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U.S. Legal Basis and Regulatory Framework for Spectrum Management

Radio Frequency Spectrum Management Workshop
UPRM
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I. Introduction

A. Responsibility for Regulation and Management of Spectrum in U.S. is Split.

-NTIA: Federal Govt. users

-FCC: Regulates all other users

-U.S. Congress: Creates statutory framework, can set policies

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I. Introduction

B. Assignment vs. Allocation of Spectrum

-Allocation: set aside specific *bands* of the spectrum generally for certain specific uses/services

-Assignment: designating a *specific frequency* or set of frequencies for use by a *specific party* in a specific *location*

International Table			United States Table		FCC Rule Part(s)
Region 1 Table	Region 2 Table	Region 3 Table	Federal Table	Non-Federal Table	
1626.5-1660 MOBILE-SATELLITE (Earth-to-space) 5.351A 5.341 5.351 5.353A 5.354 5.355 5.357A 5.359 5.362A 5.374 5.375 5.376			1626.5-1660 MOBILE-SATELLITE (Earth-to-space) US308 US309 US315 US380 5.341 5.351 5.375		Satellite Communications (25) Maritime (80) Aviation (87)
1660-1660.5 MOBILE-SATELLITE (Earth-to-space) 5.351A RADIO ASTRONOMY 5.149 5.341 5.351 5.354 5.362A 5.376A			1660-1660.5 MOBILE-SATELLITE (Earth-to-space) US308 US309 US380 RADIO ASTRONOMY 5.341 5.351 US342		Satellite Communications (25) Aviation (87)
1660.5-1668 RADIO ASTRONOMY SPACE RESEARCH (passive) Fixed Mobile except aeronautical mobile 5.149 5.341 5.379 5.379A			1660.5-1668.4 RADIO ASTRONOMY US74 SPACE RESEARCH (passive)		
1668-1668.4 MOBILE-SATELLITE (Earth-to-space) 5.351A 5.379B 5.379C RADIO ASTRONOMY SPACE RESEARCH (passive) Fixed Mobile except aeronautical mobile 5.149 5.341 5.379 5.379A			5.341 US246		
1668.4-1670 METEOROLOGICAL AIDS FIXED MOBILE except aeronautical mobile MOBILE-SATELLITE (Earth-to-space) 5.351A 5.379B 5.379C RADIO ASTRONOMY 5.149 5.341 5.379D 5.379E			1668.4-1670 METEOROLOGICAL AIDS (radiosonde) RADIO ASTRONOMY US74 5.341 US99 US342		
1670-1675 METEOROLOGICAL AIDS FIXED METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE MOBILE-SATELLITE (Earth-to-space) 5.351A 5.379B 5.341 5.379D 5.379E 5.380A			1670-1675 5.341 US211 US362	1670-1675 FIXED MOBILE except aeronautical mobile 5.341 US211 US362	Wireless Communications (27)
1675-1690 METEOROLOGICAL AIDS FIXED METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile 5.341			1675-1695 METEOROLOGICAL AIDS (radiosonde) METEOROLOGICAL-SATELLITE (space-to-Earth) US88 5.341 US211 US289		
1690-1700 METEOROLOGICAL AIDS METEOROLOGICAL-SATELLITE (space-to-Earth) Fixed Mobile except aeronautical mobile 5.289 5.341 5.382	1690-1700 METEOROLOGICAL AIDS METEOROLOGICAL-SATELLITE (space-to-Earth) 5.289 5.341 5.381		1695-1710 METEOROLOGICAL-SATELLITE (space-to-Earth) US88	1695-1710 FIXED MOBILE except aeronautical mobile	Wireless Communications (27)

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Federal Communications Commission
Wireless Telecommunications Bureau

RADIO STATION AUTHORIZATION

LICENSEE: ALSTOM SIGNALING OPERATION LLC

ATTN: ROBERT MCMANUS
ALSTOM SIGNALING OPERATION LLC
1990 NASA BOULEVARD
MELBOURNE, FL 32904

Call Sign	File Number
WQXL977	0007171838
Radio Service MC - Coastal Group	
Station Class FC	
Coast Id	**Sel Call** / **Aviation Id**

