

September 11, 2019

Via ECFS

Marlene H. Dortch
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Re: *Review of the Commission's Rules Governing the 896-901/935-940 MHz Band, WT Docket No. 17-200*

Dear Ms. Dortch:

Gogo Inc. ("Gogo"), through its counsel, submits this letter to urge the Federal Communications Commission ("FCC" or the "Commission") to ensure that any mobile broadband operations introduced in the 896-901 MHz band ("900 MHz band") through this proceeding¹ do not cause harmful interference to Air-Ground Radiotelephone Service ("ATG") operations in the adjacent 894-896 MHz band ("ATG band"). Gogo's engineering analysis shows that even a single mobile broadband device transmitting in the 900 MHz band within one kilometer of a Gogo base station can cause adjacent band interference with ATG base station receivers. This interference will either reduce the receive range of Gogo's base stations or the capacity of ATG links.

To ensure that ATG base station receivers in the ATG band are protected from harmful interference caused by potential 900 MHz broadband operations, Gogo urges the Commission to adopt safeguards similar to those recommended by another adjacent band licensee operating in the 901-902 MHz, 930-931 MHz, and 940-941 MHz bands.² Specifically, the Commission should: (1) require that 900 MHz broadband licensees prevent and remediate harmful interference to ATG operations; (2) develop a mandatory coordination process between 900 MHz broadband licensees and Gogo; and (3) encourage 900 MHz mobile broadband proponents, and require 900 MHz broadband license applicants, to conduct real-world testing to identify and address potential interference issues prior to wide-scale deployment.

I. BACKGROUND

Gogo is the leading provider of inflight connectivity and provides Internet access to thousands of aircraft worldwide. Through its subsidiaries, Gogo provides a variety of airborne services, including broadband Internet, Wi-Fi based entertainment services, interconnected and non-interconnected VoIP, inflight portals for e-commerce applications, and flight operations-oriented communications services. More recently, aircraft operators also started relying on Gogo's services for cockpit-to-ground communications. Gogo services are provided to the flying public, commercial airlines, business aviation customers, and government agencies. Gogo currently provides connectivity to approximately 3,000 commercial aircraft and 4,200 business aircraft.

¹ *Review of the Commission's Rules Governing the 896-901/935-940 MHz Band*, Notice of Proposed Rulemaking, 34 FCC Rcd 1550 (2019) ("*NPRM*").

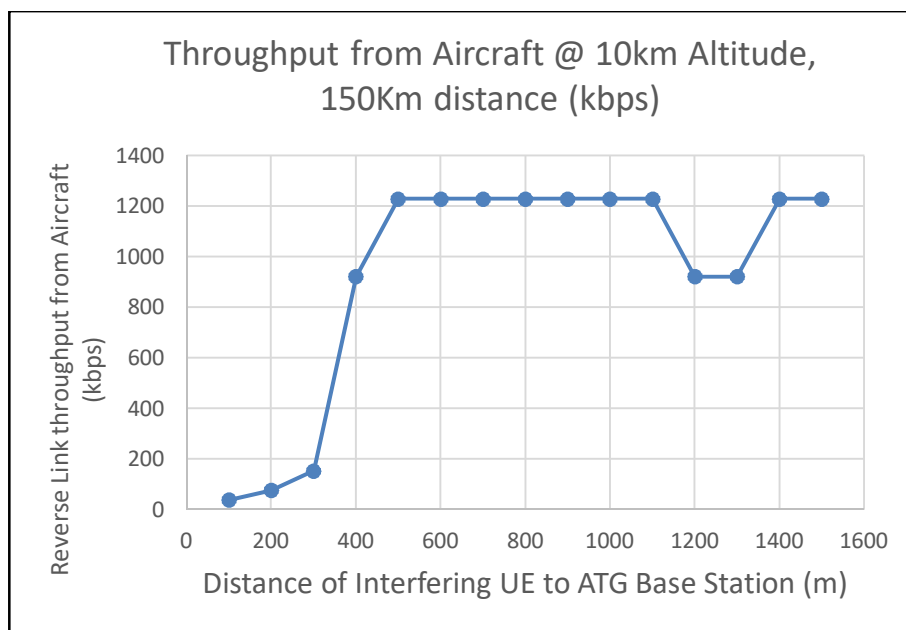
² See Comments of Sensus USA Inc., WT Docket No. 17-200, at 2 (filed June 3, 2019) ("*Sensus Comments*").

A cornerstone of Gogo's inflight service is maintaining consistent and reliable broadband service for aircraft. Gogo's base stations receive transmissions from aircraft via the ATG band. As a consequence, broadband operations adjacent to Gogo's 894-896 MHz transmissions could endanger Gogo's ability to provide reliable service. This potential for interference is especially problematic when it comes to passenger safety, as more aircraft operators use Gogo's broadband services to communicate with pilots in aircraft cockpits.

