Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	)	
	)	File Nos. SES-MOD-20170413-00388,
Iridium Satellite LLC and Iridium Carrier Services LLC	)	SES-MOD-20170413-00389, SES-AMD-20170726-00812 and SES-AMD-20170726-00813
	)	
	)	

COMMENTS OF THE GPS INNOVATION ALLIANCE

The GPS Innovation Alliance ("GPSIA") [1/] submits these comments in response to the applications submitted by Iridium Satellite LLC and Iridium Carrier Services LLC (collectively "Iridium")[2/] seeking authority to add to its existing licenses operating parameters for a new class of user terminals to be deployed with the second-generation Iridium NEXT satellite system in the 1618.725-1626.5 MHz band ("Applications").[3/] GPSIA seeks to ensure that radionavigation-satellite service ("RNSS") receivers operating in the 1559-1610 MHz band are adequately protected from out-of-band emissions ("OOBE") generated from the new Certus mobile earth station ("MES") terminals that will operate on the second generation Iridium satellite system.

GPSIA and Iridium are actively engaged in constructive discussions regarding the

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1/ Formed in February 2013, GPSIA protects, promotes, and enhances the use of Global Position System ("GPS") and Global Navigation Satellite System ("GNSS") technologies. Members and affiliates of GPSIA come from a wide variety of fields and businesses reliant on GPS, including manufacturing, aviation, agriculture, construction, transportation, first responders, surveying, and mapping. GPSIA also includes organizations representing consumers who depend on GPS for boating and other outdoor activities and in their automobiles, smartphones, and tablets.

2/ *See, Satellite Communications Services, re: Satellite Radio Applications Accepted For Filing*, Public Notice, Report No. SES-01980 (rel. Aug. 9, 2017).

3/ Iridium Satellite LLC Modification Application, SES-MOD-20170413-00388 (filed Apr. 13 2017); Iridium Carrier Services LLC Modification Application, SES-MOD-20170413-00389 (filed Apr. 13 2017). The narrative portions of these applications ("Narrative") are identical. In July, Iridium amended its applications to provide responses to questions from the Commission's International Bureau, and other information. *See* Iridium Amendments, File Nos. SES-AMD-20170726-00813 and SES-AMD-20170726-00812 (filed July 26, 2017) ("Certus Amendments").

adequacy of that protection, but no final resolution has yet been reached. GPSIA expects that it will reach an understanding and agreement with Iridium on an appropriate OOBE limit for Certus terminals and requests that the Commission condition grant of the Applications on Iridium's adherence to that agreement.[4/] In the unlikely event that GPSIA is unable to reach an agreement with Iridium, it asks the Commission to impose limitations on the operation of Certus terminal devices to protect GPS/RNSS operations in the 1559-1610 MHz band at a level equivalent to what terrestrial terminals in the same and other frequency ranges provide at -95 dBW/MHz.

I. DISCUSSION

Iridium states that the new Certus MESs, will offer land, maritime, and air mobile services for voice and data traffic.[5/] It also states that the new terminals will comply with the -70 dBW/MHz OOBE limit for the 1559-1610 MHz band in Section 25.216 of the Commission's rules.[6/] However, adherence to the OOBE levels specified in the rules may not mean that GPS and RNSS receivers operating in the 1559-1610 MHz band will be protected from OOBE. The -70 dBW/MHz limit was developed in the International Telecommunication Union ("ITU") in the 1990s for a single use scenario – protection of a GPS receiver on an aircraft in final approach to an airport from a single MES operating in the 1610-1626.5 MHz band at a separation distance of 150 feet.[7/] Because the Certus MESs will operate on land, at sea, and in the air, the terminals

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4/ Of course, if based on further discussions with Iridium, GPSIA concludes that no operating limitations, beyond what are specified in the Applications, are required, no such license conditions will be necessary.

5/ Narrative at 1.

6/ 47 C.F.R. §§ 25.216(c) and (f).

