Global Perspectives on Spectrum Sharing: WInnForum Update
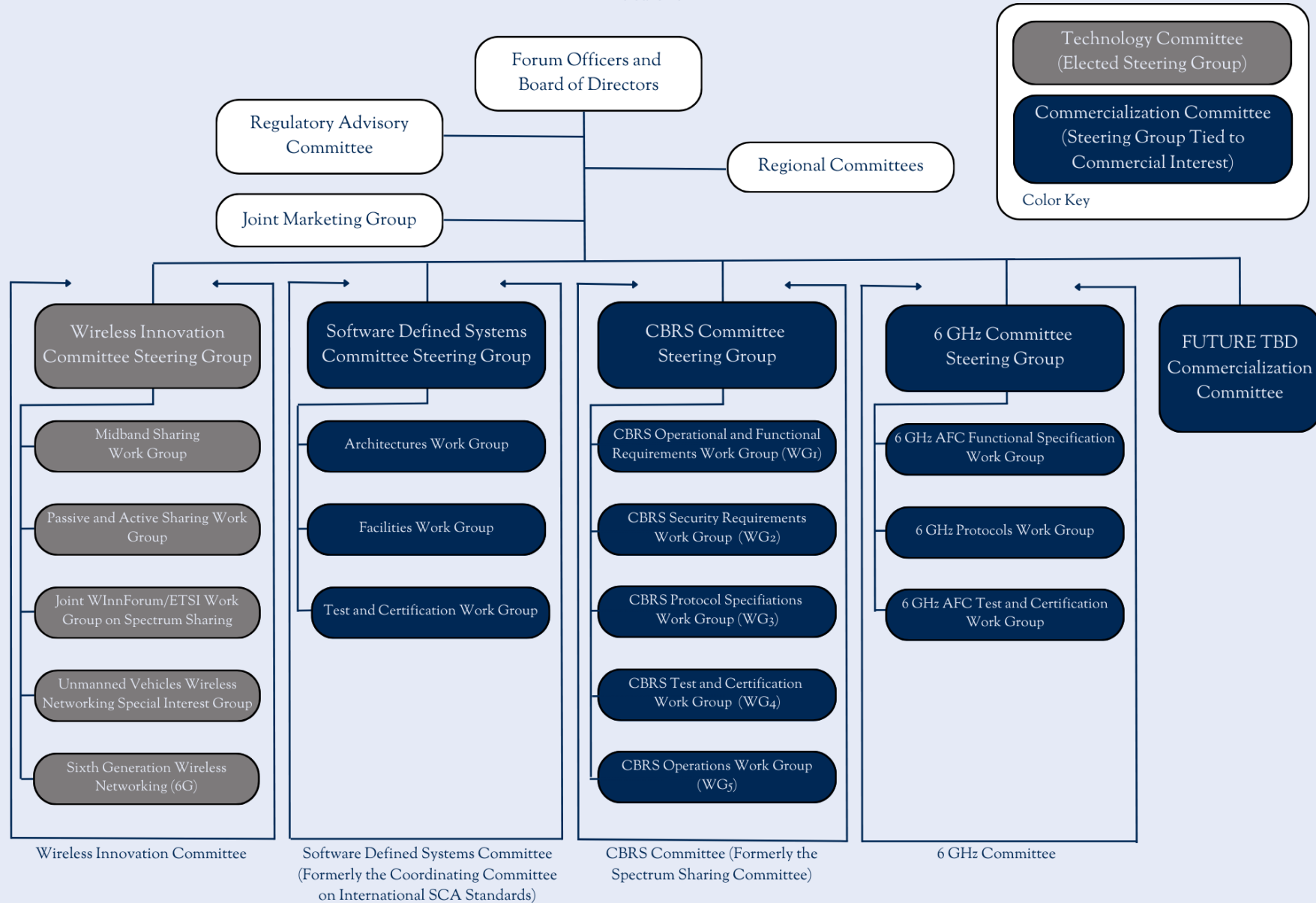
31 October 2024

The Wireless Innovation Forum is a nonprofit "mutual benefit corporation" dedicated to:

"advancing technologies supporting the innovative utilization of spectrum and the development of wireless communications systems, including essential or critical communications systems"

WIRELESS INNOVATION FORUM®

Organizational Structure for The Wireless Innovation Forum

26 June 2024

Forum Officers and Board of Directors

Regulatory Advisory Committee

Regional Committees

Joint Marketing Group

Color Key
- Technology Committee (Elected Steering Group)
- Commercialization Committee (Steering Group Tied to Commercial Interest)

Wireless Innovation Committee Steering Group
- Midband Sharing Work Group
- Passive and Active Sharing Work Group
- Joint WInnForum/ETSI Work Group on Spectrum Sharing
- Unmanned Vehicles Wireless Networking Special Interest Group
- Sixth Generation Wireless Networking (6G)

