrations Registration Process

- Simple process
 - New filings only
 - Some manual processes
- Allow for public input
 - Applications listed on the internet
 - Public can submit pleadings
- No technical modifications to registration


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Unlicensed Wireless Microphone Registrations Integration with TVWS Databases

- Simple process for passing information
- Use consistent data formats
 - Multiple coordinates
 - Time format
- Integrate processes
 - Timing for transfer of data
 - Cancelled registrations
 - Changes to registrations

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Records Obtained Through Registrations with Databases


- MVPDs (cable/satellite) and low power TV/TV translator receive sites (need input channels)
- Sites where licensed wireless microphone/LPAS equipment is used

Database administrators need to develop capabilities for accepting and coordinating registrations for these facilities in accordance with the rules

Those capabilities need to include means for the registrants to identify who, where and how to submit their registrations

Registration features need to be readily available for input by protected entities (DBA website)

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Data Errors

- Errors in FCC data
 - Database administrators not accountable for errors in FCC data
 - Are encouraged to report errors; report to the Media Bureau (CDBS) or Wireless Bureau (ULS)
 - FCC will process corrections


- Errors in registrations with databases
 - Database administrators not accountable for intentional or unintentional misinformation from registrants
 - Must look for and may reject registrations with obvious errors (missing data in critical fields)

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Questions/Comments?

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Database Access – Data Output


Ira Keltz
Office of Engineering and Technology



Public Access To Records

- Databases must provide public access to records
 - Records obtained from FCC databases
 - Fixed TVBD registrations
 - Voluntarily submitted protected entities
 - MVPD receive sites
 - Unlicensed wireless microphones
 - Wireless assist video devices
 - TV translator / Low power receive sites
- Public access not required for information collected to support additional services


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FCC Access To Records

- Databases must provide administrative access to the FCC
 - Application Programming Interface (API)
 - Not publicly available
 - Web based
 - Several levels of access
 - Access to perform tests with TV Band devices
 - Selective ability to test interaction between a TV band device under test and the Database.


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Information To Be Made Available To FCC

- Status information
 - By type
 - By area
 - List of registrants
 - Microphone channel set asides
 - Available channels
 - Audit trails
 - Details of which devices requested access at specific times and locations
- Bulk Downloads
 - Device and registration information
 - Testing
 - Possibility of FCC acting as virtual database administrator (at least initially; internal use only)
 - Internal FCC use only