7/ *See also* Comments of the U.S. GPS Industry Council, WT Docket No. 12-70 *et al*., at 7-8 (filed May 17, 2012). The OOBE recommendation in the ITU is ITU-R Recommendation M.1343, Essential technical requirements of mobile Earth stations for global non-geostationary mobile-satellite service systems in the bands 1-3 GHz. ITU-R Recommendation M.1903, which provides protection criteria for

present many use scenarios different from the one on which the -70 dBW/MHz OOBE limit was based. For example Certus terminals will be in closer proximity to GPS/RNSS receivers than 150 feet, and will be deployed in larger quantities.[8/] These factors, together with the terminals' "enhanced" operational capability – including significant increases in EIRP and data rates (as compared to the currently-authorized MESs operating with Iridium's first-generation satellite system) – and the need for information regarding the terminals' duty cycles, prompted GPSIA to contact Iridium to gain a better understanding of the new terminals' effects on RNSS.[9/]

GPSIA is currently in discussions with Iridium regarding protection of GPS/RNSS from the operation of the Certus terminals. GPSIA recognizes that the technical parameters and operating/deployment characteristics described in the Applications represent an outer envelope, and may not be representative of routine operations.

On the OOBE question, GPSIA is encouraged that, based on Iridium's publicly-available equipment authorization submissions regarding Certus terminals to the Office of Engineering

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RNSS receivers operating in the 1559-1610 MHz band, specifically states that "[t]he maximum unwanted emission levels for the band 1 559-1 610 MHz stated in Recommendations ITU-R M.1343-1 . . . have been developed pursuant to a specific interference scenario, *and are not intended to be applied to any service other than MSS MESs operating in the 1-3 GHz range without further study*." ITU-R Recommendation M.1903, Characteristics and protection criteria for receiving earth stations in the radionavigation-satellite service (space-to-Earth) and receivers in the aeronautical radionavigation service operating in the band 1 559-1 610 MHz, at Note 1 (emphasis added).

8/ *See, e.g.,* Iridium Certus Brochure, https://www.iridium.com/company/industryleadership/iridiumcertus (describing machine-to-machine fleet management solutions) (last accessed Sept. 5, 2017).

9/ The Certus terminal specifications substantially increase the maximum EIRP for all carriers on Iridium user terminals. Currently, the maximum authorized value is 11.95 dBW. The value proposed for Certus – based on a particular two-RF-channel operational mode at an elevation angle of 39 degrees – is 27.7 dBW. Narrative at 2. Moreover, the highest data rate (highest transmit EIRP) Certus service may be activated on any number of Certus terminals operating in proximity to a GPS/RNSS receiver, thereby increasing the aggregate interference level above original estimates. *See also*, Attachment to Certus Amendments, "Answers to Questions from the International Bureau," at 1 (describing how the Certus terminals will be used for "enhanced service, for land, air, and sea …").

and Technology ("OET"), it appears that emissions from Certus terminals into the 1559-1610 MHz RNSS band appear generally to be more than 20 dB below the OOBE limit of -70 dBW/MHz in Section 25.216(c) of the rules.[10/] Although GPSIA continues to analyze the OET submissions and expects to conduct further discussions with Iridium, the values reported in the Certus Test Report appear to put OOBE levels from Certus terminals into the 1559-1610 MHz band nearly on par with the -95 dBW/MHz operational limits on OOBE into the same band that have been agreed to by operators of terrestrial mobile terminals (such as the ancillary terrestrial component ("ATC") of mobile-satellite systems operating in the lower portion of the 1610-1626.5 MHz band and 2483.5-2500 MHz, and operators of AWS-4 mobile systems in the 2 GHz range).[11/]

Nevertheless, there are differences between ATC terminals and MES terminals. GPSIA is therefore committed to working expeditiously with Iridium to identify an OOBE limit that, on the one hand, Iridium agrees is commercially feasible for its Certus terminals, and on the other hand, will provide protection for GPS/RNSS equivalent to what ATC terminals in the same and

