

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of)
Upper C-band (3.98–4.2 GHz)) GN Docket No. 25-59
)

**REPLY COMMENTS OF THE
NATIONAL ACADEMY OF SCIENCES'
COMMITTEE ON RADIO FREQUENCIES**

The National Academy of Sciences, through its Committee on Radio Frequencies (hereinafter, CORF),¹ hereby submits its Reply Comments² in response to the Federal Communications Commission's (FCC's) *Notice of Proposed Rulemaking* (NPRM) in the above-captioned docket, FCC 25-78 (released November 21, 2025). In these comments, CORF discusses the importance of radio astronomy observations at 4 GHz and recommends methods for protecting those observations as well as noting the importance of the use of this band for communication of satellite data to National Weather Service (NWS) ground stations and other users of satellite remote sensing data for weather forecasts.

I. Introduction – Radio Astronomy and Observations at 4 GHz

CORF has a substantial interest in this proceeding because it represents the interests of the users of the passive scientific bands of the radio spectrum, including users of the Radio Astronomy Service (RAS) bands.

¹ See the Appendix for the membership of the Committee on Radio Frequencies.

² These Reply Comments support the Comments of the National Radio Astronomy Observatory (NRAO), filed January 13, 2026, in this proceeding ("NRAO Comments").

As the FCC has long recognized, radio astronomy is a vitally important tool used by scientists to study the universe. It was through the use of radio astronomy that scientists discovered the first planets outside the solar system, circling a distant pulsar. The Nobel Prize–winning discovery of pulsars by radio astronomers has led to the recognition of a widespread population of rapidly spinning neutron stars with surface gravitational fields up to 100 billion times stronger than that on Earth. Subsequent radio observations of pulsars have revolutionized understanding of the physics of neutron stars and have resulted in the first experimental evidence for gravitational radiation, which was recognized with another Nobel Prize. Radio astronomy has also enabled the discovery of organic matter and prebiotic molecules outside the solar system, leading to new insights into the potential existence of life elsewhere in the Milky Way galaxy. Radio spectroscopy and broadband continuum observations have identified and characterized the birth sites of stars in the Milky Way, the processes by which stars slowly die, and the complex distribution and evolution of galaxies in the universe. The enormous energies contained in the enigmatic quasars and radio galaxies discovered by radio astronomers have led to the recognition that most galaxies, including the Milky Way, contain supermassive black holes at their centers, a phenomenon that appears to be crucial to the creation and evolution of galaxies.

Synchronized observations using widely spaced radio telescopes around the world with Very Long Baseline Interferometry (VLBI) give extraordinarily high angular resolution, far superior to that which can be obtained using the largest optical telescopes on the ground or in space. Indeed, the first image of a supermassive black hole and its shadow, in the M87 galaxy, was obtained by such an array of radio

telescopes,³ followed more recently by observations of the black hole at the center of the Milky Way Galaxy.⁴

The critical scientific research undertaken by RAS observers, however, cannot be performed without access to interference-free spectral bands. Notably, the emissions that radio astronomers receive are extremely weak: a radio telescope receives less than 1% of one-billionth of one-billionth of a watt from a typical cosmic object, an amount many orders of magnitude fainter than typical human-generated signals. Because radio astronomy receivers are designed to pick up such remarkably weak signals, radio observatories are particularly vulnerable to interference from in-band emissions, spurious and out-of-band emissions (OOBEs) from licensed and unlicensed users of neighboring bands, and emissions that produce harmonic signals in the RAS bands, even if those human-made emissions are weak and distant.

³ See The Event Horizon Telescope Collaboration, 2019, *The Astrophysical Journal Letters*, 875, L1, <https://doi.org/10.3847/2041-8213/ab0ec7>. See also J. Greene, "Black Hole Photo Was No Big Surprise to Scientists. Here's Why It's Still Big Deal," *Washington Post*, April 12, 2019, at <https://www.washingtonpost.com/opinions/2019/04/12/black-hole-photo-was-no-big-surprise-scientists-heres-why-its-still-big-deal/>; S. Kaplan and J. Achenbach, "See a Black Hole for the First Time in a Historic Image from the Event Horizon Telescope," *Washington Post*, April 10, 2019, at <https://www.washingtonpost.com/science/2019/04/10/see-black-hole-first-time-images-event-horizon-telescope/>; and D. Overbye, "Darkness Visible, Finally: Astronomers Capture First Ever Image of a Black Hole," *New York Times*, April 10, 2019, <https://www.nytimes.com/2019/04/10/science/black-hole-picture.html>.