FCC Registration Number (FRN): 0025315920

Grant Date	Effective Date	Expiration Date	Print Date
04-12-2016	04-12-2016	10-09-2016	04-13-2016

STATION TECHNICAL SPECIFICATIONS

Fixed Location Address or Mobile Area of Operation

Loc. 1 **Address:** CP 10 (Main)
City: Dearborn **County:** WAYNE **State:** MI
Lat (NAD83): 42-18-21.6 N **Long (NAD83):** 083-14-18.1 W **ASR No.:** **Ground Elev:** 190.0
No. of units:

Loc. 2 **Address:** CX Henry Ruff Rd.
City: Westland **County:** WAYNE **State:** MI
Lat (NAD83): 42-17-08.9 N **Long (NAD83):** 083-20-21.1 W **ASR No.:** **Ground Elev:** 193.0
No. of units:

Loc. 3 **Address:** IS 20 - Haggerty Rd
City: Canton **County:** WAYNE **State:** MI
Lat (NAD83): 42-16-04.7 N **Long (NAD83):** 083-26-46.3 W **ASR No.:** **Ground Elev:** 208.0
No. of units:

Loc. 4 **Address:** CX Denton Rd
City: Belleville **County:** WAYNE **State:** MI
Lat (NAD83): 42-15-17.7 N **Long (NAD83):** 083-31-27.4 W **ASR No.:** **Ground Elev:** 226.0
No. of units:

Loc. 5 **Address:** CX Grove St.
City: Ypsilanti **County:** WASHTENAW **State:** MI
Lat (NAD83): 42-14-34.1 N **Long (NAD83):** 083-36-15.5 W **ASR No.:** **Ground Elev:** 244.0
No. of units:

Conditions:
Pursuant to §309(h) of the Communications Act of 1934, as amended, 47 U.S.C. §309(h), this license is subject to the following conditions: This license shall not vest in the licensee any right to operate the station nor any right in the use of the frequencies designated in the license beyond the term thereof nor in any other manner than authorized herein. Neither the license nor the right granted thereunder shall be assigned or otherwise transferred in violation of the Communications Act of 1934, as amended. See 47 U.S.C. § 310(d). This license is subject in terms to the right of use or control conferred by §706 of the Communications Act of 1934, as amended. See 47 U.S.C. §606.

FCC 601-CG
August 2007

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Licensee Name: ALSTOM SIGNALING OPERATION LLC

Call Sign: WQXL977 **File Number:** 0007171838 **Print Date:** 04-13-2016

Fixed Location Address or Mobile Area of Operation

Loc. 28 **Address:** IS 128
City: Augusta **County:** KALAMAZOO **State:** MI
Lat (NAD83): 42-20-27.4 N **Long (NAD83):** 085-19-45.5 W **ASR No.:** **Ground Elev:** 263.0
No. of units:

Loc. 29 **Address:** IS 133
City: Augusta **County:** KALAMAZOO **State:** MI
Lat (NAD83): 42-18-07.8 N **Long (NAD83):** 085-23-46.0 W **ASR No.:** **Ground Elev:** 272.0
No. of units:

Loc. 30 **Address:** CX 30th St.
City: Galesburg **County:** KALAMAZOO **State:** MI
Lat (NAD83): 42-17-19.0 N **Long (NAD83):** 085-28-33.0 W **ASR No.:** **Ground Elev:** 272.0
No. of units:

Loc. 31 **Address:** HTS 141.58
City: Kalamazoo **County:** KALAMAZOO **State:** MI
Lat (NAD83): 42-17-21.8 N **Long (NAD83):** 085-33-14.5 W **ASR No.:** **Ground Elev:** 266.0
No. of units:

Antennas

Loc No.	Ant No.	Frequencies (MHz)	Emission Designator	Output Power (watts)	Hours of Operation	Ant. Ht./Tp meters	Construct Deadline Date
1	1	000217.02500000 - 000217.50000000	32K5F1D	25.000		29.0	
2	1	000217.02500000 - 000217.50000000	32K5F1D	25.000		29.0	
3	1	000217.02500000 - 000217.50000000	32K5F1D	25.000		29.0	
4	1	000217.02500000 - 000217.50000000	32K5F1D	25.000		29.0	
5	1	000217.02500000 - 000217.50000000	32K5F1D	25.000		29.0	
6	1	000217.02500000 - 000217.50000000	32K5F1D	25.000		29.0	
7	1	000217.02500000 - 000217.50000000	32K5F1D	25.000		29.0	

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II. Spectrum Management by NTIA

-National Telecommunications and Information Administration

> an arm of the Department of Commerce

-Establishes and issues *policy* regarding allocations and regulations governing the Federal spectrum use;
-*Assigns* specific *frequencies* to specific federal users;
-Develops *plans* for the federal use of the spectrum, and in cooperation with the FCC;
-Maintains federal spectrum use *databases*.

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II. Spectrum Management by NTIA

Interdepartment Radio Advisory Committee (IRAC)

-19 federal agencies
-coordinate on assigning frequencies to U.S. agencies
-review requests by non-govt entities to use govt spectrum

"*Manual of Regulations and Procedures for Federal Radio Frequency Management" (the "Redbook")*

https://www.ntia.doc.gov/page/2011/manual-regulations-and-procedures-federal-radio-frequency-management-redbook

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II. Spectrum Management by the FCC

A. The "Basics"

-FCC – an independent federal agency, with 5 commissioners, nominated by the President, and confirmed by the Senate.

-Created through the Communications Act of 1934

-Title 47 of the U.S. Code starting at Section 151.

https://www.law.cornell.edu/uscode/text/47/chapter-5

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II. Spectrum Management by the FCC

A. The "Basics"

-Regulates *interstate and international* communications
-Thousands of employees organized in a number of *bureaus and offices.*
-*Wireless Telecommunications Bureau* -- licensed wireless services
-*International Bureau* -- international telecommunications and satellites, coordinates global spectrum activities
-*Office of Engineering and Technology* -- advises on engineering and technical issues, maintains U.S. Table of Frequency Allocations, regulates the operation of unlicensed devices, and conducts engineering and technical studies.

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II. Spectrum Management by the FCC

A. The "Basics"

-*FCC's Mission*: To make available a "rapid, efficient Nation-wide and world-wide wire and radio communications service…."

To make decisions consistent with the "*public interest*, convenience and necessity"

-FCC regulates spectrum through *policies* and *rules* contained in *Orders*.

FCC rules --- Sections 0-101 of Title 47 of the U.S. Code of Federal Regulations (CFR)

http://www.ecfr.gov/cgi-bin/text-dx?c=ecfr&tpl=/ecfrbrowse/Title47/47tab_02.tpl

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II. Spectrum Management by the FCC

B. The Rulemaking Process

-“Notice and Comment" Rulemaking

-Initiation of a rulemaking proceeding:

>Required by statute

>FCC identifies a need

>Petition for rulemaking from the public

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II. Spectrum Management by the FCC

B. The Rulemaking Process

1. FCC issues a Notice of Proposed Rulemaking
   https://apps.fcc.gov/edocs_public/

2. Public Comments -- Electronic Comment Filing System (ECFS) http://apps.fcc.gov/ecfs/

3. FCC issues an Order containing new/mod rules

4. Possible reconsideration by the FCC/judicial review

5. Parties may seek *waivers* from rules

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II. Spectrum Management by the FCC

C. Making Spectrum Available to Users

Licensed vs "Unlicensed"/License-Exempt Use

Licensed: -authorization for *specific* user/frequencies/locations
-*exclusive* use
-protected from *interference*
Example: TV station

Unlicensed: -*multiple* users
-*shared* use
-limited protection *from* interference, but *required to protect* licensed services
Example: garage door opener, WiFi router

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II. Spectrum Management by the FCC

C. Making Spectrum Available to Users

Licensed by Rule: Certain users may operate on certain frequencies for certain specific uses without an individual license, as long as they use *FCC –certified equipment* and comply with specific FCC *operational rules*.

