GOES DCS and Spectrum Policy

DCS Tech Working Group Meeting
25 April 2023
Seattle, WA

Prepared by:

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Recent Activities

- Overview of Spectrum Allocation Policy Environment
- Release of SPRES Report and Response from DCS Users
- Third Anniversary of Ligado Decision
- Inputs to National Spectrum Strategy

Current Spectrum Allocation Policy Environment – April 2023

- Federal Communications Commission (FCC): Only 4 Commissioners Confirmed (out of 5)
  - 2 Democrats (Rosenworcel (Chairwoman), Starks)
  - 2 Republicans (Carr, Simington)
  - Democratic Nominee withdrew from nomination process, awaiting another Biden Administration nominee
  - This even split means no controversial matters are being addressed

Spectrum Pipeline Reallocation Engineering Study (SPRES)

- 2017 - NOAA Spectrum Pipeline Plan to apportion $12.03 million from the Spectrum Relocation Fund to NOAA
  - Conduct engineering study – exploring whether sharing 1675-1680 MHz with mobile wireless service was feasible
  - Cost of the study will be recouped by the funds gained from the auction
  - Auction could occur within eight years.

Wildfire weather sensors send lifesaving data to GOES satellites

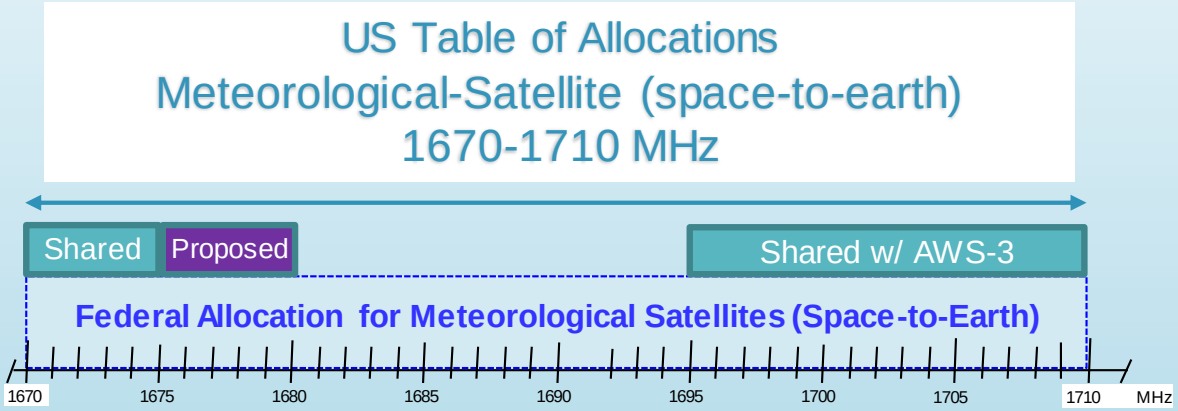
Spectrum Pipeline Study

Scope and Objectives

- **Scope:** The Spectrum Pipeline Reallocation Engineering Study (SPRES) assessed the potential for sharing the 1675-1680 MHz Meteorological Satellite (MetSat) band with commercial fixed and mobile wireless services nationwide while ensuring no impacts to NOAA and other federal user mission capabilities.
- **Objectives:**
  - GOES Data Use
    - Map the flow of GOES data to users and applications
    - Determine the impact of loss or degradation of data
    - Derive MetSat user requirements for receiving the data transmitted in the 1675-1680 MHz band, and in the adjacent affected band
  - Radio Frequency Interference (RFI) Modalities and Risks
    - Characterize any RFI to GOES receivers and quantify the RFI risks
  - Mitigation Options and Feasibilities to Facilitate Sharing
    - Identify possible RFI mitigations
    - Assess the feasibility and effectiveness of these methods

L-Band Spectrum Allocations

50% of L-band MetSat Allocation is shared



1670-1675 MHz
Auctioned 2003 to high power (downlink) Mobile/Fixed services (MS/FS). Shared between Ligado and MetSat Service

1695-1710 MHz
Auctioned 2015 to lower power (uplink) MS/FS services. Shared between AWS-3 and MetSat Service

1675-1680 MHz
Proposed for auction to share between MS/FS and MetSat Service

1670-1710 MHz is allocated internationally in all three ITU Regions for Meteorological-Satellite (Space-Earth) use, known as Met-Sat downlinks. **1670-1700 MHz** similarly allocated for Meteorological Aids (weather balloons).