⁴ See The Event Horizon Telescope Collaboration, 2022, *The Astrophysical Journal Letters*, 930, L2, <https://doi.org/10.3847/2041-8213/ac6674>.

Of note in this proceeding is the importance of radio astronomy observations in the frequency range of 3.98–4.20 GHz (referred as 4 GHz hereafter). The 4 GHz band is a workhorse of the United States’ major radio telescopes: it optimizes sensitivity while providing versatile access to a variety of astrophysical emission mechanisms. It is used to study an impressive range of astronomical phenomena, from galaxies to stars to black holes. Below, CORF describes two specific high-impact science cases that depend critically on observations in the 4 GHz band.

Scientists have only recently begun to systematically survey the variable and transient sky, searching for objects that explode or otherwise change on timescales of seconds to decades. A classic example of an astronomical transient is the supernova explosion that marks the death of a massive star, but astronomers are also uncovering a staggering diversity of other time-variable phenomena, including the mergers of stars and the tearing apart of stars by massive black holes. At 4 GHz, studies of these transient phenomena trace the fastest moving material: jets and blast waves that are launched at speeds that approach that of light and interact with surrounding material, revealing the explosion’s immediate environment. Take, for example, the object GW 170817: the first merger of two neutron stars ever detected in gravitational waves and also the first “multi-messenger” gravitational wave event.⁵ After the electromagnetic counterpart was pinpointed at optical wavelengths, monitoring began at radio wavelengths, with observations obtained in the 4 GHz band taking center stage. Over days, weeks, and now years of following the outburst, astronomers have watched a

⁵ See R. Margutti and R. Chornock, 2021, First Multimessenger Observations of a Neutron Star Merger, *Annual Review Astronomy and Astrophysics* 59:155–202, <https://doi.org/10.1146/annurev-astro-112420-030742> (last viewed Jan. 16, 2026).

radio source be born, brighten, and then fade. The radio signature heralded the birth and expansion of a tightly beamed, relativistic jet of material launched when the two stars merged. Such jets are one of the most common and dramatic manifestations of accretion onto black holes, dumping vast amounts of energy into the environment, and the launch of a jet in GW 170817 is a strong piece of evidence that a black hole could have been promptly formed in the merger.⁶ Future 4 GHz observations of neutron star mergers will shed light on the nature of merger remnants and the diversity of outcomes following stellar mergers. Meanwhile, radio dishes spaced by hundreds-to-thousands of km, as in the Very Long Baseline Array (VLBA), provide very fine imaging resolution that allows astronomers to make movies of expanding astrophysical explosions like GW 170817,⁷ measuring the speeds of their fastest ejecta and revealing departures from spherical symmetry that constrain how the explosion/jet was launched. The sensitivity and resolution of the 4 GHz band also make it ideal for tracing star formation and accreting black holes at high redshift. Unlike observations at ultraviolet, optical, and infrared wavelengths, radio observations penetrate the enshrouding dust, enabling a complete census of star formation and accretion activity across cosmic time.

Observations at 4 GHz have been used to show that, even in the early universe, star formation was distributed throughout galaxy disks (similar to our Milky Way today), and that this star formation drove outflows that seeded intergalactic space with elements like

⁶ See, e.g., National Radio Astronomy Observatory, 2018, Radio Observations Confirm Superfast Jet of Material from Neutron Star Merger, <https://public.nrao.edu/news/superfast-jet-neutron-star-merger> (last viewed Jan. 16, 2026); and Balasubramanian et al., 2021, Continued Radio Observations of GW170817 3.5 Years Post-Merger, <https://arxiv.org/abs/2103.04821> (last viewed Jan. 16, 2026).

