Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	
LightSquared Technical Working Group Report	IB Docket No. 11-109
LightSquared License Modification Application, IBFS Files Nos. SAT-MOD-20120928-00160, -00161, SES-MOD-20121001-00872	IB Docket No. 12-340
New LightSquared License Modification Applications IBFS File Nos. SES-MOD-20151231-00981, SAT-MOD-20151231-00090, and SAT-MOD-20151231-00091	IB Docket No. 11-109; IB Docket No. 12-340
Ligado Amendment to License Modification Applications IBFS File Nos. SES-MOD-20151231-00981, SAT-MOD-20151231-00090, and SAT-MOD-20151231-00091	IB Docket No. 11-109

To: The Commission

PETITION FOR RECONSIDERATION

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TABLE OF CONTENTS

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In the Matter of	)	
LightSquared Technical Working Group Report	)	IB Docket No. 11-109
LightSquared License Modification Application, IBFS Files Nos. SAT-MOD-20120928-00160, -00161, SES-MOD-20121001-00872	)	IB Docket No. 12-340
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PETITION FOR RECONSIDERATION

Pursuant to Section 1.106 of the Federal Communications Commission's ("FCC's" or "Commission's") rules,[1] Lockheed Martin Corporation ("Lockheed Martin") hereby respectfully submits this petition for reconsideration of the long-awaited Order and Authorization issued April 22, 2020 in connection with the multiple above-captioned International Bureau and FCC proceedings addressing Ligado Networks LLC's ("Ligado's") proposal to create a terrestrial system.[2] The record before the Commission contains extensive evidence, including technical analyses, that demonstrate conclusively that grant of Ligado's mobile satellite services ("MSS") license modification applications (the "Applications"), as amended, and rule waiver, would not

[1] 47 C.F.R. § 1.106.

[2] *LightSquared Technical Working Group Report et al.*, Order and Approval, IB Docket Nos. 11-109 & 12-340, FCC 20-48 (rel. Apr. 22, 2020) ("*Ligado Order*" or "*Order*").

serve the public interest. The *Order* ignores or glosses over this evidence with a limited and dismissive deliberation that appears to have been driven by the agency's desire to reach a particular outcome. The *Order* thus contains substantial legal and procedural errors and must be reversed on reconsideration. Specifically, the Commission's analysis of the voluminous evidentiary record reveals that the Commission failed to engage in the reasoned decision-making mandated by the Administrative Procedure Act ("APA"). Moreover, faced with substantial and material questions of fact present in the evidentiary record, the Commission unlawfully failed to designate the matter for hearing as required by Section 309(e) of the Communications Act of 1934, as amended (the "Act").[3] These errors require the Commission to reconsider the *Order*, reverse its grant of the Applications, deny Ligado's requested rule waiver, and designate the matter for hearing.

INTRODUCTION AND SUMMARY

One of the Commission's core functions is to license and regulate the use of commercial and private spectrum.[4] Its role in that regard is analogous to that of a municipal zoning board, responsible for serving the public interest by adopting and enforcing rules that allow landowners to maximize the value of their property while simultaneously ensuring the fair use and quiet enjoyment of their neighbors' property. The impact of the FCC's decision is tantamount to permitting a deafening nuisance into a quiet residential neighborhood over the objections of affected neighbors.

In adopting the *Ligado Order*, the Commission effectively permitted the construction and operation of a 24/7 outdoor concert venue, whose speaker volume deprives neighbors even

[3] 47 U.S.C. § 309(e).

[4] *Id.* §§ 151, 301.

blocks away from the enjoyment of their otherwise quiet, residential community. Despite the strong concerns of and opposition from a wide array of private sector and government experts and stakeholders in this community, and a record replete with evidence that granting Ligado's proposal would cause harmful interference, the Commission ignored material questions of fact, did not properly weigh the costs and benefits of Ligado's proposal, and offered a series of "remedies" that are patently inadequate. In short, the Commission simply failed to execute its "zoning" duties in the L-band responsibly and, most importantly, in the public interest; it prioritized the speculative claims of one entity over the track record of economic and national security contributions of the affected stakeholder services.

Lockheed Martin is by no means a disinterested party to this proceeding. In fact, Lockheed Martin has contributed meaningfully to the record in this proceeding since 2011, by way of numerous submissions of comments and related *ex parte* presentations.[5] A consistent and imperative theme is found in Lockheed Martin's participation in this proceeding throughout the better part of the past decade: the rightful exercise of access to unfettered Global Positioning System ("GPS") signals by users.[6] Lockheed Martin has outlined for the Commission multiple

[5] *See, e.g.*, Comments of Lockheed Martin Corporation, IB Docket 11-109 (filed July 29, 2011); Letter from Lockheed Martin *et al*., to Marlene H. Dortch, Secretary, FCC, IB Docket Nos. 11-109 & 12-340 (filed Apr. 15, 2020) (filed as Coalition of Aviation, SATCOM, and Weather Information Users).