Wireless Innovation Committee

Software Defined Systems Committee Steering Group
- Architectures Work Group
- Facilities Work Group
- Test and Certification Work Group

Software Defined Systems Committee (Formerly the Coordinating Committee on International SCA Standards)

CBRS Committee Steering Group
- CBRS Operational and Functional Requirements Work Group (WG1)
- CBRS Security Requirements Work Group (WG2)
- CBRS Protocol Specifiations Work Group (WG3)
- CBRS Test and Certification Work Group (WG4)
- CBRS Operations Work Group (WG5)

CBRS Committee (Formerly the Spectrum Sharing Committee)

6 GHz Committee Steering Group
- 6 GHz AFC Functional Specification Work Group
- 6 GHz Protocols Work Group
- 6 GHz AFC Test and Certification Work Group

6 GHz Committee

FUTURE TBD Commercialization Committee

WInnForum Standards™

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6 GHz Committee

Sharing in the US 6 GHz Band

BACKGROUND/OVERVIEW

- **FCC has opened the 6 GHz bands (5925-7125 MHz) for shared use by unlicensed devices in four segments:**
  - U-NII-5   5925-6425 MHz (500 MHz)
  - U-NII-6   6425-6525 MHz (100 MHz)
  - U-NII-7   6525-6875 MHz (350 MHz)
  - U-NII-8   6875-7125 MHz (250 MHz)

- **Two types of devices have been specified (so far):**
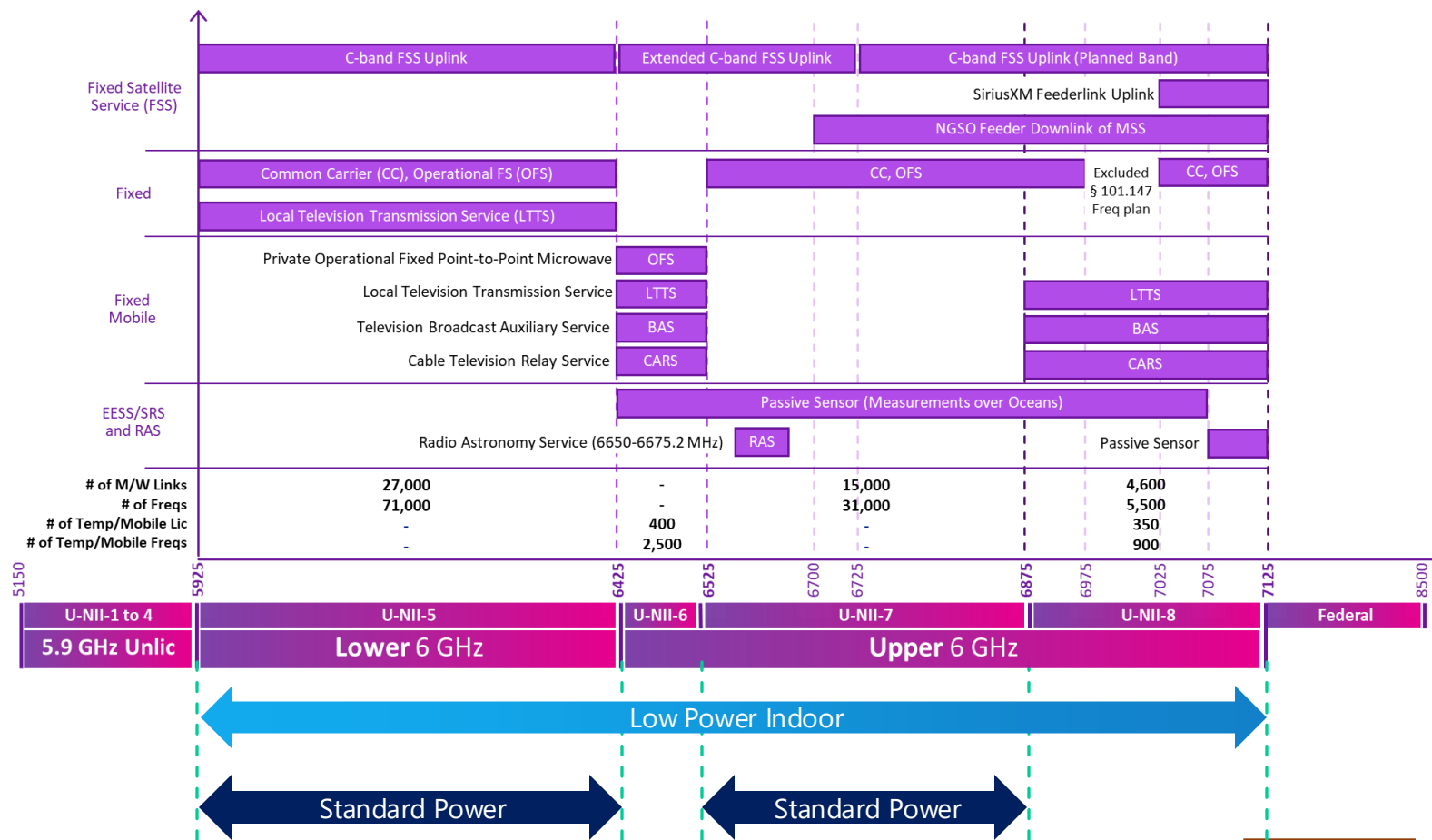 - Low Power Indoor (30 dBm / 5 dBm/MHz)
  - Standard Power (36 dBm / 23 dBm/MHz)