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[10/] *See* Report of FCC Testing of the Iridium Certus ProtoTerminal/9801CERTUSH2 in accordance with 47 C.F.R. Part 25 and 47 C.F.R. Part 2, as submitted to the Commission in conjunction with equipment authorization for the Certus terminal under FCC ID Q639801CERTUSH2 in July 2017 ("Certus Test Report"). Figures showing test plots that are approximately 20 dB below the -70 dBW/MHz limit (at least below 1605 MHz) are found in Figures 56 and 57, on pages 76 and 77 of the Certus Test Report.

[11/] *See New ICO Satellite Services G.P*, Order and Authorization, 24 FCC Rcd. 171, ¶ 65 (2009); *TerreStar Networks, Inc.*, Order and Authorization, 25 FCC Rcd. 228, ¶ 28 (2010); *Service Rules for Advanced Wireless Services in the 2000-2020 MHz and 2180-2200 MHz Bands*, *et al.,* Report and Order and Order of Proposed Modification, 27 FCC Rcd. 16102, ¶ 121 (2012). These limits were originally agreed to as a result of discussions between the licensees and the predecessor to GPSIA. Under the 2 GHz licenses, mobile terrestrial earth stations must limit EIRP density for wideband emissions to -95 dBW/MHz; while narrowband emissions are subject to a limit of -105 dBW/kHz. In addition, fixed or mobile base stations must adhere to a wideband EIRP density emission limit of -100 dBW/MHz; and a narrowband emission limit of -110 dBW/kHz. *See also* Grant of Application, SAT-MOD-20170411-00061 (granted Aug. 8, 2017) (conditioning approval of Globalstar ATC application on compliance with Globalstar's agreement with NTIA to meet the -95 dBW/MHz OOBE limit into the 1559-1610 MHz band).

other frequency ranges provide at -95 dBW/MHz. GPSIA contemplates that equivalent protection, which will take into account differences in deployment and emission profiles between Certus terminals and ATC terminals, may result in a different level of OOBE protection than specified in the rules, or in OOBE protection levels that are expressed in different units than the -95 dBW/MHz limit for ATC and other terrestrial mobile terminals. GPSIA asks that the Commission condition grant of the Applications on Iridium's adherence to the level of equivalent protection on which it agrees with GPSIA.[12/] Absent such an agreement, the Commission should condition operation of the Certus terminals on adherence to limitations that would offer protection equivalent to the -95 dBW/MHz OOBE limit.

II. CONCLUSION

GPSIA understands Iridium's desire for its Applications to be approved promptly and is working with Iridium to reach a mutually beneficial agreement as quickly as possible. GPSIA is confident that an agreement on appropriate conditions for Certus MES terminals will be reached quickly with Iridium. It asks that the Commission condition grant of the Applications on Iridium adherence to any such agreement. Alternatively, the Commission should require that Certus terminal operations be limited to modes that offer protection equivalent to OOBE levels of -95 dBW/MHz into the 1559-1610 MHz band.

[12/] It does not expect that agreement to be reflected or codified into the Part 25 rules or otherwise require a revision of international standards upon which the OOBE limit in Sections 25.216(c) and (f) are premised. In particular, this means that there would be no change to the levels in ITU-R Recommendation M.1343 for OOBE from Iridium MESs into the 1559-1610 MHz band that are reflected in Sections 25.216(c) and (f) of the Commission's rules (and in other international standards).

Respectfully Submitted,

/s/ Mark N. Lewellen

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GPS Innovation Alliance

Dated: September 8, 2017

CERTIFICATE OF SERVICE

I, Radhika Bhat, hereby certify that on September 8, 2017, a copy of the foregoing Comments of the GPS Innovation Alliance was served by first-class mail, postage paid, on the following:

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