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17 July 2015

U.S. Senate Committee on Commerce, Science, and Transportation
The Honorable John Thune, Chairman
512 Dirksen Senate Building
Washington, DC 20510

Dear Senator Thune,

The Nation's Weather and Climate Enterprise provides vital products to the general public, weather-sensitive government agencies, and private industries (e.g., energy exploration and generation, aviation, land and maritime transportation, and satellite communications). Hurricane and severe-storm warnings, flood watches and warnings, and aviation products such as volcanic ash warnings or icing and turbulence notices are examples of such products. All three components of the enterprise — government agencies, academic institutions, and the private sector — rely on the direct broadcast of weather satellite data and the relay of information via satellite. Because of the importance of these communications, **the American Meteorological Society (AMS) and the National Weather Association (NWA) express their concern, and encourage careful deliberation regarding the options and their consequences, before any decision is made regarding sharing of the 1675–1695 MHz radio spectrum band between current meteorological and hydrological users and terrestrial broadband wireless.**[1]

In recent years, demands for use of the radio spectrum have increased. The last FCC auction, which yielded $2.4B for an unpaired former polar satellite downlink band, is a perfect example of the desirability of increased spectrum availability by the private sector. As you are aware, the broadcast downlink band on GOES and GOES-R (1675–1695 MHz) is currently being evaluated by NTIA in its search for candidate federal spectrum bands for future auctions.[2] The AMS and NWA are concerned about the impact of such an auction to users in both the public and private sectors, and we have sponsored several events aimed at both educating the public of the potential dangers and increasing our understanding of who may be impacted by such an action.[3] We are sending this letter today to register our concern; emphasize the important contribution of this spectrum to the users of weather, hydrological, and environmental data; and point out the need for careful deliberation.

Accurate forecasting and the creation of a variety of other weather products require large amounts of input data. Satellite data and imagery provide a significant percentage of this time-critical information, including the basis of timely warnings of tornadoes and hurricanes, solar storm–induced electric currents, and the spread and concentration of volcanic ash clouds.

In addition, satellites make possible reliable and continuous transmission of data to meteorologists and hydrologists who issue warnings, watches, and forecasts. For example, flood warning and water-management data from remotely located, geographically diverse terrestrial

sensors in streams, rivers, lakes and coastal areas are transmitted via the GOES/GOES-R Data Collection System. Also, thanks to satellites, National Weather Service data get to first-responders and disaster managers anywhere in the country via the Emergency Managers Weather Information Network (EMWIN). Lives have been saved as a result of the near-real-time data available via EMWIN, which can receive near-real-time NWS information via a one-meter-sized open-mesh antenna and a battery powered receiver. EMWIN is a service that has been in use for twenty years.

The reliable receipt of this satellite broadcast data to unprotected satellite ground stations has a high likelihood of being jeopardized by radio frequency interference from proposed high-power terrestrial transmitters supporting commercial broadband wireless services. The downlink signals from satellites are intentionally weak; broadband wireless signals can be as much as ten trillion times stronger than downlink signals such as EMWIN. Receivers cannot properly function in the presence of such large signals when sharing the *same* spectrum as a desired weaker signal. The satellite ground stations receiving emergency management near-real-time data from the National Weather Service, data and imagery from the current and next-generation of GOES satellites, and water management and flood warning data have a high likelihood of malfunctioning in the presence of such strong in-band terrestrial LTE signals, whose ground station receivers are designed to receive signals in this spectrum band.

Even the federal government uses the 1675–1695 MHz spectrum band for direct broadcasts from space to ensure data availability at crucial federal facilities such as the NOAA Satellite Operations Facility (Suitland, MD), National Hurricane Center (Miami, FL), the Aviation Weather Center (Kansas City, MO), the Space Weather Prediction Center (Boulder, CO), the Storm Prediction Center (Norman, OK), and other National Weather Service (NWS) facilities. Although NWS facilities may have redundant methods to obtain some of this information, none is as timely, reliable, or complete as data directly broadcast via this spectrum. For example, critical observations of solar radiation and the near-earth radiation environment are communicated to NWS facilities in Boulder, Colorado, where nowcasts and warnings are issued to protect the nation's power grid, communications satellites, transpolar commercial aviation flights, and astronauts in space with as little as 10 seconds lead time. The only timely source of this data is direct satellite broadcast in the 1675–1695 MHz band.

In Honolulu, aviation and marine weather forecasts, flooding/hydrology and public forecast services over the Pacific region, and hurricane forecasts in the Central Pacific ocean region all depend upon receipt of satellite direct broadcast in this spectrum. Likewise, Alaska is also dependent upon satellite services.

Flooding and drought incur significant costs to the nation. Drought events from 1980–2014 are estimated to have cost the nation $206 billion (CPI adjusted) and inland flooding over the same timeframe $88 billion.[4] Flood warning and water management originate primarily from river, stream, and tidal-gauge data that are relayed within this band via GOES-R satellites.

Many end users of meteorological and hydrological products do not understand the role that the federal radio spectrum plays in contributing to the weather communication architecture and have no idea how sharing it could impact those products and services upon which they depend. This may be why potentially impacted users have not commented in the past.

Although the AMS and NWA recognize the need for sharing of spectrum bands for commercial broadband applications, the choice of which spectrum bands are shared should not endanger the reliability or the effectiveness of public safety meteorological and hydrological data flow from NOAA satellites. We note that the Presidential Memorandum on the wireless broadband revolution in 2010 directed that spectrum repurposing must "… take into account the need to ensure no loss of critical existing and planned Federal, State, local and tribal government capabilities[5] …" The AMS and NWA believe that sharing the 1675–1695 MHz spectrum band could create a loss of critical capabilities and that the sharing of the 1675–1695 MHz spectrum band should not move forward unless it can be confirmed that no loss or interruption of the critical live-saving operations currently using it will occur.

Thank you for the opportunity to express these views.

Sincerely,

Dr. Keith Seitter
AMS Executive Director

Janice Bunting
NWA Executive Director

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[1] Previous statements on such topics include the 2009 AMS Policy Statement on "Radio Frequency Allocations for Meteorological Operations and Research."

[2]http://www.ntia.doc.gov/files/ntia/publications/ntia_5th_interim_progress_report_on_ten-year_timetable_april_2015.pdf

[3] Panel during the 2015 AMS Annual Meeting under the Third Symposium on the Weather and Climate Enterprise, "Streaming Media: The Choice Between "Movies" or Weather Products," recording available at https://ams.confex.com/ams/95Annual/webprogram/Session37898.html. Also see the joint AMS-SWF webinar "Challenges in Sharing Weather Satellite Spectrum with Terrestrial Networks" held in Washington, D.C., 27 March 2015. The transcript is available at http://swfound.org/events/2015/challenges-in-sharing-weather-satellite-spectrum-with-terrestrial-networks/.

[4] https://www.ncdc.noaa.gov/billions/summary-stats

[5] https://www.whitehouse.gov/the-press-office/presidential-memorandum-unleashing-wireless-broadband-revolution