- **Low Power Indoor devices can operate across the full 1200 MHz**

- **Standard Power devices can only operate in the U-NII-5 and -7 segments**

- **Standard Power devices must be controlled by an Automatic Frequency Coordination (AFC) system**

- **AFC System will be certified by the FCC**

6 GHz Bands: Incumbent Use & U-NII Designations

Fixed Satellite Service (FSS)
- C-band FSS Uplink
- Extended C-band FSS Uplink
- C-band FSS Uplink (Planned Band)
- SiriusXM Feederlink Uplink
- NGSO Feeder Downlink of MSS

Fixed
- Common Carrier (CC), Operational FS (OFS)
- CC, OFS
- Excluded § 101.147 Freq plan
- CC, OFS
- Local Television Transmission Service (LTTS)

Fixed Mobile
- Private Operational Fixed Point-to-Point Microwave — OFS
- Local Television Transmission Service — LTTS — LTTS
- Television Broadcast Auxiliary Service — BAS — BAS
- Cable Television Relay Service — CARS — CARS

EESS/SRS and RAS
- Passive Sensor (Measurements over Oceans)
- Radio Astronomy Service (6650-6675.2 MHz) — RAS
- Passive Sensor

# of M/W Links	27,000	15,000	4,600
# of Freqs	71,000	31,000	5,500
# of Temp/Mobile Lic	- 400	-	350
# of Temp/Mobile Freqs	- 2,500	-	900

Frequency markers (MHz): 5150, 5925, 6425, 6525, 6700, 6725, 6875, 6975, 7025, 7075, 7125, 8500

U-NII-1 to 4	U-NII-5	U-NII-6	U-NII-7	U-NII-8	Federal
5.9 GHz Unlic	Lower 6 GHz		Upper 6 GHz		

Low Power Indoor

Standard Power   Standard Power

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Document Flow

Ongoing Efforts in 6 GHz

Coordinating with Wi-Fi Alliance on work related to WiFi 7

Leftover issues related to data, interference analysis and international
- Includes considerations for 6 GHz AFC Use of NLCD Data

Follow up as needed on 2nd FNPRM for VLP and geofenced VLP

CBRS Committee

Reminder: What is CBRS?

- **CBRS is a three-tier spectrum sharing framework:**
  - Tier 1: Incumbents
  - Tier 2: CBRS Priority Access License (PAL)
  - Tier 3: CBRS General Authorized Access (GAA)

