Before the FEDERAL COMMUNICATIONS COMMISSION Washington, D.C. 20554

In the Matter of)	
)	
Expanding Access to Broadband and Encouraging)	
Innovation through Establishment of an Air-)	
Ground Mobile Broadband Secondary Service for)	GN Docket No. 13-114
Passenger Aboard Aircraft in the 14.0-14.5 GHz)	RM-11640
Band)	
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COMMENTS OF VIASAT, INC.

ViaSat, Inc. ("ViaSat") submits the following comments in response to the Commission's Notice of Proposed Rulemaking in the above-referenced proceeding ("NPRM").

ViaSat is a leader in developing innovative technologies that enable the shared use of spectrum, which promotes spectrum efficiency, increases the amount of bandwidth available for wireless broadband, and thus enables improved performance of existing wireless broadband systems---including satellite broadband. ViaSat has first-hand experience in providing broadband on a non-interference basis. ViaSat's main concern in this proceeding regarding secondary use of the 14.0-14.5 GHz band for air-to-ground ("ATG") service is that the only interference analysis on the record is based on unrealistic assumptions about the types of NGSO FSS systems that would likely be deployed in the 14.0-14.5 GHz band on a primary basis.

Expanding Access to Broadband and Encouraging Innovation through Establishment of an Air-Ground Mobile Broadband Secondary Service for Passenger Aboard Aircraft in the 14.0-14.5 GHz Band, GN Docket No. 13-114, RM-11640, FCC 13-66 (rel. May 9, 2013).

As a result, the protection criteria that Qualcomm proposed in its Petition for Rulemaking² and that are proposed in the NPRM are insufficient to protect future NGSO FSS operations and threaten to chill future development and innovation in satellite design. Thus, ViaSat recommends that the Commission seek to develop suitable technical parameters and service rules for ATG that would reasonably protect all primary FSS operations. Subject to the development of such parameters and rules, ViaSat supports the proposal in the NPRM to apportion the 14.0-14.5 GHz into two 250 MHz licenses for secondary ATG operations. Ensuring that at least two distinct ATG providers can use this band would facilitate increased competition.

I. VIASAT SUPPORTS THE SHARED USE OF SPECTRUM RESOURCES WHERE PRIMARY USERS CAN BE ADEQUATELY PROTECTED

As a general matter, ViaSat fully supports the Commission's efforts to promote the shared use of scarce spectrum resources, including in the Ku band. ViaSat has a long history and extensive expertise in developing and deploying satellite communications technologies, for both government and commercial uses, many of which rely on secondary operations and spectrum use on a non-interference basis. Through the use of innovative sharing technologies, ViaSat has been able to improve network performance and bandwidth efficiency, while maintaining cost-effective services. For example, ViaSat has developed and deployed the ViaSat-1 broadband satellite, which is an operating GSO FSS satellite that uses portions of the Ka band, including frequencies that are not allocated primarily in the U.S. for GSO FSS spacecraft.³ In addition, ViaSat has received authorization to operate aeronautical mobile

Qualcomm Petition for Rulemaking, Amendment of the Commission's Rules to Establish a Next-Generation Air-Ground Communications Service on a Secondary Licensed Basis in the 14.0 to 14.5 GHz Band, RM-11640 (filed July 7, 2011) ("Qualcomm Petition").

See ViaSat, Inc., IBFS File Nos. SAT-LOA-20110722-00132, as amended (granted Oct. 14, 2011); SAT-LOI-20080107-00006, as amended (granted Aug. 18, 2009) ("ViaSat-1 Authorization").

antennas in the Ku band and in the Ka band within GSO FSS networks on a non-interference basis.⁴ ViaSat's mobile antenna technologies have been demonstrated to operate successfully while also protecting existing primary users of the spectrum.

While secondary ATG operations in the 14.0-14.5 GHz are potentially technically feasible, it is important that the design of those secondary uses be compatible with all expected primary and secondary FSS operations in that same band. The Ku band FSS eco-system is well-established and serves as the backbone for numerous commercial and government communications networks that depend on the reliability and wide-spread availability of Ku band satellite services and capacity. The ubiquity of Ku band infrastructure has allowed ViaSat, as well as other satellite communications providers, to develop and produce VSAT communications systems using Ku band spectrum for private networks used by a myriad of commercial businesses and for critical U.S. government, military and public safety users. As such, ViaSat supports the Commission's stated intention not to entertain the possibility of a future request for co-primary status for ATG operations at 14.0-14.5 GHz.⁵

In developing the terms for the proposed secondary use of the 14.0-14.5 GHz band by ATG networks, ViaSat urges that the Commission adopt technical rules and operating parameters that ensure the protection of both current and future FSS operations. In particular, any secondary ATG uses in that band should be subject to suitable technical parameters and other service rules that adequately protect the continuing evolution in FSS technology, such as

See ViaSat, Inc., Application for Blanket Authority for Operation of Up to 1,000 Technically Identical Ku-Band Aircraft Earth Stations in the United States and Over Territorial Waters, 22 FCC Rcd 19964 (2007); ViaSat, Inc., IBFS File No. SES-LIC-20120427-00404, Call Sign E120075 (granted July 17, 2013).