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Information Provided By FCC

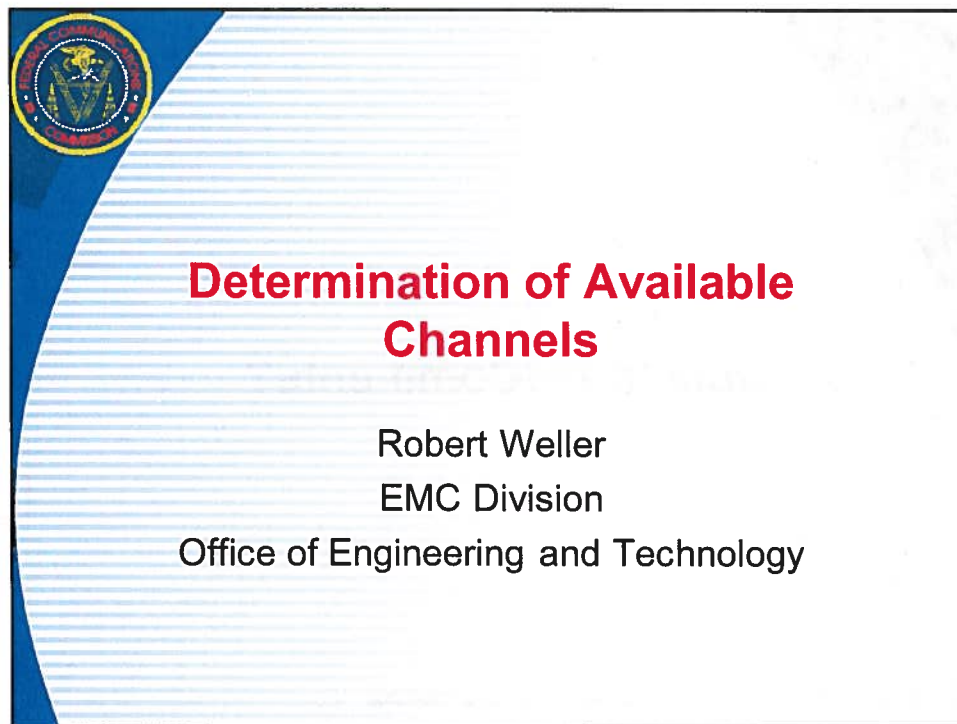
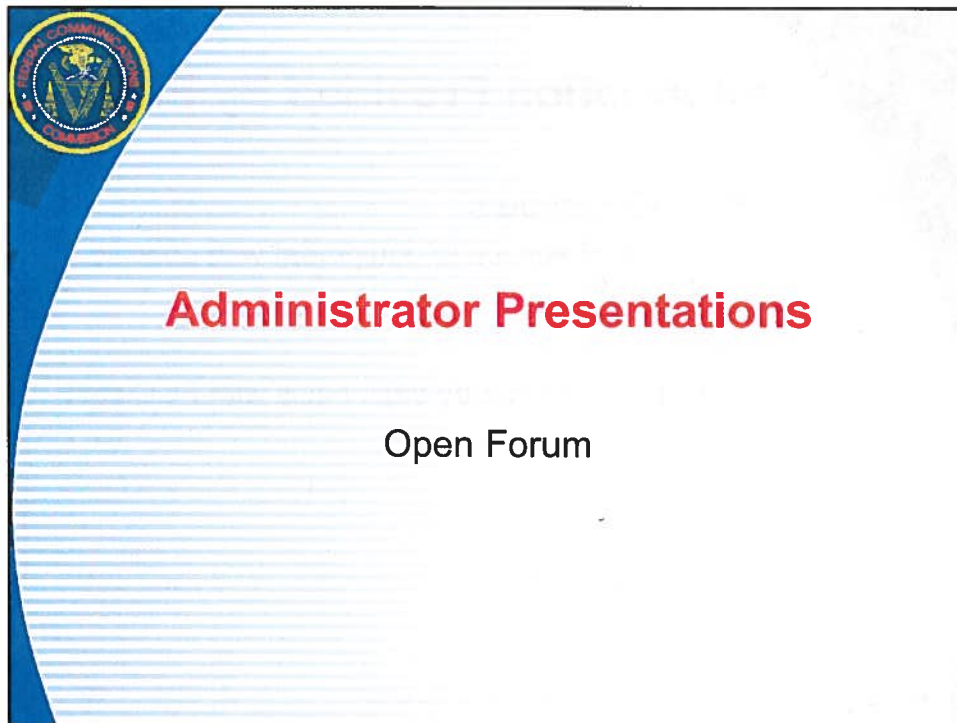
- FCC ID numbers
 - Denial of service to equipment with specific FCC IDs
- Unique cases
 - Handle on case-by-case basis with FCC staff


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Questions/Comments?

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Goal: All db providers provide the same list of channels.

- But, we understand that:
 - Some providers may update FCC data more frequently
 - Direct registrations will have a finite propagation time between db providers
- Such “slight” differences in db content at particular moments are acceptable and are not expected to result in significant interference.

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Protected Service Contours and Distances

- TV/Class A/LPTV (§15.712(a)):
 - 64 dB μ V/m F(50,50) for analog (UHF)
 - 41 dB μ V/m F(50,90) for digital (UHF)
- Minimum Distance Beyond Contour for Fixed Devices:

HAAT,m	Co-Ch sep., km	Adj-Ch sep., km
< 3	6.0	0.10
3 – 10	8.0	0.10
10 – 30	14.4	0.74


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 **Distance Calculation**

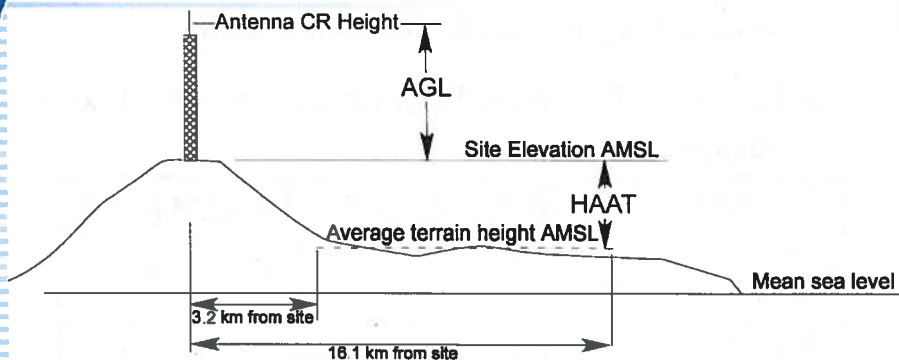
- Do not use method described in §1.958
- All coordinates must be in NAD-83
- Ellipsoidal Earth projected to a plane [1]
 - WGS 84 Ellipsoid model
 - Equatorial (major) axis, $r_e = 6378.137$ km
 - Polar (minor) axis, $r_p = 6356.7523... \text{ km}$
 - NGS "INVERSE" Fortran code available at:
http://www.ngs.noaa.gov/PC_PROD/Inv_Fwd/