Assignments in **1670-1690 MHz** authorize NOAA to operate radiosondes. The frequency use has been reduced over time as Radiosondes transition out of the band, but transmissions will continue in the **1675-1683 MHz** through 2023.

Assignments in **1673.4-1710 MHz** authorize NOAA to operate Geostationary Operational Environmental Satellites (GOES) and polar-orbiting satellites to: 1) retrieve sensor data; 2) broadcast processed data; and 3) broadcast unprocessed instrument data (from polar satellites) to the meteorological community.

SPRES Outcomes

- **The SPRES project flow resulted in four specific outcomes:**
  1. **Evaluation of alternative data distribution architectures**
     - DCS Administration and Data Distribution System (DADDS)
  2. **Alternative GOES downlink design recommendations**
     - Combinations of various technologies that were leveraged to meet GeoXO requirements
  3. **GOES receive site RFI monitoring approaches**
     - Items to consider: Sub-noise detection and classification, angle of arrival determination, aggregate RFI performance, real-time capabilities of monitoring system and notifications to wireless carriers
  4. **GOES downlink protection mechanisms and RFI mitigation methods**
     - Protection mechanisms are location-specific
     - Sharing rules are driven by population density, commercial deployment type, severity of anomalous propagation, terrain effects

Calls to Refine the SPRES Analysis

- **SPRES-FO is initiated to refine the efforts of the SPRES projects**
  - SPRES-FO report will propose solutions in the four main SPRES-FO tasks
  - Risk assessment analysis and risk impacts in outcomes of SPRES-FO
  - RFI modeling assumptions may impact sharing rules/protection criteria and assessments of alternative DCS facilities
  - RFI modeling assumptions will have different levels of impact based on the earth station location
    - Surface duct assumptions
    - Clutter modeling is location-specific
  - **End-user outreach, degree of responses, and response time**
    - **Understanding end-user technical requirements**

User Views on SPRES and way forward

Letter to FCC on SPRES Report (13 Sept 2022)

"As stated in the SPRES report, our organizations know the proposed sharing of the 1675-1680 MHz band carries substantial risks."

"The SPRES report indicates that satellite receivers operated by users of NOAA satellite data would likely incur radio frequency interference (RFI), resulting in loss of data. The consequences of such interference would be harmful and costly.

"The SPRES report examined a range of mitigations, including alternatives to the GRB and DCS broadcasts. Following a comprehensive exploration, there were no terrestrial distribution solutions that met the requirements, functionality, and performance of existing systems."

"We understand the FCC's interest in advancing spectrum sharing for the future but believe our long-stated concerns and the evidence provided in the SPRES report should signal a significant warning. The FCC should vacate its efforts to proceed with final rulemaking in the 1675-1680 MHz radio spectrum."

Signatories include:

AccuWeather, Inc.
Air Line Pilots Association, Intl
ALERT Users Group
American Geophysical Union (AGU)
American Meteorological Society (AMS)
American Weather and Climate Industry Association (AWCIA)
GeoOptics, Inc.
National Weather Association
Microcom Environmental
PlanetIQ
The Semaphore Group
Space Science and Engineering Center at University of Wisconsin
University Corporation for Atmospheric Research (UCAR)

Ongoing FCC Proceeding on Ligado
Request to Share 1675-1680 MHz

The approval three years ago of a related proceeding with Ligado to operate adjacent to GPS still faces considerable opposition – but due to lack of full complement of FCC Commissioners, the requests to stay the decision are still outstanding.

On 24 April 2023, a letter signed by 91 organizations was sent to President Biden and Congressional leaders highlighting the continued opposition to Ligado's efforts at both related to GPS and satellite communications, as well as weather and hydrological forecasting.

"The FCC should also not proceed with any companion rulemakings causing harmful interference to weather forecasting and hydrology services that could result in Ligado deployments, particularly in light of the analysis and recommendations presented in the "Spectrum Pipeline Reallocation 1675–1680 MHz Engineering Study (SPRES) Program Report."