[6] *See, e.g.*, Comments of Lockheed Martin Corporation, IB Docket 11-109 (filed Mar. 16, 2012); Opposition of Lockheed Martin Corporation, RM-11683 (filed Dec. 17, 2012); Letter from David Silver, Vice President, Aerospace Industries Association, to Marlene H. Dortch, Secretary, FCC, IB Docket Nos. 11-109 & 12-340 *et al*. (filed Apr. 21, 2020).

times its contributions to maintain this vital communications network as the manufacturer of the most recent generation of advanced GPS satellites, GPS Block III.[7]

The number and types of Lockheed Martin systems and solutions that leverage this critical navigation system represent an even more expansive array of technologies and platforms that contribute daily to the benefits of users and, indeed, the contributions that American aerospace manufacturers make to the United States economy. Lockheed Martin is a leading global manufacturer of fixed-wing aircraft and, with its acquisition of Sikorsky Aircraft since the time that this proceeding was initiated, a premier manufacturer of a variety of medium- and heavy-duty performance rotorcraft. These aircraft all rely in some capacity on uninterrupted, predictable GPS signals for the safety of their operations, which routinely are conducted across some of the most challenging terrain and in fulfillment of critical missions. Lockheed Martin also recognizes the essential role that accurate GPS signals will play in the next generation of aviation as it develops classes of Unmanned Aircraft Systems ("UAS") capable of flying at all altitudes of navigable airspace. Predictable and uninterrupted GPS navigation is essential throughout all of these operational domains.

For these reasons, and as described in greater detail below, the Commission should grant reconsideration, reverse its grant of the Applications, and designate the matter for hearing as mandated under Section 309(e) of the Act.

[7] *See, e.g.*, Letter from Bryan M. Tramont, Counsel to Iridium Communications, Inc., to Marlene H. Dortch, Secretary, FCC, IB Docket Nos. 11-109 & 12-340 *et al*., at 4 (filed Sep. 6, 2019) (filed as Coalition of Aviation, SATCOM, and Weather Information Users).

I. THE *ORDER* IS NOT THE CONSEQUENCE OF REASONED DECISION-MAKING AND SHOULD BE REVERSED.

It is well established that Commission decisions must reflect reasoned decision-making.[8] This mandate requires the Commission to engage in a careful analysis of "relevant data and articulate a satisfactory explanation for its action including a 'rational connection between the facts found and the choice made.'"[9] Courts will reverse agency decisions that fail "to consider an important aspect of the problem, [or] offer[] an explanation for its decision that runs counter to the evidence before the agency, or is so implausible that it could not be ascribed to a difference in view or the product of agency expertise."[10]

The Commission's approach to addressing the complex issues raised in this matter fails to meet these stringent standards. The Commission has before it a voluminous record in response to Ligado's proposed terrestrial network, developed over a decade of debate and with thousands of pages of evidence. The Commission nevertheless failed to resolve, and in some cases failed even to address, substantial and material questions of fact raised in that record. In short, the Commission did not "take[] a 'hard look' at the salient problems, and . . . [genuinely] engage[] in reasoned decision-making."[11] On these grounds alone, the *Order* must be reversed.

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[8] 5 U.S.C. § 557(c)(3)(A) (agency resolving an adjudication issue must address "all the material issues of fact, law, or discretion presented on the record."); *Citizens to Preserve Overton Park v. Volpe*, 401 U.S. 402, 416 (1971) (agency's decision must be "based on a consideration of the relevant factors").

[9] *Motor Vehicle Mfrs. Ass'n of the U.S., Inc. v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1983).

[10] *Id.*

[11] *Loyola University v. FCC*, 670 F.2d 1222, 1227 (D.C. Cir. 1982). *See also Public Citizen v. National Highway Traffic Safety Admin.*, 848 F.2d 256, 266-267 (D.C. Cir. 1988).

A. The *Order* Fails to Adequately Consider the Critical Issue of the 1 dB Standard and Interference to Satellite Communications.

Beginning in 2015, Ligado argued that the latest incarnation of its terrestrial network addressed the in-band and adjacent band harmful interference concerns that plagued its predecessors. As modified, Ligado's Applications reflect the terms of agreements with various GPS manufacturers to protect commercial GPS, including power restrictions and abandonment of terrestrial operations in certain spectrum.[12] In 2018 Ligado amended its Applications to further reduce its operational power levels in certain frequency bands in response to the Department of Transportation's Adjacent Band Compatibility Study ("DOT ABC Study").[13] Having made these concessions and provided analyses for the record, Ligado repeatedly asserted that the record was "complete" and ready for the Commission to grant Ligado's Applications.[14]

The record tells a different story. From Ligado's 2015 amendment through the Commission's recent *Order*, Lockheed Martin, along with numerous other members of the GPS community, have repeatedly argued that even with Ligado's modifications and amendments, its terrestrial operations will still cause harmful interference to GPS.[15] Notably, while Ligado suggests that its 2018 amendments are "consistent with the Department of Transportation's

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[12] *See* Description of Proposed Modification and Public Interest Statement, IBFS File Nos. SES-MOD-20151231-00981, SAT-MOD-20151231-00090, and SAT-MOD20151231-00091 (Dec. 31, 2015).