[1] Vincenty, "Direct and Inverse Solutions of Geodesics of the Ellipsoid with Application of Nested Equations"

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 **HAAT Calculation**

- Determine AT (AMSL) at 3.2–16.1 km
- Subtract from Site Elevation to obtain HAAT



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Protected Service Contours and Distances

- **Receive Site Protection (CATV, TV Translators, etc.)**
 - 80 / 8 km co-channel, (max. distance from contour)
 - 20 / 2 km adj-channel, (max. distance)

Protected contour

WAAA-TV

80 km, max
±30°

r = 8 km

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Other Protection Distances

Service	Co-ch Dist., km	Adj-ch Dist., km
Land Mobile (reserved)	134	131
Land Mobile (waiver)	54	51
LPAS/Wireless	1.0 (Fixed)	<i>none</i>
Microphones	0.4 (PP)	

ORTS (Channels 15-18): See §74.709(e)
Radio Astronomy Sites (all ch.): 2.4 km
Table Mountain (CO), NRRO (all ch.): 2.4 km

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**ORTS Area Preclusions
(Channels 15 – 18)**



(Areas approximate)


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Special Cases

- Experimental Authorizations: No Protection
- LP Digital Data Service (12 stations):
 - Treat as LPTV [2]
- STAs (Silent or Mod. Technical Operations)
 - Ignore for now
 - Working to ensure technical data are consistently entered into CDBS

[2] See 47 USC §336(h)


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Contour Calculations

- Use §73.684 method with available data from CDBS
- OK to ignore elevation pattern, if not in database
- Example calculator: "Curves"
<http://www.fcc.gov/mb/audio/bickel/archive/fmtvcurves.zip>
- Terrain: Use old USGS 3" DEM, with 0.1-km sampling
ftp://ftp.fcc.gov/pub/Bureaus/Engineering_Technology/Software/terrain.zip


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Bad Data

- If FCC record data are suspect, please let us know!
 - FCC errors will be corrected promptly
 - Licensee errors must be corrected by licensee
 - Please error-check direct registrations
- Meanwhile, continue to use suspected bad data, if possible.


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Interpretations

- Use TVWSinfo@fcc.gov if there are questions about specific situations.
- We will respond, and post interpretations on KDB.
- OET intend to develop channel availability calculator and make available (without support).


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Miscellany

- Records Preservation: db administrators must maintain records of channel lists provided to devices for at least 30 days (including location, FCC ID, Serial #, date/time of request)
- Changes to Methodology: changes to approved channel availability methodology must notify FCC and be tested/approved prior to public use.

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Questions

?


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Database Coordination and Synchronization


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Overall Requirements

- All Databases must permit registration of protected entities whose information is not available from the FCC (section 15.713(b)(2))
- Given multiple administrators the requirements of section 15.715(l) require standardized process for distribution of the collected information to all the other administrators
- Commission must be able to request such registration data


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Implementation Considerations

- Data must be distributed at least on a daily basis, but preferably more often to maintain timely response to demands
- To improve efficiency, the data structure for sharing should be common among all the administrator
 - Specific exchange data structure needs to be defined
- Data dissemination and consumption models should allow for flexible arrangement, network topology – some options:
 - Publish / subscription models
 - Bulk file transfers
 - Database peering


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Data Distribution Considerations


- Administrator “publishing” or “distributing” the data must take reasonable care to:
 - Ensure that the data is consistent
 - Complete as required by the rules
 - Accurate to the extent it can be verified
- Enable audit trails if necessary
- “Subscriber” or “receiving” entity must have the ability to “flag” to the publisher if potential errors in the data
 - If data is further distributed the source entity must be clearly identified

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Questions/Comments?