II. MOBILE BROADBAND OPERATIONS IN THE 900 MHZ BAND WILL LIKELY INTERFERE WITH GOGO'S ATG SERVICE UNLESS SAFEGUARDS ARE ADOPTED.

The Commission's notice of proposed rulemaking sought comment on an out-of-band emissions ("OOBE") limit of $43 + 10\log P$ for uplink broadband operations in the 900 MHz band.³ While this limit is typical for flexible use services,⁴ it may not adequately protect ATG operations from harmful interference caused by mobile broadband devices operating in the 900 MHz band. For example, a single mobile broadband device transmitting in the 900 MHz band within one kilometer of a Gogo base station could reduce the range of the base station by 9 to 14 percent. A single mobile broadband device that is just 100 meters from a Gogo base station could reduce the range of a Gogo base station by up to 83 percent.⁵

Alternatively, when interference occurs, the Gogo base station could step down to a more robust modulation and coding scheme ("MCS") to maintain the same range. But as shown in the graph below, this change to a more robust MCS would significantly reduce the throughput capacity of the link. In any event, the net result of such harmful interference is that either the receive range of the base station will be reduced or the capacity of the ATG link will be reduced.



³ NPRM at ¶ 74.

⁴ See, e.g., 47 C.F.R. § 27.53(a)(1)(i).

⁵ Aggregate interference from multiple 900 MHz broadband mobile devices could reduce the range of the Gogo base station by even more than the figures listed here.

Harmful interference is more likely to occur at base stations located in more densely populated areas and areas where mobile broadband device usage is likely to be higher. For instance, it is common for Gogo to locate its base stations near airports, where there is likely to be a large number of 900 MHz broadband industrial and business users. Given the large number of potential 900 MHz mobile broadband users, these base stations are at higher risk of interference. Thus, deployment of service from new 900 MHz broadband licensees can cause harm to Gogo's broadband connectivity at such key locations.

III. THE COMMISSION SHOULD MINIMIZE THE RISK OF INTERFERENCE IN THE ATG BAND.

A. Allocation of a portion of the 900 MHz band for mobile broadband operations should be limited to a 3/3 megahertz paired segment.

The *NPRM* proposes a 3/3 megahertz broadband segment but seeks comment on whether the Commission should reallocate the entire band to create a 5/5 megahertz broadband segment.⁶ Gogo agrees with the large majority of commenters that support the *NPRM*'s proposal to allocate only a 3/3 megahertz segment for broadband operations.⁷ Adopting a 3/3 megahertz broadband segment, with narrowband operations remaining in the 896-897.5 MHz band, will help ensure that OOB from mobile broadband devices do not cause harmful interference to adjacent ATG operations.

B. The Commission should establish and require a coordination and testing process to prevent and resolve interference with adjacent ATG operations.

New 900 MHz broadband licensees should be responsible for resolving interference to Gogo operations in the ATG band. The Commission should establish a coordination process that requires 900 MHz broadband licensees to coordinate with Gogo to mitigate interference risks and immediately resolve any harmful interference events that may occur. Establishing a mandatory coordination process would allow licensees to self-police and minimize Commission involvement.

To reduce the likelihood of interference, this coordination process also should encourage 900 MHz mobile broadband proponents, and require 900 MHz broadband license applicants, to conduct real-world testing to identify and address potential interference issues⁸ prior to wide-scale deployment. Addressing interference issues prior to deployment could include, but would not be limited to, measures such as designing mobile broadband devices to incorporate a more stringent OOB limit in the ATG band,⁹ restrictions on the location of 900 MHz base stations, and/or

⁶ *NPRM* at ¶¶ 11, 20.

⁷ See, e.g., Sensus Comments at 3; Comments of Southern Company Services, Inc., WT Docket No. 17-200, at 4 (filed June 3, 2019); Comments of the Utilities Technology Council, WT Docket No. 17-200, at 4-5 (filed June 3, 2019).

⁸ Requiring real-world testing to detect potential interference before the Commission identifies the 900 MHz broadband licensees has important timing implications. If the Commission only required real-world testing after the Commission issued the 900 MHz licenses, this would likely cause delays to the 900 MHz broadband licensees' deployment plans.