⁷ See Mooley et al., 2018, A Mildly Relativistic Wide-Angle Outflow in the Neutron-Star Merger Event GW170817, *Nature* 561:355, <https://www.nature.com/articles/nature25452> (last viewed Jan. 19, 2026); and Ghirlanda et al., 2019, Compact Radio Emission Indicates a Structured Jet Was Produced by a Binary Neutron Star Merger, *Science* 363:968, <https://www.science.org/doi/10.1126/science.aau8815> (last viewed Jan. 19, 2026).

carbon, oxygen, and nitrogen⁸ that comprise the building blocks of life on Earth. In the future, by combining 4 GHz observations with higher-frequency data, the contributions from star formation and black holes will be separated, enabling an understanding of how the supermassive black holes that lurk at the centers of most galaxies have grown since 13 billion years ago, or when the universe was less than 10% of its current age.⁹

RAS facilities in the United States that observe at 4 GHz are found at a range of locations, both rural (including in the National Radio Quiet Zone [NRQZ]) and urban. A representative subset of these instruments is listed in Table 1 below.

TABLE 1 Examples of U.S. RAS Observatories That Observe at 4 GHz¹⁰

Facility	Location	Receiver in Relevant Range	Notes
Very Large Array (VLA)	Socorro, NM	2–4 GHz (S-band) 3.9–7.9 GHz (C-band)	Rural
Green Bank Telescope (GBT)	Green Bank, WV (NRQZ)	3.95–8 GHz (C-band)	NRQZ
Very Long Baseline Array (VLBA)	Antennas sited at: Saint Croix, VI Hancock, NH North Liberty, IA Fort Davis, TX Los Alamos, NM Pie Town, NM Kitt Peak, AZ Owens Valley, CA Brewster, WA Mauna Kea, HI	2.9–7.9 GHz (C-band)	A mix of urban and rural sites

⁸ Rujopakarn et al., 2016, VLA and ALMA Imaging of Intense Galaxy-Wide Star Formation in $z \sim 2$ Galaxies, *The Astrophysical Journal* 833:12, <https://doi.org/10.3847/0004-637X/833/1/12> (last viewed Jan. 16, 2026).

⁹ Pope et al., 2019, Simultaneous Measurements of Star Formation and Supermassive Black Hole Growth in Galaxies, *Bulletin of the AAS* 51(3), <https://baas.aas.org/pub/2020n3i330> (last viewed Jan. 16, 2026).

¹⁰ See also Footnote US131 of the U.S. Table of Frequency Allocations 47 CFR 2.106 for a similar list of RAS facilities for coordination at 10.7–11.7 GHz.

Allen Telescope Array (ATA)	Hat Creek Radio Observatory (HCRO), CA	500 MHz–10 GHz	Rural
Very Long Baseline Interferometry (VLBI) Global Observing System (VGOS)	Antennas in the United States sited at: NASA Goddard, Greenbelt, MD Kōke'e Park Geophysical Observatory, Kōke'e Park, HI McDonald Observatory, Fort Davis, TX Westford Radio Telescope, Westford, MA	2.5–14 GHz	A mix of rural and urban sites

Estimates from the National Radio Astronomy Observatory (NRAO) spectrum management office suggest that observations in the 4 GHz band are common at its radio telescopes with the following details:

- At the NRAO's Very Large Array (VLA) near Socorro, New Mexico, between January 2012 to December 2023, the VLA observed the radio skies for 11,456 hours (15.8% of total time) and 11,696 hours (16.1%) using the C-band (4–8 GHz) and S-band (2–4 GHz) receivers, respectively.¹¹ These are the third and second most used receiver band on the VLA (after L-band or 1-2 GHz) and together represent 35% of the time at the VLA being used for observations at 4 GHz.

¹¹ EVLA Memo No. 232 - VLA Dynamic Scheduling Statistics, May 30, 2024, available at https://library.nrao.edu/public/memos/evla/EVLAM_232.pdf (last viewed January 16, 2026).

- For the 10-dish VLBA: C-band observations make use of about 15% of the VLBA observing time, with 50% of that time being used by the U.S. Naval Observatory for observations vital to the calibration of navigational coordinate systems.