- **A cloud-based Spectrum Access System (SAS) manages interference from the CBRS tiers into the incumbents, interference within the PAL tier, and interference from GAA into PAL**
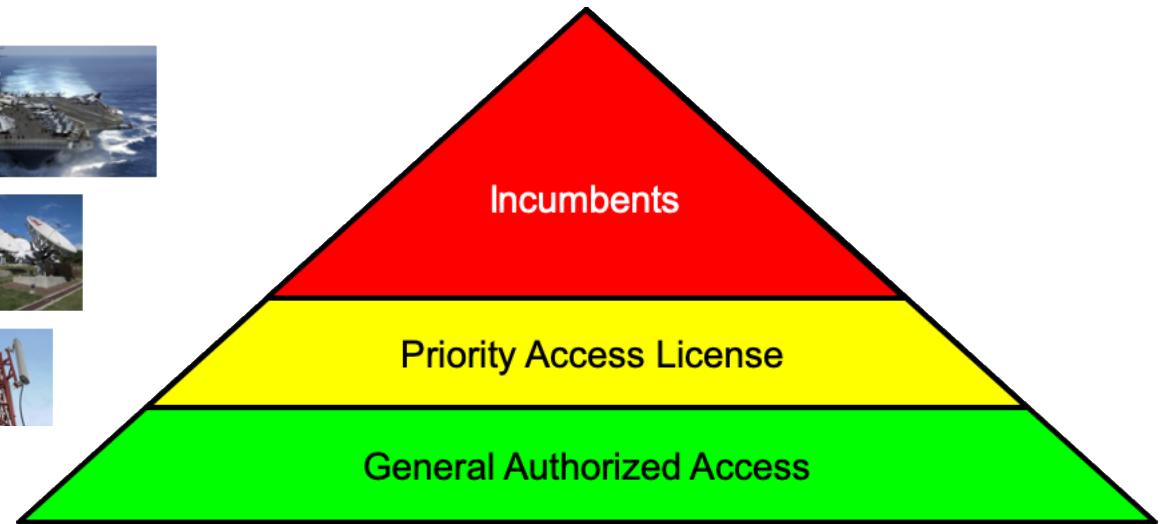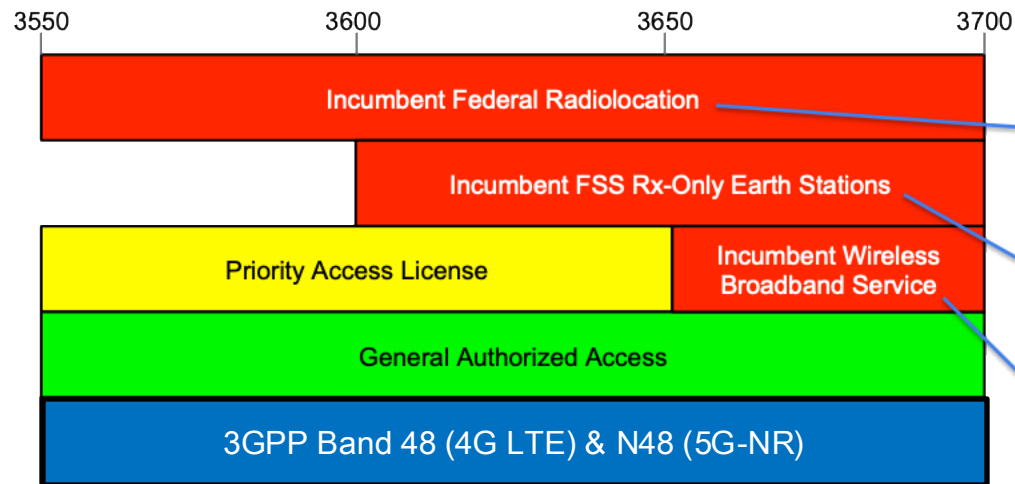
CBRS Standards Releases

Release 1

Baseline Standards
Used for Initial Certification

Release 1+

Post Initial Certification Revisions to
Baseline Standards
Addressing Regulatory Changes

Release 2

Enhancements to Baseline Standards
Addressing Industry Need

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CBRS Release 1 Standards and Ecosystem Support

10 WInnForum Standards and Supporting Ecosystem Development

SAS Test Specification

CBSD Test Specification

PAL Database | PKI | CPI

SAS to CBSD Protocol Specification

SAS to SAS Protocol Specification

Communications Security | Operations Security

Operational and Functional Requirements

Approved CBSD Testing

Approved PKI Certificate Authority

Approved CPI Training Program

Measurement Database

Air Interface Database

CBSD Test Harness

SAS Test Harness

Certified SAS

Certified CBSD

Certified ESC

Certified Professional Installer

Results: 4 Key Certifications

CBRS Release 1+ Standards and CBRS 2.0

Release 1	Release 1+	Release 2
Baseline Standards Used for Initial Certification	Post Initial Certification Revisions to Baseline Standards Addressing Regulatory Changes	Enhancements to Baseline Standards Addressing Industry Need

1. **Propagation models now take into account the impact of clutter (i.e., buildings and foliage) for devices at or below 6 meters (about 20 ft) above ground level**

2. **Adoption of less conservative statistical assumptions regarding time-variable propagation losses**

3. **Refined considerations about typical power output from CBRS devices that take into account the average activity factor of the signals, instead of always assuming maximum power output**

4. **For devices outside of areas impacted by incumbent radar activity, SAS check-in required only every 24 hours, instead of every five minutes**

Note: These standards have been adopted by OnGo Alliance as a part of their CBRS 2.0 initiative.