Examples: certain maritime/ship radios, Citizens Band/CB radios

How to become a licensed user:

-*apply* to FCC for license
-be the high bidder at FCC spectrum *auction*
-*lease* spectrum from existing license holder

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II. Spectrum Management by the FCC

D. Examples of FCC Spectrum Management

1. Quiet Zones/Puerto Rico Coordination Zone

Section 1.924 of the FCC's Rules:

-Places limitations on certain classes of transmitters, to reduce or prevent interference to certain protected Radio Astronomy observatories

a. National Radio Astronomy Observatory ("NRAO") /Naval Radio Research Observatory – West Virginia

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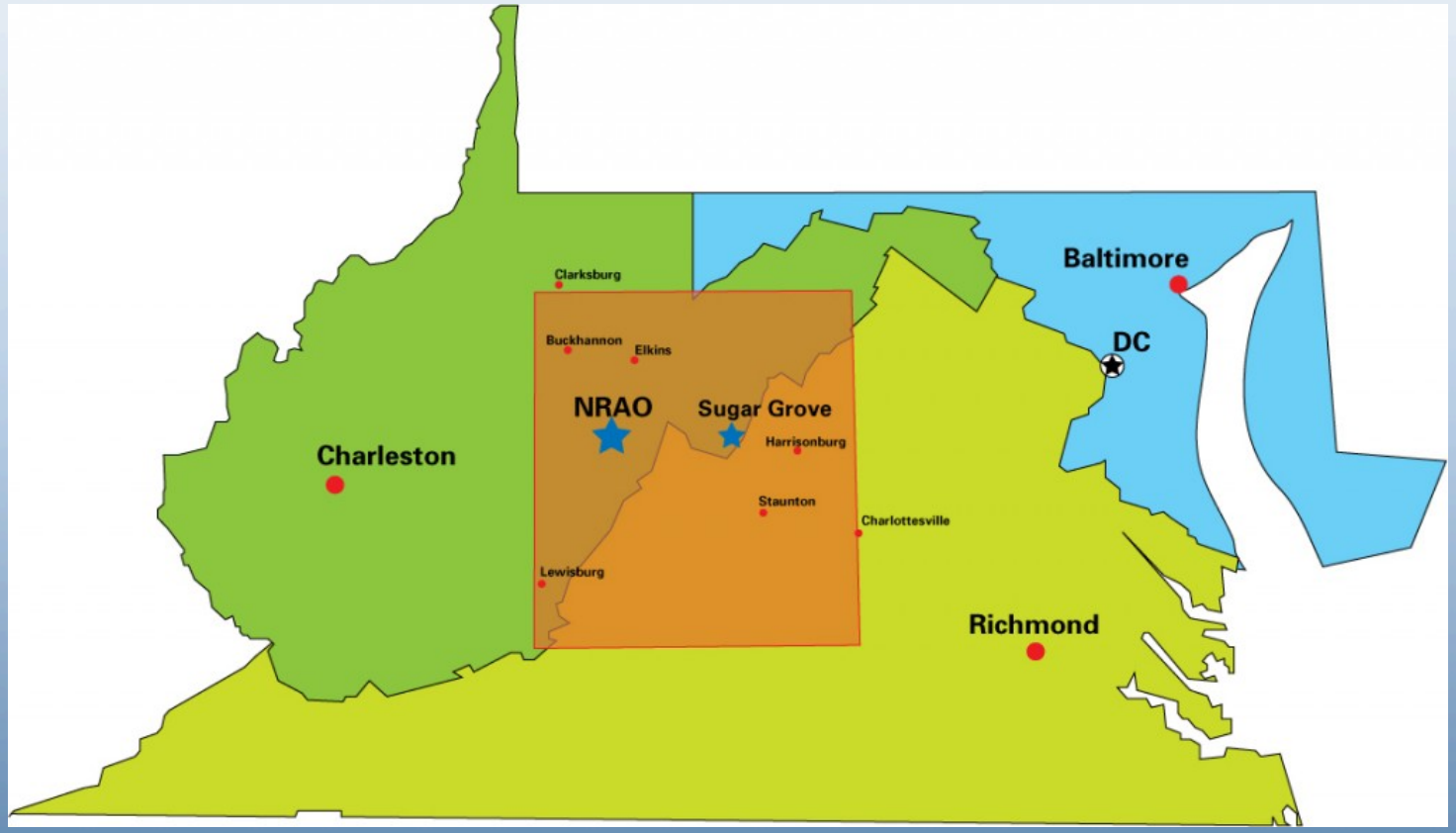
II. Spectrum Management by the FCC