[13] *See* Description of Amendment to License Modification, IBFS File Nos. SAT-AMD-20180531-00044, SAT-AMD20180531-00045, and SES-AMD20180531-00856 (May 31, 2018) ("Ligado Amendment Narrative").

[14] *See, e.g.*, Letter from Gerard J. Waldron, Counsel to Ligado Networks LLC, to Marlene H. Dortch, Secretary, FCC, IB Docket No. 11-109 *et al*. (filed Apr. 4, 2019).

[15] *See, e.g.*, Reply Comments of Aviation Spectrum Resources, Inc., IB Docket Nos. 11-109 & 12-340 (filed July 24, 2018) ("ASRI Reply Comments"); Letter from Joel N. Myers, Founder, President and Chairman, AccuWeather *et al*., to Ajit Pai, Chairman, FCC, IB Dockets No. 11-109 & 12-340 *et al*. (filed July 18, 2018) ("Coalition of Aviation July 2018 Letter") (filed as Coalition of Aviation, SATCOM, and Weather Information Users).

analysis in its recently released adjacent band compatibility study,"[16] the record reflects "that a 1 dB degradation in C/N_0 detracts noticeably from receiver performance" and that the 1 dB standard is necessary to protect GPS from harmful interference from Ligado.[17] Support for the 1 dB standard is notably absent from Ligado's 2018 amendments, and Ligado has vehemently opposed application of the 1 dB standard to its operations.[18] Other commenters, including satellite operator Iridium Communications Inc. ("Iridium"), have argued that Ligado's proposals, even as modified, fail to address the impact of Ligado's terrestrial operations on communications satellite operators in adjacent bands.[19] Notwithstanding the merits of the arguments on either side of these issues, it is clear that at the core of this proceeding are multiple substantial and disputed questions of material fact.

The Commission's limited and dismissive analysis of the 1 dB standard and interference to satellite communications does not constitute the required "hard look" at this issue.[20] For instance, rather than addressing the merits of the 1 dB standard and the many concerns raised by commenters head-on, the *Order* merely states, tautologically, that "[i]n sum, the Commission has

[16] Ligado Amendment Narrative at 1.

[17] *See, e.g.*, Letter from J. David Grossman, Executive Director, GPS Innovation Alliance, to Marlene H. Dortch, Secretary, FCC, IB Docket Nos. 11-109 & 12-340 *et al*., at 7 (filed Dec. 20, 2019). *See also* ASRI Reply Comments at 12-16.

[18] *See, e.g.*, Letter from Gerard J. Waldron, Counsel to Ligado Networks LLC, to Marlene H. Dortch, Secretary, FCC, IB Docket No. 11-109 *et al*. (filed Jan. 13, 2020).

[19] *See, e.g.*, Letter from Bryan N. Tramont, Counsel to Iridium Communications Inc., to Marlene H. Dortch, Secretary, FCC, IB Docket Nos. 11-109 & 12-340 *et al*. (filed July 26, 2018); Comments of The Boeing Company, IB Docket Nos. 11-109 & 12-340 (filed July 9, 2018); ASRI Reply Comments.

[20] *Loyola University*, 670 F.2d at 1227.

not used a 1 dB C/N_0 degradation metric as the basis for establishing the technical limits for adjacent band ATC operations to protect GPS device operations within the RNSS allocation."[21]

Equally problematic, following dismissal of the 1 dB standard, the Commission articulates, for the first time, a series of critiques of the DOT ABC Study—critiques that stakeholders were given no reasonable opportunity to address.[22] The Commission attempts to overcome this shortcoming in a footnote, informing participants of its previously unexpressed view that "the DOT ABC Report does not directly address the 'performance or functioning' of GPS devices, as had been requested in the *Comment PN*."[23] This approach is fundamentally inconsistent with the Commission's obligations under the APA and is, alone, grounds for reversal.[24]

The Commission's passing reference in a footnote is hardly demonstrative of analysis sufficient to address the most fundamental concerns raised by the GPS community about Ligado's proposals—concerns so fundamental that GPS manufacturers, despite their individual agreements with Ligado, still feel compelled to argue that the 1 dB standard is the appropriate measure of harmful interference.[25]

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[21] *Order* para. 50.

