



AMERICAN METEOROLOGICAL SOCIETY

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Federal Communications Commission
Ms. Marlene Dortch, Secretary
445 12th Street, S.W.
Washington, DC 20554

RE: Letter in response to RM-11681 Petition for Rulemaking: Ligado's Request to Allocate the 1675-1680 MHz band for Terrestrial Mobile Use Shared With Federal Use

Dear Ms. Dortch:

Founded in 1919, the American Meteorological Society (AMS) is the nation's premier scientific and professional organization promoting and disseminating information about the atmospheric, oceanic, hydrologic sciences. Its more than 13,000 members include scientists, researchers, educators, broadcast meteorologists, students, weather enthusiasts, and other professionals in the fields of weather, water, and climate. The AMS represents academic, government, and industry members.

The members of the AMS are reliant on data collected from Geostationary Operational Environmental Satellites (GOES) for both research and operational activities, including those of a commercial nature. These activities enhance the meteorological and hydrological actionable and scientific products that are provided to private customers, the American public, and federal operational meteorologists. Consistent, reliable, and timely receipt of geostationary weather satellite data is a necessary element of developing and delivering products and services to our members and our members' stakeholders.

To this end, some AMS members rely on direct broadcasts of GOES imagery and have made investments to continue this reception capability in the GOES R-Series (GOES-R) era. Radio frequency interference in the 1675-1695 MHz spectrum from strong terrestrial downlinks within or adjacent to the weaker GOES and GOES-R signals may interrupt the access to weather satellite imagery from direct broadcast reception stations. The proposal at hand jeopardizes a longstanding and proven method for AMS members to access weather satellite imagery and serve derived products, particularly during periods of active and severe weather, when the efficiency of data access is of utmost importance.

Those advocating to share the 1675-1695 MHz radio spectrum have proposed a terrestrial delivery method to ameliorate concerns of interrupted access to GOES and GOES-R data. However, this proposal presents several obstacles to AMS members that are detrimental to the timeliness and reliability of the data flow. These are outlined without any specific designation of relative importance.

First, the specified GOES Rebroadcast (GRB) data rate in the GOES-R era is 31 Mbps, which is substantially greater than the 2.11 Mbps data rate of the current GOES service. This is due to the higher spatial and temporal resolution of GOES-R compared to current GOES. The GOES-R imager will also provide imagery at a spatial resolution of approximately 0.5 km for the visible band, and 2 km for the infrared bands, an improvement of four times. GOES-R will also have an optical sensor, or mapper, to detect lightning flashes, that does not exist on current GOES. The network infrastructure necessary to provide suitable bandwidth to support all GRB data via a terrestrial network, plus other meteorological data that AMS members require, such as numerical weather prediction model output and Doppler radar imagery, may not be universally accessible or feasible to purchase.

Second, AMS members need weather information at all times, and currently receive and collect GOES imagery at all times via direct broadcast. In designing new generation weather satellites, the federal government performs an exhaustive process to determine the observational visible, near-infrared, and infrared spectral bands of importance on weather satellite imagers for the purpose of weather analysis and forecasting. The weather enterprise desires clear access to all sixteen bands, eleven more than currently on GOES, and at full temporal and spatial resolution on GOES-R, which GRB will provide. The delivery of data for weather-sensitive applications is highly dependent on timeliness. Given the GOES-R imager is capable of providing imagery every 30 seconds for select domains, a latency of more than 30 seconds has the potential to negatively impact meteorological services that AMS members provide in situations where the environment is evolving rapidly, especially in cases of severe thunderstorms, wildfires, hurricanes, hazardous plumes from unplanned or intentional releases of dangerous biological, radiological, or chemical materials, and volcanic eruptions. Terrestrial delivery networks and cloud services of insufficient capacity are susceptible to performance limitations under variable access loads, characteristic of weather information users.

Third, the Japan Meteorological Agency (JMA) currently provides a functional example of provisioning satellite imagery via a cloud service. JMA provides a cloud service of full resolution imagery from its Himawari-8 satellite to requesting national meteorological and hydrological services. The imager on Himawari-8 is very similar to that on GOES-R. In practice, despite its constraint on the number of users, the delivery method from the cloud service has not met the reliability standards that GRB users will require. By their nature, terrestrial networks have multiple points of failure based on the number of nodes the data transits. Outages of data have resulted from interruptions in paths between the cloud service and terminus users, and have lasted from hours to days, impacting operations.