The National Radio Quiet Zone



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II. Spectrum Management by the FCC

D. Examples of FCC Spectrum Management

-Applicants for new or modified station at a permanent fixed location must *notify* the NRAO before filing an application at the FCC:

Geographical coordinates, antenna height/directivity, frequency, emission type and power.

-NRAO has a period of *20 days for comments or objections*.

Typically, proponents coordinate with the NRAO *prior* to any filing with the FCC

https://science.nrao.edu/facilities/gbt/interference-protection/nrqz

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II. Spectrum Management by the FCC

D. Examples of FCC Spectrum Management

1. Quiet Zones/Puerto Rico Coordination Zone

b. Puerto Rico Notification-Coordination Zone

-For new or modified station below 15 GHz at a *permanent fixed location* on:
Puerto Rico, Desecheo, Mona, Vieques or Culebra

-Must notify the Arecibo Observatory of: the geographical *coordinates* of the antenna location, the *antenna* height/directivity, *frequency*, type of *emission*, and *EIRP*.

-Notification at least 20/45 days *in advance* of the applicant's planned operation

-Requires *reasonable efforts* to protect the Observatory from interference.

-Observatory has *20 days* for comments or objections.

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II. Spectrum Management by the FCC

D. Examples of FCC Spectrum Management

2. Coordination of 1.6 GHz Mobile Satellite Service and RAS

-Operators of 1.6 GHz MSS are *Iridium* and *Globalstar*

-Section 25.213: *coordinate* MSS operations within *50/160 km* of certain protected U.S. RAS facilities, to limit interference.

Primarily, Arecibo and facilities operated by the NRAO

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II. Spectrum Management by the FCC

D. Examples of FCC Spectrum Management

2. Coordination of 1.6 GHz Mobile Satellite Service and RAS

Section 25.213(a)(2): Satellite stations transmitting in the *1613.8-1626.5 MHz* band shall *take whatever steps necessary* to avoid causing *harmful interference* to the protected radio astronomy facilities *during periods of observation*.

Section 25.213(a)(4): RA observatories shall *avoid scheduling* radio astronomy observations during *peak* satellite traffic periods to the *greatest extent practicable*.

-"whatever steps necessary"?
-"harmful interference"?
-"greatest extent practicable"?

Coordination agreements to flesh these terms out

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II. Spectrum Management by the FCC

D. Examples of FCC Spectrum Management

3. Channel 37 – Radio Astronomy, WMTS and White Space Devices

-Over the air television -- Channels 2-51

54-216 MHz – VHF
470-698 MHz – UHF

Each television channel is 6 MHz.

Channel 37 = 608-614 MHz

Originally allocated solely for the use of Radio Astronomy.

1990's -- add Wireless Medical Telemetry Service ("WMTS")

