TV WHITE SPACE
DEVICES & WIRELESS
MICROPHONES

Presented by
Joe Snelson, CPBE, 8-VSB
TV White Space Devices

• The FCC has authorized a new type of unlicensed wireless service device
• The type of services these devices can provide could range from wireless internet access to control of equipment, toys, “Smartgrid” devices, etc.
• These devices are authorized to operate within the TV band on unused TV channels
• We refer to these devices as TV White Space (TVWS) devices or TV Band Devices (TVBD’s)
• The concern for broadcasters is that these unused TV channels are also used for wireless microphone operations
TV White Space Devices

- This gets further complicated because these channels may also be used by motion picture production companies, churches, theaters and the general public for microphones.
- Unlicensed mic operators will also be allowed to register for certain events to get protection further reducing spectrum availability at those events.
- There is concern if wireless microphones will be able to coexist with TV White Space Devices without interfering with each other. This will impact field news operations for broadcasters!
TV CHANNELS
Review of the TV Band and Channel Line Up

<table>
<thead>
<tr>
<th>VHF</th>
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CHANNEL 37 IS RESERVED FOR RADIO ASTRONOMY AND MEDICAL TELEMETRY ONLY!
IT IS NOT AVAILABLE FOR ANY OTHER USES

VHF Frequencies: 54 – 216 MHz (Ch. 2 – 13)
UHF Frequencies: 470 – 698 MHz (Ch. 14 – 51)
NOTE: Operation above 698 MHz (Ch. 51) is no longer permitted!
**TV CHANNELS**

**Example of Usage Today (Pre-2012)**

<table>
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<th>VHF</th>
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**IMPORTANT NOTE**

- Not all channels are used for TV in every market.
- These unused or available channels are also called “White Spaces.”
- These white spaces are used today for wireless mic, IFB and intercom.
- Note: Wireless mics in this presentation also means IFB & Intercom.

- **Unavailable** - Used TV Channel
- **Available** - Available for wireless mic use
- **Channel 37** is not available.
Wireless Mic Authorizations Typically Define a Radius of Operation

96.6 km Radius of Operation
Unlicensed Wireless Microphones

- Currently authorized to operate on TV channels under a waiver of FCC rules
- Limited to 50 mW maximum power output
- Similar TV station protection requirements for licensed wireless mics found in FCC rules Part 74.802
- Cannot interfere with licensed wireless mics and must accept interference from licensed users
- Must accept interference if used on channels used by TVWS devices
- Strongly consider using the reserved mic channels
TVWS - Device Rule

• FCC rules will now allow unlicensed TVWS devices in the TV band
• TVWS devices must protect TV stations and registered mic locations
• Portable TVWS devices allowed on channels 21 – 51 (except 37). While lower power (up to 100 mW ERP) they are portable and could get next to a wireless mic receiver
• Fixed TVWS devices allowed on channels 2 – 51 (except 3, 4 & 37). While fixed they can operate at much higher power levels (up to 4 Watts ERP!)
TVWS - Device Rule

• 2 channels reserved on each side and closest to channel 37 for use by licensed and unlicensed wireless microphones, IFB or intercom. TVWS devices are prohibited from operating on these channels

• TVWS devices check with a database at least once every 24 hours for channel availability

• There are 10 TVWS Database Administrators that will share their databases. Eight are conditionally approved and two have been fully authorized
TVWS - Device Rule

• The DBA’s service for broadcasters to reserve mic channels is free
• Broadcasters may choose any of the 10 DBA’s to reserve channels
• Even though wireless mic database entries may propagate to other DBA’s virtually “instantaneously” devices are only required to check once every 24 hours unless they move from their location
### TV CHANNELS

#### Before & After

**TV Band & Available Mic Channels Pre 2012**

| VHF | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 |
|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
|     | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 |

**TV Band Mic Sharing with White Space Devices**

- **Unavailable - Used TV Channel**
- **Available for wireless mic use**
- **Licensed & Unlicensed mic use**
- **Available for TVWS Devices**
  - Licensed wireless mics could operate but are subject to interference
- **Channel 37 is not available**

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SBE.
A single TV channel **may be able to support 12 to 20 mics**.