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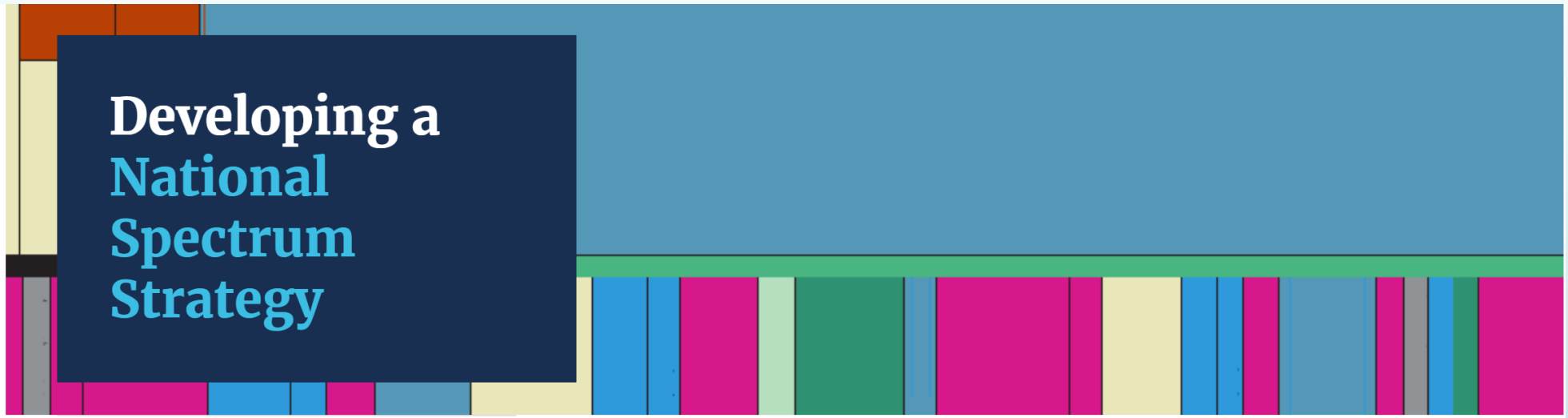

Developing a National Spectrum Strategy

Sufficient access to the radio spectrum is critical for national security, public safety, competitive next-generation communications, and scientific discovery. Spectrum access enables advances in U.S. innovation, connectivity, and competition benefiting all Americans. Access to spectrum must be managed responsibly and efficiently to achieve key economic, social, and national security goals.

To ensure Americans have sufficient access to spectrum resources, the Secretary of Commerce has called for the development and implementation of a comprehensive National Spectrum Strategy (NSS) for the United States. This strategy will represent a government-wide approach to maximizing the potential of our nation's spectrum resources.

NTIA is leading the development of the NSS and implementation plan in collaboration with the Federal Communications Commission, and in coordination with other Executive Branch agencies.

National Spectrum Strategy

Seeking to Identify 1500 MHz Spectrum for Auction

Comments at Public Event from American Meteorological Society (AMS):

"The prediction and early warning of weather and climate hazards like hurricanes, tornadoes, wildfires and winter storms are reliant on environmental technologies like satellites, buoys, stream gauges, balloons and radars. RF spectrum is crucial to the continuous operation of these technologies."

Written Comments from ALERT Users Group:

"On behalf of the ALERT Users Group (AUG), I am writing you in order to urge you to safeguard the 1675-1680 MHz spectrum band currently used to receive and transmit hydrologic data for public safety."

Written Comments from AMS:

"The hydrology and flood management community is specifically concerned with the delivery of real-time stream gage data and other crucial hydrologic and meteorological information that is transmitted near 1680 MHz and provides high flood risk communities throughout the U.S. and its territories with situational awareness and decision support during flood emergencies."

Key Links from this Presentation

(The AMS Website is currently down – so I will share the links to these letters and comments in the next few days.)

- October 2022 Letter to Senate Commerce Committee leadership on spectrum assets supporting forecasting of Hurricane Ian: https://www.ametsoc.org/index.cfm/ams/about-ams/ams-position-letters/letter-to-senate-committee-on-commerce-science-and-transportation-on-radiofrequency-spectra-vital-to-earth-system-observation-and-emergency-management/

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