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FILED VIA ECFS

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

Re: ***Notice of Ex Parte Meeting*, GN Docket No. 18-122**

Dear Ms. Dortch,

On October 23, 2019, the representatives from twenty-two aviation and aerospace organizations listed in the annex met with Barbara Pavon, Ira Keltz, Michael Ha, Kenneth Baker, Janet Young, Paul Powell, and Thomas Derenge from the Commission's Wireless Telecommunications Bureau and Office of Engineering and Technology in connection with the above-referenced docket. In particular, the representatives were focused on the need to ensure that radio altimeters operating at 4200-4400 MHz, a critical safety feature of the vast majority of manned aircraft, including commercial passenger planes, general aviation aircraft, and helicopters, do not suffer harmful interference as a result of any band realignment at 3700-4200 MHz that introduces commercial flexible use operations into this frequency range. The meeting also covered recently-filed preliminary results of ongoing testing examining the potential for interference to radio altimeters from prospective 3700-4200 MHz operations.[1]

During the meeting, the group elaborated that the radio altimeter is an essential piece of aviation safety equipment and is critical to the safe operation of flight for many thousands of aircraft and the 900 million passengers that fly in the United States each year. Though other pieces of navigational equipment, like the Global Positioning System ("GPS"), may be able to provide a certain level of assistance to a pilot in understanding the aircraft's altitude and surroundings, the radio altimeter is the only piece of equipment that can provide the necessary accuracy and reliability for altitude readings and terrain avoidance to the pilot for operations at low altitudes above terrain, including landings.

The participants described various altimeter functions that are operational throughout the entirety of a flight for almost all airspace users. This included speakers from the commercial airlines, the helicopter community, and general aviation operators:

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[1] *See* "Behavior of Radio Altimeters Subject to Out-Of-Band Interference," attachment to Letter of Dr. David Redman, Aerospace Vehicle Systems Institute, to Marlene H. Dortch, Secretary, Federal Communications Commission, Docket No. 18-122 (filed Oct 22, 2019).

- Commercial airlines require altimeters for precision approach in all weather conditions, and the automated flight control surfaces that depend on altimeter reports to deploy at the correct time during landing. The altimeter also provides a resilient source of data that can be depended on during emergency scenarios such as loss of cabin pressure or flying through mountainous terrain.
- The helicopter community spoke to the altimeters' crucial role in all helicopter operations given their proximity to the ground, functioning at all times from the ground up to normal transit altitudes. They gave the example of medevac helicopters providing rescue services at any location across America, needing to execute missions in low altitudes often very close to infrastructure and buildings.
- Representatives from the general aviation community spoke to the large number of aircraft (approx. 40,000) currently using FAA-approved radio altimeters to better navigate and land at smaller airfields without significant infrastructure. Similar to the helicopter community, they often fly at lower altitudes and accurate altitude reports are essential to safe flight.

Members of the aerospace community also commented that both private and state-owned aircraft use the radio altimeter. Further, Unmanned Aircraft Systems ("UAS") are now implementing the technology to assure safe operation. These UAS would operate within even closer proximity to the ground and infrastructure than manned aircraft to maintain accurate flight.

On October 22, 2019, preliminary test results were filed in the Docket by Aerospace Vehicle Systems Institute ("AVSI"), assessing the potential for harmful interference to radio altimeters by flexible use operations that the Commission is considering to allow, for the first time, in at least a few hundred megahertz of the 3700-4200 MHz band. The AVSI participants explained the methodology used, the assumptions made, the relevance of the results, and the future testing and analysis work underway to develop the information further and refine the conclusions. Specific points made during the discussion included:

- The analysis assumed broadband interference representative of 5G transmissions starting at the 3700 MHz band edge and including increasing amounts of total bandwidth up to nearly the 4200 MHz band edge.
- Results were represented in power spectral density ("PSD") over specific bandwidths, and can be converted to total power as needed.
- The majority of altimeters studied reported a broadly consistent level of desired performance until approx. 200-250 megahertz of 5G signals were simulated starting at the 3700 MHz band edge, i.e., the 3700-3900 MHz or 3700-3950 MHz frequency ranges were occupied. Harmful interference occurred when more bandwidth was occupied than the threshold amounts.
- One altimeter used by a large number of smaller private aircraft and helicopters appeared to have a lower performance than the other six altimeters. This unit is aimed for the most cost sensitive users in the aviation market, but is still an FAA-approved piece of avionics that needs protection.
- The interference issue appears to be a desensitization problem that is present in the IF bandwidth of the radio altimeter receiver.
- Work is still being developed by AVSI and the aviation/aerospace communities, with an end of 2019 target to provide a complete set of work with more refined results.

The participants emphasized that more complete studies to meet aviation assurance requirements in the face of prospective flexible use of an as yet unspecified portion of the 3700-4200 MHz band must account for the worst-case scenarios for both 5G RF environments and aviation operational scenarios. Further, while the preliminary studies have examined seven altimeters in a select number of airspace usage scenarios, all airspace users and radio altimeter equipage types need to be accounted for. The participants also noted that additional work was needed to assess the impacts from potential handset usage onboard aircraft and the expected isolation between them and onboard altimeters.

In summarizing the work by AVSI thus far, the participants emphasized that the results demonstrated a need for caution to ensure data-driven decision-making in this Docket and to ensure that safe operation of radio altimeters is not compromised by an overly aggressive realignment. While aviation and aerospace understand the importance of making additional mid-band spectrum available for flexible uses, it should be done in a way that protects critical aviation safety functionalities that make passenger travel safe. The group noted that aviation and aerospace found the questions and inputs from the Commission staff present useful for the continued analysis to be done and stated they will release more information as the work develops. Lastly, the group stated that its members have been in contact with the FAA on this matter exploring the best way of maintaining safety of the national airspace in light of these results and the proposals for the 3700-4200 MHz band.

This document is being filed as required by Section 1.1206 of the Commission's rules for inclusion in Docket No. 18-122.

Respectfully submitted,

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Annex – Aviation and Aerospace Representative Participants List

*denotes joined via telephone

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