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DPA Neighborhood

Dynamic Protection Area
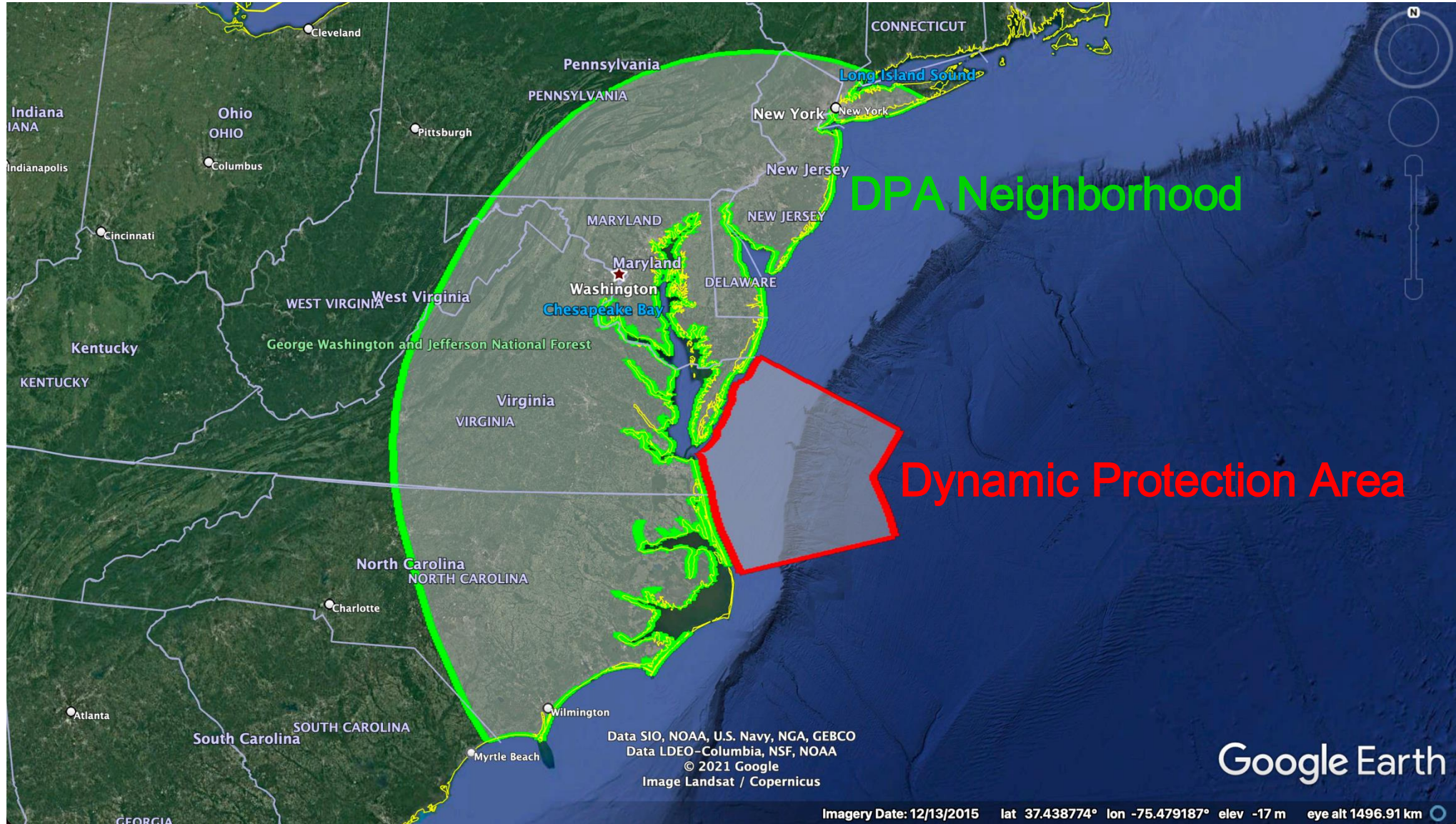
Comparison of existing DPA neighborhoods (solid red) with the new DPA neighborhoods (green outline), for indoor Category A devices below 6 m height above ground level.
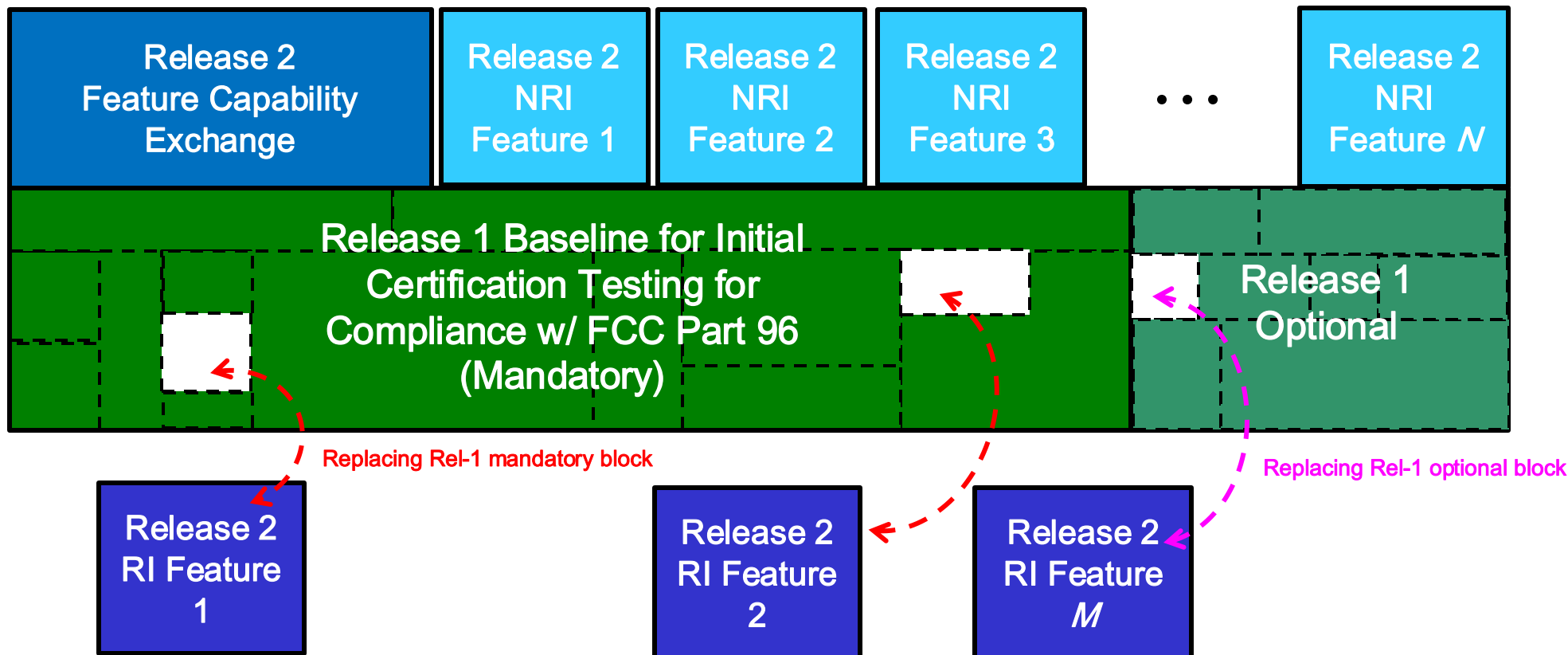
In coastal areas, the new neighborhoods generally extend just a few km inland from the coast.