In addition, several new RAS facilities are under development, which will be sensitive to radio emissions at 4 GHz. These facilities represent significant U.S. investment in RAS. They include:

1. The VLBI Global Observing System (VGOS), an internationally coordinated system of 12-meter dishes with wideband receivers covering 2.5–14.0 GHz.¹² This facility is under development by the International VLBI Service for Geodesy and Astrometry, which provides accurate reference correction for Coordinated Universal Time used in GPS, precise satellite orbits, and space navigation.¹³ The U.S.-based VGOS facilities include antennas at Kōkeʻe Park (Hawaii), McDonald Observatory (Texas), Greenbelt (Maryland), along with the Westford Radio Telescope operated by the Massachusetts Institute of Technology (MIT) Haystack in Massachusetts.
2. The Green Bank Observatory (GBO), located in the NRQZ, is actively developing a 0.7–4 GHz ultra-wideband receiver (UWBR)¹⁴ for the Green Bank Telescope (GBT) with the primary science goal of improving sensitivity to low-frequency gravitational waves and broadband fast transients.

¹² See <https://ivscc.gsfc.nasa.gov/technology/vgos-general.html> (last viewed Jan. 16, 2026).

¹³ See https://ivscc.gsfc.nasa.gov/stations/IVS_flyer_2025_final.pdf (last viewed Jan. 16, 2026). See also, NRAO Comments at para. 7.

¹⁴ See <https://ieeexplore.ieee.org/document/10297937> (last viewed Jan. 16, 2026).

Secondary science goals include the study of radio recombination lines and molecular spectroscopy.

3. The NRAO's Next Generation Very Large Array (ngVLA), a proposed successor for the current NRAO VLA, consists of 244 dish antennas of 18-m diameter and 19 dishes of 6-m diameter distributed over a large geographical region over 1,000 km in both rural and close to urban areas. The densely populated core array will be situated at the current VLA site in Socorro, New Mexico. Each of ngVLA antenna stations will be equipped with a number of receivers covering 1.2–116 GHz. Particularly, its proposed band No. 2 receiver will have an operational frequency range between 3.5–12.3 GHz.¹⁵
4. The Allen Telescope Array (ATA), operated at the Hat Creek Radio Observatory (HCRO), is planning an upgraded receiver with single cooled log-periodic feed covering 1–14 GHz.¹⁶

Radio astronomers routinely process data containing emissions from other systems (both intentional and spurious and/or OOBES) to reach the extremely low sensitivity limits needed for astronomical sources. The fractional sensitivity loss for a wide band receiver is roughly equal to the square root of the fraction of the band that has to be excised. In addition, very bright emissions can result in a complete loss of all data during the time the signal is active, and faint emissions below the level that can be identified and excised raise the overall noise floor reducing overall sensitivity. This work to mitigate the impact of emissions from other services results in a loss of data and/or

¹⁵ See <https://ngvla.nrao.edu/page/performance> (last viewed Jan. 16, 2026).

¹⁶ See <https://www.seti.org/projects/ata> (last viewed Jan. 16, 2026).

sensitivity of the radio telescope, effectively reducing the available radio telescope time on existing and future facilities. Increased allocations to active services will require radio astronomers to expend additional resources in both computing and scientists' time on mitigation efforts. For new instruments, the broadband science drivers require as wide a band as possible. The trend is toward receivers like the UWBR at GBO with greater flexibility rather than narrowband special purpose receivers. Transmitters in the band would require the use of (additional) notch filters, which are necessarily quite a bit wider than the specific bands of the transmitters.

II. Coordination with RAS at 4 GHz

CORF recognizes that there is no RAS allocation in this 4 GHz band. However, coordination between active and passive users of the spectrum would greatly benefit important scientific research at 4 GHz. CORF recommends that consideration be given to adding the band 3.98–4.2 GHz to those listed in US 342, requesting “all practicable steps” be taken by upper C-band licensed operators to protect the RAS from harmful interference. This might range from simple avoidance of RAS receiver saturation (and potential damage) to retaining some coordinated access at 4 GHz for sensitive astronomical observations. Such coordination could occur through the requirements of Section 1.924 of the FCC’s rules for the NRQZ (for operations within the geographic area covered in that rule) through new coordination zones to be established as part of new C-band rules or through the use of dynamic coordination. It should be noted that most radio telescopes in the United States are in locations with low population density,

and thus there is less pressure on spectrum resources to serve a lower number of subscribers.