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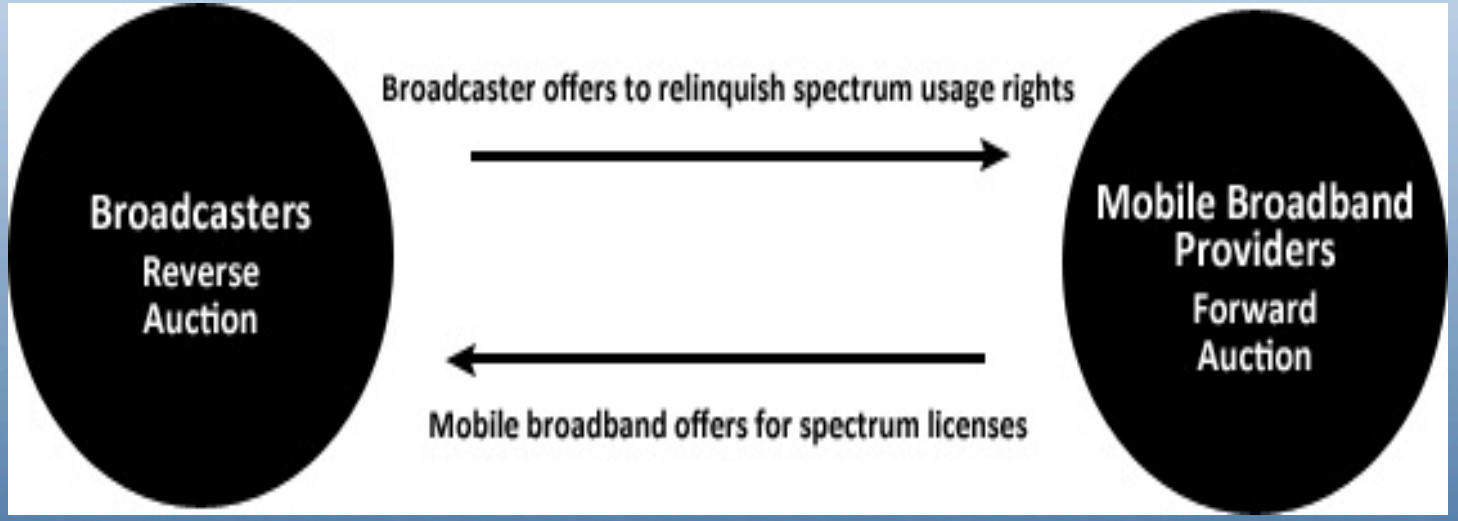
II. Spectrum Management by the FCC

D. Examples of FCC Spectrum Management

3. Channel 37 – Radio Astronomy, WMTS and White Space Devices

REALLOCATION OF PORTION OF THE UHF BAND FOR WIRELESS BROADBAND

TV stations will sell their channels to FCC, FCC will sell spectrum to Telcos



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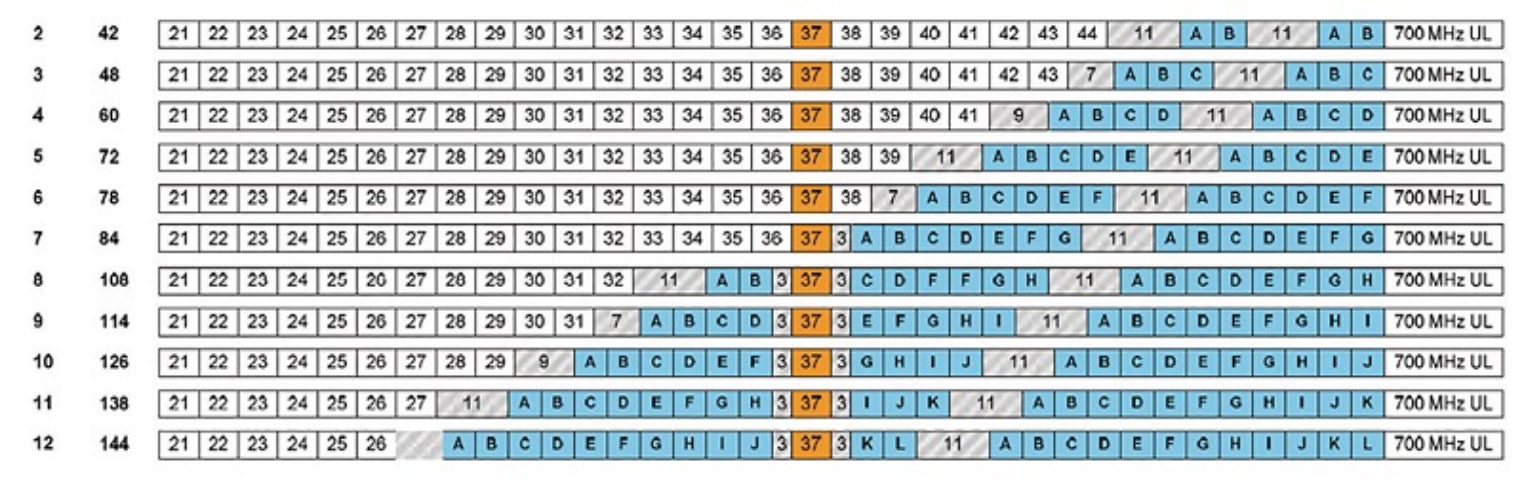
II. Spectrum Management by the FCC