Increases the population outside of impacted areas by about 40 million.

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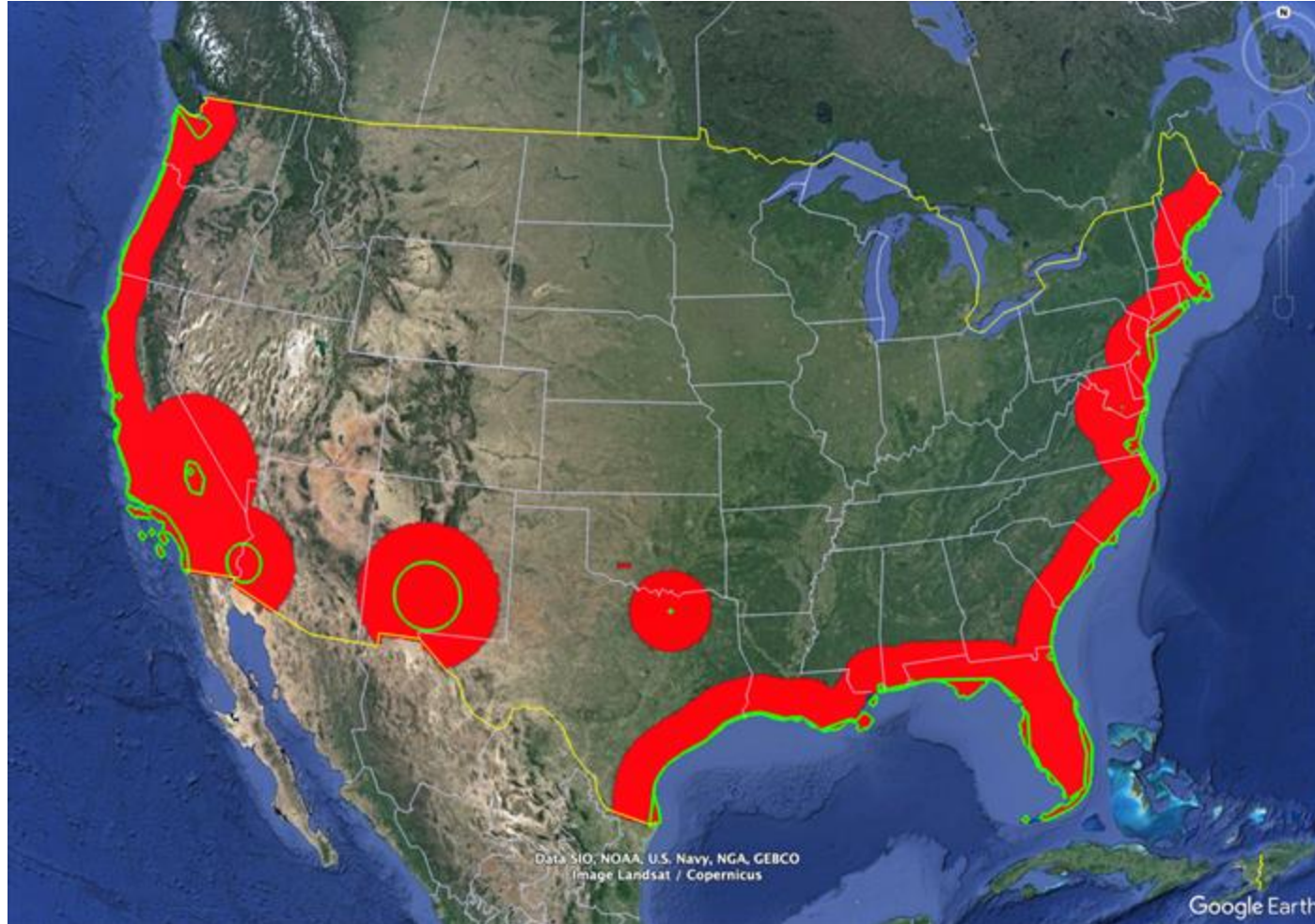
CBRS Release 2 Changes