A. National Radio Quiet Zone

Section 1.924(a) of the FCC's rules establishes an NRQZ in portions of Virginia and West Virginia. Under these requirements, applicants and licensees planning to construct and operate a new or modified station at a permanent *fixed* location must provide written prior notification to the Director of the NRAO of the technical details of the proposed operation. This triggers a 20-day period for NRAO comments or objections and for coordination between the NRAO and the operator. Any new fixed terrestrial upper C-band operations in the NRQZ would be subject to this coordination process.¹⁷

B. Coordination Zones

An additional approach to the protection of RAS observations at 4 GHz would be the enactment of traditional style coordination or protection zones, such as those set forth in Footnotes US131 and US161, and the requirements of Section 25.213 of the FCC's rules. In regard to coordination with RAS observatories working at 4 GHz listed in Table 1 above, the first principle is that the coordination zone must be designed to

¹⁷ In paragraph 39 of the FCC's May 27, 2025, Further Notice of Proposed Rulemaking in SB Dkt. 25-180/GN Dkt. 22-352/WT Dkt. 23-158/GN Dkt. 14-177 ("FNPRM"), it noted that RAS operations within the NRQZ could be affected by changes in satellite allocations in the 12.7–13.25 GHz band, particularly if satellite downlinks are authorized in that band. Thus, the FNPRM sought comment on protecting RAS observations in that band at remote sites, including within the NRQZ. In response, CORF Comments filed in that proceeding on July 28, 2025, recommended (at pages 10–14) coordination of any such satellite downlinks with a limited number of radio astronomy observatories, both in and outside of the NRQZ. CORF recommends the same approach in the present proceeding if the FCC retains satellite downlinks in the upper C-band. Indeed, in Comments filed on May 30, 2024, in GN Dkt. 23-65/IB Dkt. 22-271, CORF noted (at pages 14–15, footnote 21) that the NRQZ rule was conceived before the era of modern satellite communications, is badly outdated, and thus CORF recommended that Section 1.924(a) be updated to include coordination with satellite operators.

protect observatories to the levels set forth in ITU-R RA.769-2.¹⁸ Furthermore, even for satellite earth station uplinks (and if the FCC so chooses, downlinks), coordination must take into account if the transmitter is in the line of sight of a radio astronomy observatory.¹⁹

¹⁸ See https://www.itu.int/dms_pubrec/itu-r/rec/ra/R-REC-RA.769-2-200305-!!!PDF-E.pdf (last viewed Jan. 16, 2026).

¹⁹ Even if the FCC declines to mandate coordination with RAS facilities outside of the NRQZ, it could enact a rule that urges every practicable effort to be made to avoid the assignment of frequencies to stations in the fixed and mobile services that could interfere with radio astronomy observations within a radius of the RAS facilities in Table 1 above, similar to the text of Footnote US385(a), and/or it could facilitate voluntary coordination as set forth in Footnote US385(b).

C. *Dynamic Coordination*

As an alternative to adding coordination zones, the FCC could facilitate dynamic coordination between upper C-band operators and a limited set of RAS facilities. This might be similar to the coordination facilitated between non-geostationary satellites at 10.7–11.7 GHz in Footnote US131. This would create a further opportunity to experiment with and demonstrate new engineering and technical capabilities to enable such sharing.

In recognition of the complex and dynamic future of spectrum sharing that may be enabled with modern technology, the National Science Foundation (NSF) and other organizations supported work on the development of a National Radio Dynamic Zone (NRDZ). The NRDZ is a recent concept study exploring a unifying and dynamic spectrum sharing framework for active and passive spectrum users.²⁰ This approach could enable innovative new antennas and spectrum management schemes to work in close geographic proximity with passive RAS facilities by sharing spectrum in time. Radio telescopes are typically mounted with several receivers, each of which covers a range of frequencies, and while many receivers on radio telescopes have very broadband sensitivity no specific frequency is continuously monitored by any individual RAS telescope.