3. Channel 37 – Radio Astronomy, WMTS and White Space Devices



Light Blue: 5 MHz blocks of spectrum for auction. Orange: Channel 37 reserved for radio astronomy and medical telemetry. Diagonally shaded gray: guard bands between allocations. Blocks with numbers from 21–36 and 38–44 are the possible remaining TV channels. In May 2016, FCC stated that it is targeting to auction 10 channel pairs – 126 MHz. But result cannot be known at this time.

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II. Spectrum Management by the FCC

FCC Order on TV White Space Device Operations on Ch. 37

1. *RURAL AREAS*

-FCC had proposed greater power in rural areas, RAS suggest no operation in rural areas, since other channels available.

FCC Order: "recommend" that TVWSDs only operate on Ch. 37 where less than 3 channels available for use. FCC "expects" that in most cases, use of Ch. 37 will not be needed.

Will TVWSD operators follow this recommendation? May need to do so to protect WMTS.

2. *NRQZ and PRQZ*

TVWSD operation prohibited. (TVWSDs required to connect to database)

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II. Spectrum Management by the FCC

FCC Order on TVWSD Operations on Ch. 37

3. TVWSD Operations on Guard Bands

If FCC recovers targeted amount of spectrum so that channels above and/or below Ch. 37 are wireless, there will be 3 MHz guard bands separating them from Ch. 37.

>TVWSDs *prohibited* from operating on those guard bands.

4. Prohibition on Operation of TVWSD within 2.4 Kilometers of Protected Observatories

The FCC *retained* this prohibition of operation on *any* channel.

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II. Spectrum Management by the FCC

Wireless Microphones

Wireless Microphones – theaters, churches, broadcast remote

-2010: FCC waiver allowing unlicensed use on TV channels, except Ch. 37

-2015 Order: Authorize same

>mics may also use guard bands (20 mW EIRP)

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III. Spectrum Management – the Role of Congress

Congress:

-Enacted the *Communications Act* and *amendments*, and *other* telecommunications *legislation*

-Oversees the FCC, confirms FCC Commissioners

Source of recent Congressional interest in spectrum management:

-huge growth in *smart phone* use and demand on spectrum

-importance of wireless services to the *Internet economy*

-opportunity to sell spectrum rights to get *$$ for the U.S. Treasury*.

AWS Auction: $40 billion!!

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III. Spectrum Management – the Role of Congress

Congress:

Recent example:

S.2555 -- MOBILE NOW Act (Pending Bill)

https://www.congress.gov/bill/114th-congress/senate-bill/2555

A. FCC and NTIA work together to *identify 255 megahertz* of spectrum *below 6 GHz* for allocation and assignment for mobile and fixed broadband use.

-at least 100 megahertz must be made available for unlicensed use

-lists specific frequency ranges not to be considered

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III. Spectrum Management – the Role of Congress

Congress:

S.2555 -- MOBILE NOW Act (Pending Bill)

B. FCC and NTIA produce reports to Congress on *feasibility* of *allowing shared use* between Federal agencies and commercial services at 3.1-3.5 GHz and 3.7-4.2 GHz.

C. NTIA and FCC produce report *assessing* the impact on federal spectrum operations of commercial use at 31-33, 71-76 and 81-86 GHz.

D. FCC issue an NPRM on rules for mobile/fixed terrestrial services at 24, 25, 31-33, 42, 71-76, and 81-86 GHz.

Congress wading into a mess, -- non-fed services already operating, and rules pending.

Commercial use of Federal bands – relocation of federal incumbents vs. shared use?

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QUESTIONS?

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THANKS!

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