- **[Release 1 Mandatory building block]** Release 1 *Mandatory* building block (a function, process, behavior, etc.)
- **[Release 1 Optional building block]** Release 1 *Optional* building block (a function, process, behavior, etc.)

- **[Mandatory]** Mandatory to claim conformance with Release 2
- **[Optional NRI]** Optional "à la carte" Release 2 *NRI* Feature
- **[Optional RI]** Optional "à la carte" Release 2 *RI* Feature

Release 2 Feature Capability Exchange

Release 2 NRI Feature 1

Release 2 NRI Feature 2

Release 2 NRI Feature 3

. . .

Release 2 NRI Feature N

Release 1 Baseline for Initial Certification Testing for Compliance w/ FCC Part 96 (Mandatory)

Release 1 Optional

Replacing Rel-1 mandatory block

Replacing Rel-1 optional block

Release 2 RI Feature 1

Release 2 RI Feature 2

Release 2 RI Feature M

New CBRS NPRM

Federal Communications Commission   **FCC 24-86**

Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of   )

)

Promoting Investment in the 3550-3700 MHz band   )   GN Docket No. 17-258

)

)

)

NOTICE OF PROPOSED RULEMAKING AND DECLARATORY RULING

Adopted: August 5, 2024   Released: August 16, 2024

Comment Date: 30 days after publication in the Federal Register
Reply Comment Date: 60 days after publication in the Federal Register

https://docs.fcc.gov/public/attachments/FCC-24-86A1.pdf

Wireless Innovation Committee

Ongoing Projects

PASS: Passive and Active Spectrum Sharing WG
- Emphasis on assisting/protecting terrestrial Radio Astronomy sites
- Augment CBRS dynamic spectrum access/sharing architecture for spectrum sharing within a National Radio Dynamic Zone (NRDZ) with an emphasis on assisting/protecting terrestrial Radio Astronomy sites
  - Dynamic coordination zone vs static exclusion zone.

Joint Work Group with ETSI-TC RRS
- ETSI Technical Report *ETSI TR 103 885* and WInnForum Technical Report *WINNF TR-2011 V1.0.0*.
- Joint white paper
- Joint workshops

Unmanned Vehicles Wireless Networking Special Interest Group
- AKA "The Drone SIG"
- Currently evaluating the requirements for a Dynamic Frequency Management System identified in the 5 GHz Spectrum for UAS Report and Order
  - Includes reviewing for possible participation, particularly regarding multi-stakeholder participation

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6GWG@WInnForum: Chartered Goals

GOAL: In support of an interoperable, secure, resilient, sustainable, open, innovative and scalable global 6G wireless marketplace and ecosystem:

To contribute WInnForum's leading Spectrum Sharing and Wireless Innovation voice to the evolution and complementary advancement of 6G technology development, collaborating with other international SDO's and other industry organizations.

To develop the WInnForum 6G Strategy for value-added contribution to the rapidly evolving 6G ecosystem towards improved spectral efficiency, capacity, effectiveness, usability & market commercialization.

Agree a **reasonable, updatable definition of 6G** to feed into core WInnF Topic Area**:**

"The Role of Spectrum Sharing in 6G", initially by review/survey with other SDO's, industry, academic, and government groups, as well as through the lens of 5G-IMT and MSS experience to date.