TV CHANNELS

TV Band Mic Sharing with White Space Devices

<table>
<thead>
<tr>
<th>Channel</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 - 36</td>
<td>Available for TVWS Devices</td>
</tr>
<tr>
<td>37</td>
<td>Not available</td>
</tr>
<tr>
<td>38 - 51</td>
<td>Licensed &amp; Unlicensed mic use</td>
</tr>
</tbody>
</table>

Legend:
- **Available for wireless mic use**
- **Unavailable - Used TV Channel**
- **Available for TVWS Devices**
- **Channel 37 is not available**
**TV CHANNELS**
TV Band Mic Sharing with White Space Devices

**CURRENT UHF MICS DO NOT COVER THE ENTIRE UHF TV BAND**
**OPERATION MAY SPAN 2 - 10 TV CHANNELS**

<table>
<thead>
<tr>
<th>Available for wireless mic use</th>
<th>Available for TVWS Devices</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Green] 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26</td>
<td>[White] 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51</td>
</tr>
</tbody>
</table>

- **Unavailable - Used TV Channel**
- **Licensed & Unlicensed mic use**
- **Channel 37 is not available**
TV CHANNELS
TV Band Mic Sharing with White Space Devices

Reserved Mic Channels cannot be used by TVWS devices

- [ ] Unavailable - Used TV Channel
- [ ] Licensed & Unlicensed mic use
- [ ] Available for wireless mic use
- [ ] Available for TVWS Devices
- [ ] Channel 37 is not available
TV CHANNELS
TV Band Mic Sharing with White Space Devices

RESERVED MIC CHANNELS ARE SHARED BY UNLICENSED USERS

- Red: Unavailable - Used TV Channel
- Green: Available for wireless mic use
- Blue: Licensed & Unlicensed mic use
- White: Available for TVWS Devices
- Gray: Channel 37 is not available
TV CHANNELS
TV Band Mic Sharing with White Space Devices

RESERVED MIC CHANNELS WILL DIFFER FROM MARKET TO MARKET

- Unavailable - Used TV Channel
- Available for wireless mic use
- Channel 37 is not available
- Licensed & Unlicensed mic use
- Available for TVWS Devices
TV CHANNELS
TV Band Mic Sharing with White Space Devices

RESERVED MIC CHANNELS MAY DIFFER WITHIN A MARKET

- Unavailable - Used TV Channel
- Licensed & Unlicensed mic use
- Available for wireless mic use
- Available for TVWS Devices
- Channel 37 is not available
OPERATING A MIC ON A WHITE SPACE CHANNEL MAY RESULT IN THE TVWS DEVICE CAUSING INTERFERENCE INTO THE MIC!

Unavailable - Used TV Channel
Licensed & Unlicensed mic use
Available for wireless mic use
Available for TVWS Devices

Channel 37 is not available
## TV CHANNELS

TV Band Mic Sharing with White Space Devices

**SOME CHANNELS ARE NOT AVAILABLE FOR TVWS DEVICES CHANNELS**

**THESE CHANNELS MAY VARY WITHIN A MARKET**

| 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 |

| 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 |

**THESE UNAVAILABLE CHANNELS FOR TVWS COULD BE A GOOD CHOICE FOR IMMEDIATE WIRELESS MIC USAGE**

- **Red**: Unavailable - Used TV Channel
- **Blue**: Licensed & Unlicensed mic use
- **Yellow**: Wireless Mic / No TVWS allowed
- **White**: Available for TVWS Devices
- **Gray**: Channel 37 is not available
For Recurring or Future Events

- Select a TVWS Database Administrator to register a location
- Register TV channel(s) for wireless mics used at studio for 24 hours, 365 days
- Consider registering frequently occupied venues (e.g. city hall). Caution: Overprotection may be rejected!
- Register TV channel(s) for wireless mic use for known future events
For Recurring or Future Events

- Registration reserves a whole TV channel (12 to 20 microphones) not a frequency
- Consider channel sharing with other stations
- Inter-station coordination of mic channels can be of value
- Local SBE frequency coordinator may help to facilitate usage between stations where channels are scarce
Registration Process

• Must provide main station or auxiliary authorization call sign
• Must define a start and end date and time
• May reserve in advance up to 365 days
• May register single point(s) for a 400 meter radius of protection
• May register a quadrilateral for large venues e.g. golf tournament
• Data may pass to all administrators within minutes
• TVWS devices may not check in for 24 hours...unless they move
When Advance Registration Isn’t Possible

- Determine in advance what channels are not used by TVBD’s
- There is a good possibility at least one channel below 21 is available since only fixed TVBD’s are allowed
- Reserved channels are always available but be aware they may be shared with a number of unlicensed users
- Use database administrator tools to determine channels available
- Administrators may provide iPhone tools using geolocation
http://whitespaces.spectrumbridge.com/Main.aspx

TV White Space Database: Protected Entity Registration and Data Portal

Spectrum Bridge's White Space database solution is certified by the FCC.