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Database Security and Device Access


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Types of Security for TVBDs

- Device to device
- Database to device
- Database to database
- Integrity of database content
- Reliability of database


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Communications with TVBDs

- Must prevent corruption of communicated data
- Must prevent interception of data
- Database must verify that TVBD is certified
- Database must have ability to verify that serial number, geographic location are unique to avoid “spoofing”
 - protocols for detecting clone TVBDs with same FCC ID and serial numbers requesting channels.


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Security measures required

- Encryption of communications between
 - TVBDs and databases
 - different administrators' databases
- Coded identification of permissible database(s) for contact
 - TVBDs may contact only authorized databases
 - Device manufacturers and database administrators must verify security method
- Measures to prevent “hacking the database”


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Security measures required (cont.)

- Databases must provide service only to certified devices –
 - list of certified devices available from the FCC Equipment Authorization System (EAS)
- Database must provide functionality to deny channel lists to specific devices and models of devices upon request of the FCC Chief Engineer


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Security methods

- Rules do not require the use of specific technologies
- May use generally accepted methods or proprietary methods
- Must not be susceptible to compromise by an average informed party or stronger


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Security methods (cont.)

- Administrators must provide full description of method and how it provides reliable security
 - Commission will review security methods before giving final approval for a database
 - Commission will request further information as necessary
- Security is ultimately the responsibility of the database administrator


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Database Integrity

- Databases must be protected against unauthorized:
 - Input of data
 - Alteration of records or processing software


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Database reliability

- Provide for continuance of database operation
 - system must not collapse in the event of power loss or systems failure
 - need back-up/duplicate systems in different locations
 - provide for dynamic routing of requests (static IP address)
- Plan for handling a denial of service attack


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Data Retention

- Records Preservation
 - Database administrators must maintain records of channel lists provided to devices for at least 30 days
 - Include location, FCC ID, date/time of request

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Questions/Comments?

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Database Trial, Testing and Approval


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Database Implementation Documentation

- Database Administrator to provide detailed documentation of their implementation to include at minimum:
 - Overall Architecture
 - Procedures for accessing and maintaining FCC Data
 - Procedures for providing access to protected entities
 - Implementation for database access for various parties
 - Test Access Plans
 - Database Coordination procedures
 - Process to provide information to other admin
 - Process to receive information from other parties
 - Database to TVBD Authentication Procedures
 - Pre-equipment authorization procedures
 - Database Security


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Database Trial Period

- Databases are required to undergo a trial period, for not less than 45 days, prior to final acceptance for operation:
 - OET staff to subject each database to non-device based inquiries for lists of channels available at specific locations
 - OET staff will test database using a TVBD device
 - Provide for interested parties to perform database trial inquiries


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Database Interfaces

- ➊ Databases must provide an interface to permit submission of inquiries (inquiries by means that does not involve a TVBD device)
- ➋ Need interface to make inquiries through an actual TVBD device


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Evaluation Criteria

- ➊ Database must provide list of the facilities or reservations protected at the specified location and the channels protected for each such facility or reservation
- ➋ Satisfactory performance under the trial requirement will be deemed satisfied when:
 - the database results consistently reliably match the OET channel results for a test sample of locations selected on a nationwide basis
 - the database update procedures function reliably and regularly
 - the database security provisions are found satisfactory
- ➌ Database has satisfactory performance with an actual TVBD that accesses the database


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Test Sample Locations

- For example, test locations will be selected to verify that database provides correct results for:
 - Digital television stations, and digital and analog Class A TV, low power TV, TV translator and TV booster stations:
 - Protected contour
 - Required separation distance
 - Translator receive sites and cable headends
 - Fixed Broadcast Auxiliary Service (BAS) Links
 - PLMRS/CMRS operations
 - Offshore Radiotelephone Service
 - Low power auxiliary services, including wireless microphones
 - Border areas near Canada and Mexico
 - Radio astronomy services


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Final Approval

- Decision for final approval of TVBD database administrators will take into consideration the following:
 - Review of the procedures for:
 - Registration of protected facilities
 - Coordination with other databases
 - Security measures
 - Satisfactory performance under the database trial period tests


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Measurement Procedures


- OET will publish draft measurement procedures for TVBD:
 - Draft will be made available on OET KDB page
 - <https://apps.fcc.gov/oetcf/kdb/reports/PublishedDocumentList.cfm>
 - Comment period will be provided to allow for public comment
- Device will be required to demonstrate that it works with at least one of the recognized TVBD databases

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Questions/Comments?

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Wrap-Up

- Discussion
- Outstanding Questions – Issues
- Key Action Items
- Plans for Next Meeting

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