Many RAS facilities are already dynamically scheduled to account for projects in the observing queue, positions of associated astronomical targets in the sky, and anticipated weather conditions when allocating observing time to specific bands within their suite of receivers. A dynamic scheduling system can evaluate weather, equipment,

²⁰ See <https://www.nsf.gov/funding/opportunities/sii-nrdz-spectrum-innovation-initiative-national-radio-dynamic-zones/505990/nsf22-579> (last viewed Jan. 16, 2026).

and radio astronomy observer availability to optimize the observing schedule for the near future use of the telescope. Observers usually have 24–48 hours’ notice of their allocation of observing time slots. This method enables the most efficient match of frequency range to weather conditions. The VLA,²¹ VLBA,²² and GBT²³ are dynamically scheduled in this manner.

One of the NRDZ development efforts led by NRAO is the Operational Data Sharing (ODS) system.²⁴ This enables radio telescopes to share observation parameters (e.g., observing time range, telescope pointing coordinates, and frequency range in use) with satellite constellation operators in machine readable form online in near real time through an application programming interface (API).²⁵ The satellite operators can then use this information to adjust their downlink transmission to reduce, if not entirely mitigate, the level of potential interference to the telescopes. For example, using the telescope schedule data provided by the ODS system, SpaceX has implemented the Telescope Boresight Avoidance (TBA) technique, which can modify and disable the downlink beam placement of a particular Starlink satellite when its orbital trajectory intersects the main antenna beam of the radio telescopes.²⁶ It is

²¹ See <https://science.nrao.edu/facilities/vla/docs/manuals/obsguide/dynsched/introduction> (last viewed Jan. 16, 2026).

²² Operational need to run multiple antennas at once pushes the VLBA to fixed scheduling at times when coordinating with VLBI. See <https://science.nrao.edu/facilities/vlba/observing/dynamicguide> (last viewed Jan. 16, 2026).

²³ See <https://science.nrao.edu/facilities/gbt/schedules/dynamic> (last viewed Jan. 16, 2026).

²⁴ See <https://ieeexplore.ieee.org/document/11226977> & <https://obs.vla.nrao.edu/ods> (last viewed Jan. 16, 2026).

²⁵ Currently, 15-20 minute notice of observations is possible with ODS and one major satellite operator. Depending on a constellation’s capability, other satellite operators may require the ODS to inform them sooner.

²⁶ See, e.g., https://starlink.com/public-files/Telescope_Boresight_Avoidance.pdf?srsId=AfmBOooOeYTSFCo4jchXB2em03GfEvQMtkAr6pU9c6iKO-ZptdzazMkD (last viewed January 20, 2026); Bang D. Nhan et al., Toward Spectrum Coexistence: First Demonstration of the Effectiveness of Boresight Avoidance between the NRAO Green Bank Telescope and Starlink Satellites, 2024 ApJL 971 L49, DOI 10.3847/2041-8213/ad6b24.

CORF's understanding that SpaceX is currently operating and testing TBA for NRAO's VLA, VLBA, and GBT, along with the HCRO's ATA, the MIT Haystack Westford Telescope, and the nine telescopes operated by the Commonwealth Scientific and Industrial Research Organisation's Australia Telescope National Facility.²⁷

CORF recommends that under an NRDZ approach, upper C-band operators would notify the NSF of construction of fixed facilities within line of sight of a limited number of RAS observatories in a timely manner. Then coordination could be initiated by those RAS facilities when and where observations will be occurring at 4 GHz.

III. Possible Negative Impact on Weather Forecasting

CORF notes that the FCC's upper C-band proposal would also impact the satellite communications at 4.02 GHz used to relay NWS products, satellite imagery, radar data, and model outputs (for which the passive measurements serve as an important input) to many users. These users include all NWS forecast offices (see Figure 1 below), river forecast centers, the Federal Aviation Administration Central Weather Service Unit locations, and NWS specialized centers such as the National Hurricane Center, Storm Prediction Center, Aviation Weather Center, Weather Prediction Center, Space Weather Prediction Center, Ocean Prediction Center, as well as external users such as The Weather Company and AccuWeather. Additional federal users of this network are the Department of Defense and the U.S. Geological Survey.