...to better support innovation, commercialization/industrialization, & advancement in emerging global 6G technology.

Where have we come to?

- **_Chartered goals_**
- **_6GWG/RAC JTG Mini-Workshops_**
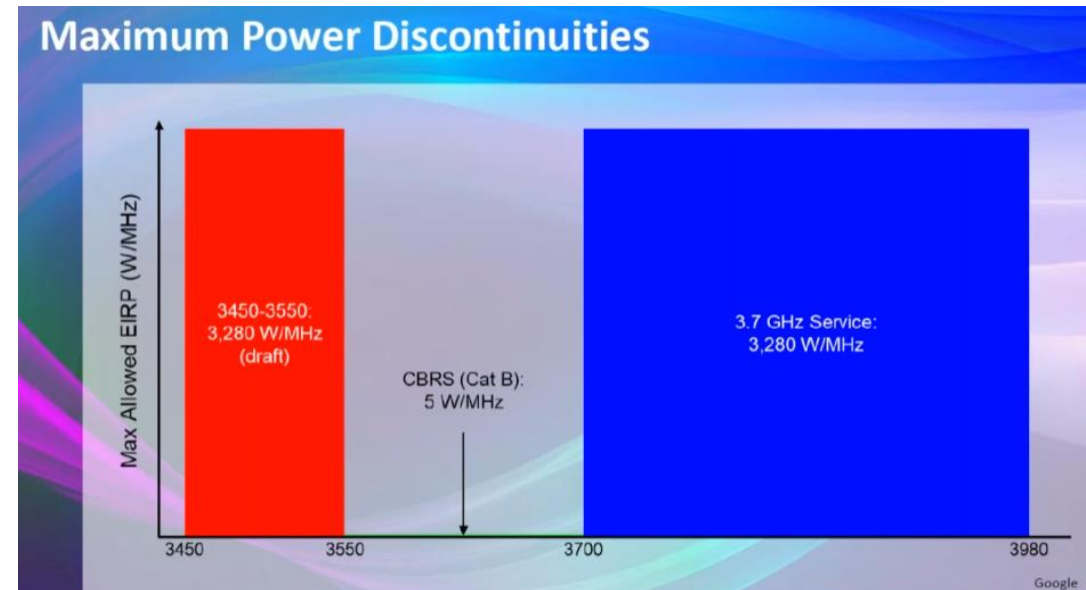- **_Example Dynamic Spectrum Sharing (DSS) Inputs_**

Where are we going?

- **_Draft 7-8GHz TR for 7-8GHz & emerging 6G Bands_**
- **_Guiding Themes_**

Purpose:

- To consider challenges associated with coexistence among various systems and services operating in midband spectrum
  - "Mid-band" in our case is ~3-24 GHz, although not well-defined
  - Most active topics are 3.45/CBRS/3.7, as well as potential 3.1 issues
- Are there actionable items for WInnForum?

Maximum Power Discontinuities

Max Allowed EIRP (W/MHz)

3450-3550:
3,280 W/MHz
(draft)

CBRS (Cat B):
5 W/MHz

3.7 GHz Service:
3,280 W/MHz

3450   3550   3700   3980

Google

Highly Dynamic Spectrum Sharing Project

- **For government and industry stakeholders, including regulators, who want to share spectrum on a much more dynamic basis than has been done in CBRS or 6 GHz**

  - To include consideration of sharing with airborne incumbents

  - Includes those who may want to inform demonstration projects in additional bands (e.g., the U.S. 3.1 GHz band)

- **Expected work products: reports and recommendations that analyze the problem and look at simplification or adaptation of existing centralized spectrum management frameworks**

  - Includes associated radio equipment and devices

  - Includes potentially new decentralized frameworks to support the identified requirements

- **The work products can leverage the expertise across WInnForum, including SAS and AFC system administrators, equipment manufacturers, and others**

- **The goal is to examine the requirements for centralized and possibly de-centralized spectrum management systems that can support highly dynamic sharing.**

Project Scope

1. **Analysis**

   1. Includes looking at, but not limited to, the 3.1 GHz band (3.1-3.45 GHz)

   2. Highly dynamic sharing in time, space (including geography), and spectrum compared to existing solutions, with "highly dynamic" to be defined

   3. Includes further understanding of the incumbents that need to be protected, such as protection of airborne assets and their protection criteria.

   4. Need to also assess requirements for robustness, reliability, and security

2. **Look at frameworks to support the identified requirements, including:**

   1. Simplification or adaption of existing frameworks (e.g., CBRS/SAS and AFC), to include associated radio equipment and devices

   2. Other, more real-time frameworks for decentralized spectrum management

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QUESTIONS???