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June 21, 2016

Federal Communications Commission  
Ms. Marlene Dortch, Secretary  
445 12<sup>th</sup> 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:

My company has worked in the NOAA weather satellite domain, particularly on the GOES geostationary weather satellites, since the late 1990's. We have contracted directly with NOAA and we have worked for NOAA as major subcontractors on multiple ground system projects.

Based on our more than 20 years of work within NOAA, we are aware every day of the value of the direct broadcasts from the Geostationary Operational Environmental Satellite (GOES) and will use the direct broadcasts from GOES-R series satellites in the 1675-1695 MHz radio spectrum. As we value consistency and infuse innovation into our work with NOAA (e.g., improving algorithms to precisely locate severe weather and distribute weather data with the minimum delay), we know timely and reliable reception of data from NOAA's geostationary satellites is crucial to getting this taxpayer-funded technology to work as it needs to for the public. Low latency direct broadcast is a key driver for our GOES-R system design, which will enable decision makers, first responders, and forecasters to have the most timely weather data upon which to base decisions that affect life and property.

Carr Astronautics is also aware that many private sector companies that provide value-added meteorological and hydrological data products also rely critically on our work and the 100 percent reliability of this data. We believe radio frequency interference can be generated from strong terrestrial downlinks, which share the same spectrum as the relatively weak signals from GOES in space, would have a devastating impact on all who rely on real-time weather forecasts in the U.S. and across the western hemisphere.

The weather enterprise is on the verge of launching a new generation of GOES satellites. GOES-R series satellites are a giant leap forward in technology, and Carr Astronautics is a major contributor to the development of the GOES-R ground

system under subcontract to Harris Corp. These satellites will offer more and different types of data products that will be more accurate, of higher resolution and greater quantity than the current system. And that data will be available faster than the current satellite – in large part attributable to the direct broadcast downlink and the environmental/hydrological data relay in 1675-1695 MHz band.

Many universities and research institutions, which whom we work, rely on receipt of directly broadcast data. These users often have small budgets and would be adversely impacted by terrestrial interference in the 1675-1680 MHz band. Some of these institutions have on-going research programs and use GOES data for the operation of other systems. One such system, of which we have direct knowledge, is the TEMPO mission being run from the Smithsonian Astrophysical Observatory as a NASA-funded Earth Venture Instrument project. I am a Co-Investigator on the TEMPO Science Team. Although, we will not be operational until 2018 or later, we critically need GOES data for our science data processing and would want to have the ability to access that via direct broadcast (i.e., GRB).

Working within NOAA on these crucial technologies, we know warnings to protect lives and property must be issued as rapidly as possible and be available under all conditions and situations. Direct downlink information must be available 100 percent on a 24/7/365 basis to NOAA users since we know that cellular networks and Internet capabilities are often taxed to their maximum during severe weather and natural disasters, whereas the GOES / GOES-R direct broadcasts have very little infrastructure that is subject to failure during stressing conditions.

As noted in a Washington Post Capital Weather Gang<sup>1</sup> guest post on May 6, 2016:

“[T]he 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<sup>2</sup> [ ] 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.”

While we understand the FCC’s interest in advancing technology, Carr Astronautics knows that the dissemination of life saving weather information to the nation via GOES and the future GOES-R series of satellites every day is very important and interference would endanger the reliability and the effectiveness of public safety meteorological and hydrological data flow. We applaud the transmission of weather warnings via smartphones and tablet computers, but it is critical to note that

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<sup>1</sup> <https://www.washingtonpost.com/news/capital-weather-gang/wp/2016/05/06/opinion-commercial-interests-may-block-transmission-of-vital-weather-data-we-cant-allow-it/>

<sup>2</sup> <https://www.whitehouse.gov/the-press-office/presidential-memorandum-unleashing-wireless-broadband-revolution>

Federal data received from NOAA satellites relying on technology and services developed by Carr Astronautics contributes substantially to the content made available on wireless broadband devices in the first place.

Today's NEXRAD weather radar data is routinely available over approximately five-minute intervals and are essential to forecast meteorologists. However, the higher resolution, faster data that will be available from GOES-R is likely to make comparable cloud top data taken at 5-minute rapid intervals a new tool to compliment this weather radar data. The new products that may be possible from these two time-comparable sources are only now under consideration by the weather enterprise.

**This transition to GOES-R will be a generational change in meteorology and hydrology; why would we want to handicap the fastest and most reliable means of disseminating this new satellite capability before the \$8.5 million dollar satellite series is even brought into use?** The satellites<sup>3</sup> are already designed and the first and second ones are either built or under construction, using the 1675-1695 MHz spectrum in their transmitters.

The interference caused by the sharing of the 1675-1680 megahertz band will significantly threaten the distribution of crucial weather/hydrological information from the GOES weather satellite system, developed in part by Carr Astronautics in partnership with NOAA, which the nation relies on to respond immediately with the highest quality information to dangerous weather like tornados, hurricanes and wildfires.

Carr Astronautics recommends that this spectrum not be shared with commercial interests. Thank you for the opportunity to share our views in this matter.

Sincerely,

James L. Carr

CC:

The Honorable John Thune, Chairman, Senate Commerce, Science and Transportation Committee

The Honorable Bill Nelson, Ranking Member, Senate Commerce, Science and Transportation Committee

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<sup>3</sup> GOES-R and GOES-S satellites under construction showing L-band transmit antennas [http://farm2.staticflickr.com/1493/23884245579\\_32ac3a2311\\_b.jpg](http://farm2.staticflickr.com/1493/23884245579_32ac3a2311_b.jpg)

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