²⁷ See, e.g., Nhan et al., ODS: A Self-Reporting System for Radio Telescopes to Coexist with Adaptive Satellite Constellations, <https://ieeexplore.ieee.org/document/11226977> (last viewed Jan. 16, 2026). Non-NRAO facilities are currently hosting their own ODS API server independently. See <https://obs.vla.nrao.edu/ods/index.html/community.html> (last viewed Jan. 16, 2026). See also NRAO Comments at para. 11.

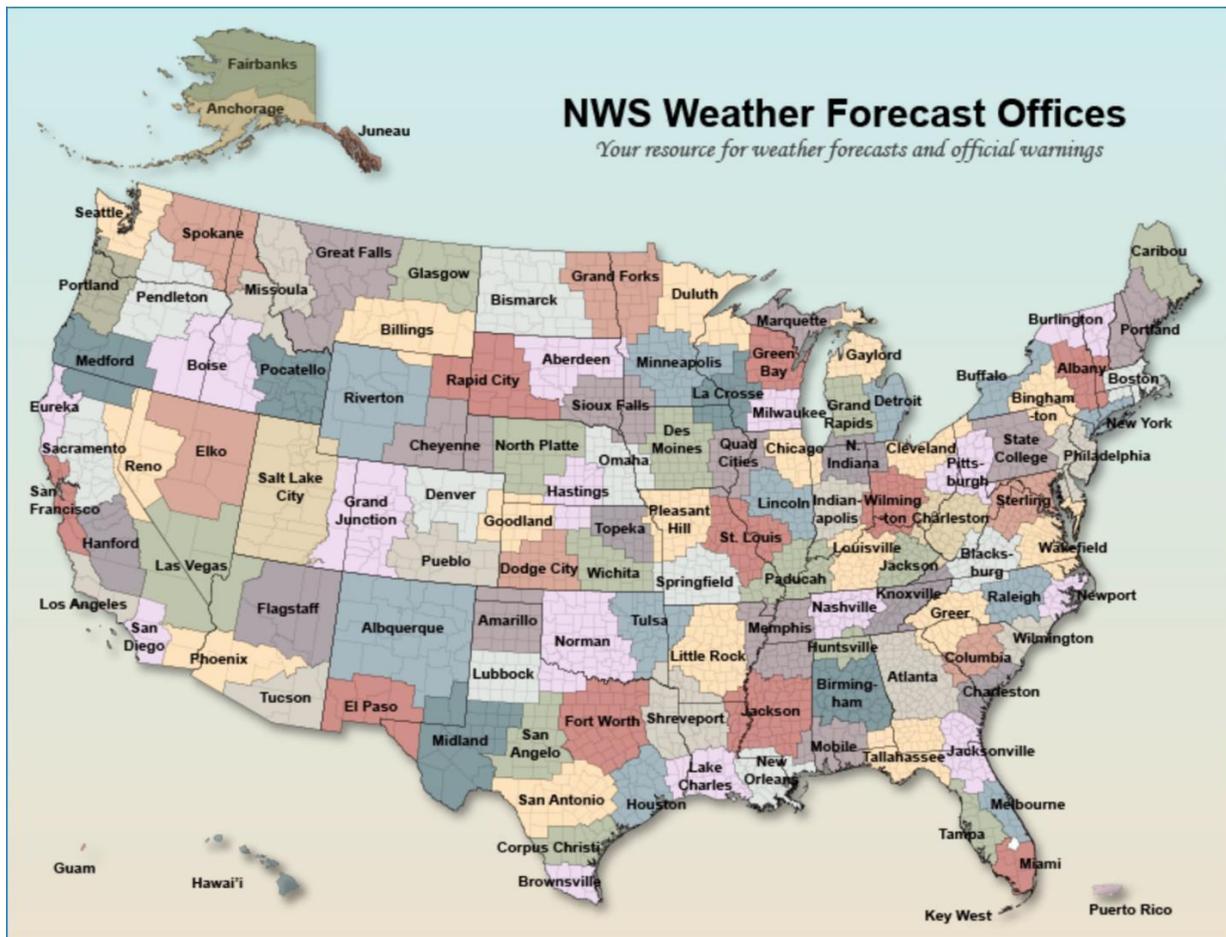


FIGURE 1 National Weather Service forecast offices that use 4 GHz downlink for primary data acquisition necessary for forecast generation. SOURCE: NWS Weather Forecast Offices, <https://www.weather.gov/srh/nws/offices> (last viewed Jan. 16, 2026).