⁵ NPRM at \P 27.

improved satellite receiver performance, smaller satellite spot beams and greater satellite frequency reuse necessary to achieve greater spectrum efficiency and throughput.

Further, any secondary use of the 14.0-14.5 GHz band for ATG must protect all intended uses by primary FSS operations – including NGSO FSS systems – and should not unreasonably constrain the development of new technologies for future NGSO FSS operations. It is not enough to declare that ATG service must be secondary to NGSO FSS systems or to rely on the fact that no Commission licenses for NGSO FSS systems in the band exist today. Both the technology developed to produce smaller and more affordable satellites and the greater availability of launch services have lowered the cost of implementing constellations of multiple satellites. Therefore, the existing co-primary NGSO FSS allocation cannot be discounted, as it is in the Qualcomm Petition. Instead, the Commission should institute protection criteria that take into consideration all current and future FSS systems in order to successfully enable secondary ATG services at 14.0-14.5 GHz. It is critical to ensure that the analysis underlying the protection criteria for FSS is complete and reflects all intended primary and secondary uses of the spectrum.

II. QUALCOMM'S TECHNICAL ANALYSIS OF POTENTIAL INTERFERENCE INTO NGSO FSS SYSTEMS DOES NOT ACCOUNT FOR VARYING NGSO SYSTEM CONFIGURATIONS

Secondary ATG operations in the 14.0-14.5 GHz band should be supported by a satisfactory demonstration that all primary and secondary operations in the band can be sufficiently protected. However, the record in this proceeding currently contains an analysis of potential interference from an ATG system into the NGSO FSS that considers only a single NGSO constellation configuration. Furthermore, the configuration selected is not illustrative of the types of NGSO systems that are likely to be deployed in the Ku band and does not reflect realistic operating parameters. At a minimum, ViaSat would expect to see an analysis of interference scenarios between ATG systems and hypothetical NGSO network architectures

resembling the SkyBridge NGSO system that was previously licensed in the Ku band or other NGSO systems licensed by the Commission operating in other frequency bands.

The assumed NGSO system is a medium earth orbit system, and Qualcomm's analysis is premised on the assumption that NGSO systems would not operate at elevation angles of less than 15 degrees. This assumes that NGSO spacecraft would only operate at lower inclination angles, which is unlikely to be the case for Ku band NGSO FSS systems that may be deployed in the future to serve the U.S. An NGSO FSS system in the Ku band, that would be coprimary with GSO FSS systems, would be designed to operate as close to the northern horizon as possible, to maximize the isolation from the GSO orbital plane and to ensure compliance with the applicable EPFD limits. Moreover, higher inclination angles are necessary to deploy NGSO networks that have coverage in northern regions that GSO networks are unable to serve.

Therefore, it is unrealistic to assume that elevation angles to the NGSO hub antenna would always be greater than 15 degrees. Indeed, the SkyBridge NGSO system that was previously licensed in the Ku band, as well as currently operating NGSO systems in other bands, such as those of Iridium and Globalstar, are characterized by orbits in which the spacecraft could operate with hub antennas at elevation angles well below 15 degrees.

⁶ Qualcomm Petition, Attachment A at A-13, A-14.

⁷ See 47 C.F.R. § 25.208(g), (k); see also ITU Rad. Reg., Article 22.

See, e.g., SkyBridge, LLC, IBFS File Nos. SAT-LOA-19970228-00021, SAT-AMD-19970703-00058; SAT-AMD-19980630-00056 (granted July 18, 2005) (basing analyses on a minimum elevation angle of 10 degrees; orbiting at an inclination angle of 53 degrees); Globalstar, LLC, IBFS File No. SAT-MOD-20030606-00098 (granted Jan. 28, 2005) (application for modification of Globalstar system, identifying an incline angle of 52 degrees and minimum elevation angle of five degrees); Motorola Satellite Communications, Inc., IBFS File No. SAT-MOD-19960322-00047 (granted Oct. 30, 1996) (application for modification of Iridium system, including analyses of an elevation angle of 8.2 degrees in a polar orbit system).