⁹ This OOB limit could be required by the Commission's rules or voluntarily implemented by the 900 MHz broadband licensee, but we note that the U.S. 900 MHz band is a subset of 3GPP Band Class 8 used in Europe and other parts of the world. The mobile transmit band for Band 8 is 880-915 MHz, which means that the U.S. ATG band is in-band for Band 8 mobile devices. And since current Band 8 mobile devices likely cannot meet a more stringent requirement, a requirement for additional attenuation in the ATG band would likely require a new band class for the 900 MHz band in the U.S. In this case, voluntary

implementation of a geo-fencing technology to prevent 900 MHz mobile broadband devices from transmitting in areas where they may cause interference to Gogo's operations.

Encouraging a coordination process to prevent and resolve interference between new 900 MHz broadband licensees and Gogo also would align with the Commission's past practices. For example, the FCC stressed in its 2017 Cellular Services proceeding that it, "expects licensees to work together to resolve interference problems."¹⁰ In that case, Cellular operations operating at higher power risked causing harmful interference to Gogo's ATG service due to the Commission adopting power rules based on Power Spectral Density ("PSD"). The Commission explained:

We encourage Gogo and Cellular carriers to *continue to work together not only to address interference as it occurs, but also to be proactive in avoiding increased interference to Gogo's ATG operations from Cellular PSD operations* under the revised radiated power rules we are adopting today. We also remind all parties that, under Section 22.917(d), the Commission may require a greater attenuation if any emission from a Cellular transmitter results in interference to users of another radio service.¹¹

Although the Commission could also implement a rule similar to 22.917(d) that applies to the broadband segment of the 900 MHz band, this could be more difficult because the interference is caused by 900 MHz broadband mobile devices, not base stations. It would be much more challenging for any 900 MHz broadband licensees to meet a requirement for greater attenuation of OOB from its mobile devices after wide-scale deployment of the service. Therefore, a testing and coordination process to prevent and resolve any interference from new broadband operations in the 900 MHz band – before widespread deployment of devices – would continue to safeguard the reliability of Gogo's ATG operations.

C. The risk of harmful interference could be further reduced if Gogo's mobile transmitters could increase their effective radiated power.

Apart from establishing a mechanism to resolve interference to ATG transmissions, the Commission could also increase the effective radiated power ("ERP") of airborne mobile transmitters. Currently, the peak ERP of airborne mobile transmitters cannot exceed 12 Watts.¹² Adjusting Gogo's ATG mobile transmission power limits to a *maximum* ERP of 12 Watts (as opposed to peak ERP) would alter the measurement procedure such that the average power would increase by 5 dB. This higher average transmit power would help Gogo mitigate some of the anticipated interference caused by 900 MHz broadband deployments – without increasing the risk of harmful interference to adjacent services.

For example, the additional transmit power would provide a stronger signal at the base station receiver, which would reduce the effect of any interference from nearby mobile broadband devices operating in the 900 MHz band. In conjunction with a coordination process with the 900

implementation by the 900 MHz broadband licensee of more stringent OOB is unlikely. But the prospect of the Commission implementing this OOB limit in the future would encourage new 900 MHz broadband licensees to collaborate with Gogo on preventing and resolving potential interference.

¹⁰ *Amendment of Parts 1 and 22 of the Commission's Rules with Regard to the Cellular Service, Including Changes in Licensing of Unserved Area*, Second Report and Order, Report and Order, and Second Further Notice of Proposed Rulemaking, 32 FCC Rcd 2518, ¶ 105 (2017).

¹¹ *Id.* (emphasis added).

¹² 47 C.F.R. § 22.867(a).

MHz broadband licensees to prevent and resolve interference issues, this approach would further reduce the probability of harmful interference and potentially reduce the need for stricter OOB limits.

Alternatively, to achieve the same result the Commission could increase the peak ERP for airborne mobile transmitters above the current limit of 12 Watts. Gogo recognizes that either approach may be outside the scope of this proceeding and require initiation of a separate, time consuming rulemaking or waiver proceeding. To the extent the Commission does not adopt the above discussed proposals concerning 900 MHz broadband licensing and operations and/or take action that would serve to increase the ERP for airborne mobile transmitters, Gogo may need to separately petition the Commission for an increase or change in these peak ERP limits.

IV. CONCLUSION

New 900 MHz mobile broadband operations risk causing harmful interference to Gogo's base stations receiving in the ATG band, which will result in inconsistent Air-Ground broadband connectivity. Not only would this lead to unreliable broadband service to airplane passengers, but also to pilots trying to communicate with their aircraft operators and crew via Gogo's broadband connection. Adopting the above proposals will ensure that wide deployment of mobile broadband operations in the 900 MHz band do not disrupt the critical services provided by Gogo.

Please contact the undersigned with any questions.

Respectfully submitted,

/s/ Michele C. Farquhar

Michele C. Farquhar
Tom Peters
HOGAN LOVELLS US LLP
555 Thirteenth Street, NW
Washington, DC 20004
(202) 637-5663