Interference to this satellite data broadcast network could significantly degrade the data inputs to weather forecaster workstations at these locations. Moving this satellite communication network to higher frequencies could result in a negative impact on reliable transmissions during severe weather. The protection and integrity of these existing one-way receive terminals (regardless of frequency range) are paramount.

Another relevant National Oceanic and Atmospheric Administration (NOAA) satellite network is GEONETCast Americas (GNC-A) operating at 4.08 GHz, which provides a

near real time global network of satellite-based data to diverse communities of users.²⁸ Operational terminals at NOAA or other federal agencies would require protection.

If the upper C-band is repurposed as proposed in the NPRM, with satellite communications moved to another band of higher frequency, it is unclear if the transmission of key weather data would have the same reliability in severe weather, as compared to C-band. Shifting to a higher-frequency band may not be feasible if that higher-frequency band has outages during severe precipitation events. Notably, the NOAAPort Advanced Weather Interactive Processing System Satellite Broadcast Network²⁹ is the primary data source for weather forecasters to obtain information necessary to make weather forecasts and develop watches, warnings, and other meteorological products.

IV. Conclusion

As discussed above, while no allocation exists for RAS at 4 GHz, many existing radio telescopes opportunistically observe at this band, and significant U.S. investment is currently being made in new, very sensitive facilities that will be able to observe at that band. Facilitating coordination between RAS and new upper C-band operators to help to enable the success of these very sensitive broadband radio continuum astronomy observations at a limited number of geographic locations, either through the expansion of coordination zones or via an NRDZ-like approach, would serve the public interest developing cutting-edge science, as well as new efficient coordination technologies. In addition, the upper C-band satellite communications at 4.02 GHz are

²⁸ See <https://www.geonetcastamericas.noaa.gov/> (last viewed Jan. 16, 2026).

²⁹ See <https://www.weather.gov/noaaport> (last viewed Jan. 16, 2026).

essential for the relay of NWS products, satellite imagery, radar data, and model outputs to numerous U.S. federal agencies. GNC-A additionally operates at 4.08 GHz. This information represents the primary data sources used by weather forecasters to make weather forecasts and develop watches, warnings, and other meteorological products. Thus, any allocation to new upper C-band users requires the consideration of protection of these important receive-only operators.

Respectfully submitted,

NATIONAL ACADEMY OF
SCIENCES' COMMITTEE ON
RADIO FREQUENCIES

A handwritten signature in black ink that reads "Marcia McNutt". The signature is written in a cursive style with a long, sweeping horizontal line extending to the right from the end of the name.

Marcia McNutt
President, National Academy of Sciences

Direct correspondence to:

CORF
National Academies of Sciences,
Engineering, and Medicine
500 Fifth Street, NW, Keck 954
Washington, DC 20001
(202) 334-3520

February 13, 2026

Appendix

Committee on Radio Frequencies

Members

David G. Long, Brigham Young University, *Co-Chair*

Karen L. Masters, Haverford College, *Co-Chair*

Héctor G. Arce, Yale University

Nancy L. Baker, Naval Research Laboratory (retired)

Reyhan Baktur, Utah State University

Shamibrata Chatterjee, Cornell University

Laura B. Chomiuk, Michigan State University

Kshitija Deshpande, Embry-Riddle Aeronautical University

Tomas E. Gergely (retired)

Christopher Kidd (retired)

David G. Lubar, The Aerospace Corporation

Sidharth Misra, NASA Jet Propulsion Laboratory

Bang D. Nhan, National Radio Astronomy Observatory (Virginia)

Jeffery J. Puschell (NAE), Northrop Grumman

Suzanne Staggs (NAS), Princeton University

Staff

Kristen Garofali, Responsible Staff Officer

Christopher J. Jones, Responsible Staff Officer