Furthermore, Qualcomm's interference showing relies almost entirely on the orientation of ATG base stations pointing north, away from the GSO arc. This spatial orientation may protect NGSO systems operating solely in a low-incline plane (*e.g.*, an equatorial orbit) or in the southern hemisphere. However, as discussed above, NGSO systems in the Ku band serving the U.S. are more likely to operate at high inclination angles. In these types of NGSO constellations, direct in-line scenarios between ATG and NGSO operations that result in interference events would be very likely to occur. Therefore, further analysis of interference into NGSO FSS and a more complete demonstration that all NGSO FSS systems can be protected are necessary before the Commission could consider allowing any secondary ATG operations in the 14.0-14.5 GHz band.

As the NPRM suggests, the rules for secondary ATG operations should include shut-off requirements for ATG operations to protect NGSO FSS systems during in-line events, similar to the interference protection mechanisms that many GSO FSS systems have implemented in the 18.8-19.3 GHz and 28.6-29.1 GHz portions of the Ka band to protect NGSO FSS systems that are primary in those bands. This approach has been embraced by NGSO FSS operators in the Ka band context, and it is well-established in the Commission's precedent that it is feasible to cease operations when aligned with an NGSO FSS satellite, and that doing so offers sufficient interference protection. Such a requirement also provides a technology-neutral solution for ATG systems that currently are being developed or that may be developed in the future, and would ensure protection for all NGSO FSS systems. Qualcomm acknowledges that ATG systems are capable of being designed to use the ephemeris data on the NGSO FSS satellite

⁹ NPRM at ¶ 105.

See, e.g., ViaSat-1 Authorization; Hughes Network Systems, LLC, 26 FCC Rcd 8521, 8524-25 (2011); Northrop Grumman Space & Mission Systems Corporation, 24 FCC Rcd 2330, 2357-2360 (2006).

locations to determine when the ATG stations are in alignment with the NGSO satellite, and suggests that ATG systems would reduce transmit power for the duration of the in-line event.

As discussed above, the assumptions for NGSO FSS systems underlying the calculation of the impact of the proposed ATG transmissions must be revised before the appropriate power reduction level necessary to adequately protect NGSO operations can be determined.

III. PROVIDED THAT APPROPRIATE PROTECTION CRITERIA CAN BE DEVELOPED, VIASAT IS IN FAVOR OF THE AUCTION OF AT LEAST TWO SPECTRUM LICENSES

Subject to the comments above regarding the adequate protection of all current and future FSS operations, ViaSat would support a licensing scheme and rules for ATG licenses in the 14.0-14.5 GHz band that will promote competition among providers. Increased competition among providers will spur innovation and investment in ATG technology, and aeronautical services generally. Auctioning two 250 MHz ATG licenses, as Qualcomm proposes, would promote the development and deployment of efficient technology. ViaSat also supports the adoption of rules that would prohibit a single entity from owning or controlling all ATG spectrum in the 14.0-14.5 GHz band, at least in the initial auction.

In that same vein, ViaSat respectfully requests that the Commission consider its proposal to divide the spectrum into smaller geographic regions and frequency bands, to the extent technically feasible. Structuring the initial auction of ATG spectrum in this manner may provide the opportunity for smaller entities and new entrants to access this spectrum resource, which would enable lower cost services that are accessible to smaller, regional airlines.

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¹¹ Qualcomm Petition, Appendix A at A-3.

IV. CONCLUSION

For the foregoing reasons, ViaSat respectfully requests that the Commission ensure that any secondary ATG operations in the 14.0-14.5 GHz band sufficiently protect existing and intended primary and secondary uses of the band. The record currently lacks a complete demonstration that future NGSO FSS systems would be adequately protected by the proposed secondary ATG operations. If the Commission determines based on a complete record that adequate protection criteria can be developed, ViaSat would support apportioning the 14.0-14.5 GHz band into at least two ATG licenses in order to promote competition.

Respectfully submitted,

/s/

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August 26, 2013

ENGINEERING INFORMATION CERTIFICATION

I hereby certify that I am the technically qualified person responsible for reviewing the engineering information contained in the foregoing submission, that I am familiar with Part 25 of the Commission's rules, that I have reviewed the engineering information submitted in the foregoing ViaSat Comments, and that it is complete and accurate to the best of my knowledge and belief.

Daryl T. Hunter

Director, Regulatory Affairs

ViaSat, Inc.

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