Fourth, the number of prospective cloud service users for GOES-R is not fixed, nor is the number of direct broadcast users that would desire a cloud service well known, even currently. As part of developing a cloud service, the characteristics of the users and their needs would need to be known because the cost and nature of a solution is dependent on the number of parties requiring data. The AMS has endeavored to engage its membership on these important proceedings, though it is likely that many do not understand the gravity of the FCC rulemaking process, since these communities do not traditionally follow FCC proceedings. Given that environmental satellite data is freely and openly available to users that have the technology to obtain it, there is no existing register of users. While manufacturers of direct broadcast antenna reception systems are likely aware of current users from past customer lists, and therefore can communicate with them, achieving comprehensive public lists of current users may be difficult. Thus, users reliant on this data may not know of ongoing FCC proceedings despite their potential significant impact on access to and the reliability of weather satellite data. This underscores the need for more comprehensive user and market research beyond this public notice, which merits delaying decisions related to the sharing of this band.

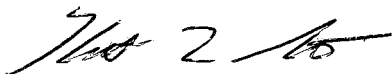
Furthermore, customers of commercial meteorological services and environmental data providers may be a separate class of users of direct broadcast weather satellite data that are detached from these proceedings. Those users may require a certain timeliness and quality of imagery and derived products originating from direct broadcast that has been previously unthreatened. For instance, weather satellites provide a significant portion of weather information to aviators on transoceanic routes, where hazards, such as thunderstorms, turbulence, and volcanic ash, pose a substantive threat to flight safety. Impacts to these types of indirect users should also be considered, though identifying and contacting interested users first requires further effort.

In summary, the AMS is concerned that sharing the 1675-1680 MHz radio spectrum and resulting interference as a result of that sharing would limit the American weather enterprise's access to timely weather satellite imagery and thus burdens the weather research and decision services that our members provide, with implications for the American public. Eliminating direct broadcast reception of weather

satellite imagery would substantiate a risk of bandwidth limitations, data interruptions, subpar reliability, and unmet user needs.

We understand the FCC's interest in advancing technology, but believe our concerns should signal caution and need for pause before advancing with rulemaking in the 1675-1680 MHz radio spectrum. Thank you for the opportunity to represent our membership and comment on this issue of importance to our organization and society.

Sincerely,



Keith L. Seitter
Executive Director

cc:

The Honorable John Thune, Chairman, Senate Commerce, Science and Transportation Committee
The Honorable Bill Nelson, Ranking Member, Senate Commerce, Science and Transportation Committee
The Honorable Marco Rubio, Chairman, Subcommittee on Oceans, Atmosphere, Fisheries, and Coast Guard
The Honorable Cory Booker, Ranking Member, Subcommittee on Oceans, Atmosphere, Fisheries and Coast Guard
The Honorable Richard Shelby, Chairman, Commerce, Justice, Science, and Related Agencies Subcommittee
The Honorable Barbara Mikulski, Vice Chairwoman, Senate Appropriations Committee
The Honorable Fred Upton, Chairman, House Energy and Commerce Committee
The Honorable Frank Pallone, Jr, Ranking Member, House Energy and Commerce Committee
The Honorable Greg Walden, Chairman, Communications and Technology Subcommittee
The Honorable Anna G. Eshoo, Ranking Member, Communications and Technology Subcommittee
The Honorable Jim Bridenstine, Chairman, Subcommittee on Environment, House Science, Space and Technology Committee
The Honorable Suzanne Bonamici, Ranking Member, Subcommittee on Environment, House Science, Space and Technology Committee
The Honorable John Fleming, Chairman, Subcommittee on Water, Power and Oceans, House Natural Resources Committee
The Honorable Jared Huffman, Ranking Member, Subcommittee on Water, Power and Oceans, House Natural Resources Committee
The Honorable John Culberson, Chairman, Commerce, Justice, Science and Related Agencies Subcommittee
The Honorable Mike Honda, Acting Ranking Member, Commerce, Justice, Science and Related Agencies Subcommittee
The Honorable Lawrence E. Strickling, Assistant Secretary for Communications and Information and NTIA Administrator, Department of Commerce
The Honorable Dr. Kathryn D. Sullivan, Under Secretary of Commerce for Oceans and Atmosphere and NOAA Administrator