The Commission's Part 15 rules (47 C.F.R. § 15.701 et seq.) require that unlicensed TV band devices (TVBDs) contact an authorized database system to obtain a list of channels that are authorized for operation (i.e., channels not protected for authorized radio services). Channel use authorizations are determined for a specific location.

Radios authorized and operating as white space devices (TVBDs) are required to provide their geographic location, by means of a secure Internet connection, to a TV band database system authorized by the Commission. The database will return a list of authorized channels available for operation by the TVBD for its reported location. Please contact Spectrum Bridge about our partner program and access to this service.

This web portal can also be used to register certain protected devices and services entitled to protection authorized by the FCC rules. These devices and services include: low power auxiliary stations, including wireless microphones, Multi-Channel Video Programming Distributor (MVPD) receive sites and Broadcast Auxiliary links (cable headend receive sites).

Latest News:
Spectrum Bridge receives approval from FCC to begin TV white space database operations. Read More...

All Protected Entity registrations entered after January 20, 2012 at 11:59 p.m. will be permanent records. Registrations made before this time are part of the FCC’s Public Testing of the Database System's Registration Facilities and will be discarded. Read More...

Search
Locate available TV White Space channels here.
View TV White Space channels and protected areas here.
Locate channels available exclusively for wireless microphones (both licensed and unlicensed) here.

Protected Entity Registration
Register a Temporary Broadcast Auxiliary Service link here.
Register an MVPD Receive Site here.
Register a licensed Low Power Auxiliary Station (wireless microphone) here.

Support
All feedback, comments and responses are welcomed.
Click here for the submission form.
All information required by the FCC to be in the TV bands database is publicly available at http://ftp.tvws.spectrumbridge.com/
Best match: 25 TV 5 Dr, Henderson, NV 89014

<table>
<thead>
<tr>
<th>Channel Number</th>
<th>Frequency Range (MHz)</th>
<th>Availability</th>
<th>Noise Floor (dBm)</th>
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<tbody>
<tr>
<td>36</td>
<td>602-608</td>
<td>Exclusive</td>
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<tr>
<td>38</td>
<td>614-620</td>
<td>Exclusive</td>
<td></td>
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<tr>
<td>5</td>
<td>76-82</td>
<td>Available</td>
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<td>8</td>
<td>180-186</td>
<td>Available</td>
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<td>10</td>
<td>192-198</td>
<td>Available</td>
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<td>12</td>
<td>204-210</td>
<td>Available</td>
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<td>15</td>
<td>476-482</td>
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<td>21</td>
<td>512-518</td>
<td>White Space</td>
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<td>26</td>
<td>542-548</td>
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<td>33</td>
<td>584-590</td>
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<td>39</td>
<td>620-626</td>
<td>White Space</td>
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<td>44</td>
<td>650-656</td>
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<td>45</td>
<td>656-662</td>
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<td>662-668</td>
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<td>680-686</td>
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<tr>
<td>51</td>
<td>692-698</td>
<td>White Space</td>
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* Additional notes on channels available for wireless microphone use.

Interested in the rules regarding wireless microphone operation in the TV white spaces bands? [Learn More >>]

This product is protected by US and international patents and patent filings. Click here to review.
Future Considerations

- Acquire wireless equipment that is frequency agile
- Get equipment that can operate on most of the available channels in your market
- When operating outside area of operation work through local SBE Frequency Coordinator for that area
- Large venues may have an event coordinator for mics
- NAB is working on a Best Practices Guide
Important Takeaways

• For broadcasters, heavy, if not exclusive, involvement will be required on the part of the news department to know how to determine what channels are available for wireless mics and how to register mic locations for interference protection
• This will involve assignment desk personnel for registering and photographers to implement in the field as well as determining last minute channel availability
• For the above, knowledge of the TVWS DBA website is crucial
• For most stations engineering will be unable to assist on a daily ongoing basis due to limited staff availability
When Does All This Begin

- It has already officially begun with one TVWS manufacturer and one TVWS database administrator in Wilmington, NC
- Two other TVWS device manufacturers await FCC approval which may occur any day
- Wilmington, NC is on-line now! It’s the “REAL DEAL” there.
- Once FCC gets the registration process in place for unlicensed microphones they will authorize roll-out to all other markets
- It is possible we will see implementation across all markets by calendar Q3 or Q4 of 2012! So...be ready.
TV WHITE SPACE DEVICES & WIRELESS MICROPHONES

QUESTIONS