[22] *Id.* paras. 54-57.

[23] *Id.* n.123.

[24] *Cf. Conn. Light & Power Co. v. Nuclear Regulatory Comm'n*, 673 F.2d 525, 530-31 (D.C. Cir. 1982) ("The purpose of the comment period is to allow interested members of the public to communicate information, concerns, and criticisms to the agency during the rule-making process . . . . To allow an agency to play hunt the peanut with technical information, hiding or disguising the information that it employs, is to condone a practice in which the agency treats what should be a genuine interchange as mere bureaucratic sport. An agency commits serious procedural error when it fails to reveal portions of the technical basis for a proposed rule in time to allow for meaningful commentary.").

[25] *See* Letter from J. David Grossman, Executive Director, GPS Innovation Alliance, to Marlene H. Dortch, Secretary, FCC, IB Docket Nos. 11-109 & 12-340 (filed Mar. 4, 2020).

The nature of the agreements reached between GPS manufacturers and Ligado is also disputed and entirely glossed over in the *Order*. The Commission characterizes these as "co-existence" agreements in the *Order* and states that their existence is "critical" to the Commission's consideration of Ligado's Applications.[26] Yet Garmin International, Inc. ("Garmin"), one of the major manufacturers that entered into such an agreement with Ligado, corrected the Commission's characterization by clearly stating that it is a "settlement agreement" intended to resolve litigation, not a "co-existence agreement," and that "[n]othing in the Settlement Agreement constitutes support for or an endorsement of Ligado or its proposed services or technologies."[27] Garmin further noted that it was troubled by the *Order*'s failure to address concerns about certified aviation devices, and the rejection of the 1 dB standard, which is supported by "decades of precedent in domestic and international fora" and "the consistent and unanimous support of the entire GPS industry, and the collective government support of the U.S. Department of Transportation's testing."[28] To the extent that the Commission and staff misunderstood the nature of these agreements and that this misunderstanding was material to their decision to grant the Applications, the Commission must revisit that decision.

The *Order* similarly fails to address material questions raised by Iridium concerning harmful interference to Iridium's mobile-satellite service ("MSS") operations. Iridium has raised its concerns about the impact of harmful interference from Ligado's terrestrial operations to the Iridium satellite communications system for years, and provided two technical analyses for the

[26] *Order* para. 85.

[27] *See* Letter from Scott Burgett, Director, GNSS and Software Technology, Garmin International, Inc., to Marlene H. Dortch, Secretary, FCC, IB Docket Nos. 11-109 & 12-340 *et al*., at 2 (filed May 15, 2020) (citation omitted).

[28] *Id.* at 3.

record explaining the nature and scope of harmful interference to Iridium.[29] However, rather than address the substantive concerns raised by Iridium in its technical analyses, the Commission merely points to two "conservative" assumptions in Iridium's analyses and rejects both without any substantive discussion of which assumptions would be appropriate.[30] The Commission further criticizes the Iridium analyses for being "based on an out-of-channel emissions level that is 9 dB higher than the limit being imposed here,"[31] but fails to acknowledge the fact that Iridium's analyses were based on the power levels proposed by Ligado in its own Applications. It is unclear how the Commission could reasonably expect any party to have known to submit analyses predicated on limits not in the record but ultimately adopted in the *Order*.

To the extent Commission staff was not satisfied with the way any of the GPS or satellite studies were structured, Commission staff should have been authorized to engage formally with the relevant parties to identify the limitations of the methodologies applied in each case and to provide the parties with an opportunity to revise their analyses in a manner that conformed to the Commission's preferences. Alternatively, given the significant conflict in the record, it would have been not only appropriate, but potentially advantageous for resolution of the conflicts, for the Commission to contract with an independent party, such as a federally funded research and development center ("FFRDC") with radionavigation satellite service ("RNSS") expertise, to conduct its own independent studies to evaluate competing demonstrations of harmful

[29] *See* Technical Analysis of Ligado Interference Impact on Iridium User Links (Sept. 1, 2016) (attached as exhibit to Letter from Bryan N. Tramont, Counsel to Iridium Communications, Inc., to Marlene H. Dortch, Secretary, FCC, IB Docket Nos. 11-109 & 12-340 *et al.*); Technical Analysis of Ligado Interference Impact on Iridium Aviation Services (Dec. 14, 2016) (attached as exhibit to Letter from Bryan N. Tramont, Counsel to Iridium Communications, Inc., to Marlene H. Dortch, Secretary, IB Docket Nos. 11-109 & 12-340 *et al.*).

[30] *Order* para. 117.

[31] *Id.*

interference. Having chosen not to take such steps or to otherwise address the disputed questions of fact raised by commenters, the Commission has failed to satisfy its obligations under the Communications Act. The Commission cannot avoid dealing with such disputed material facts; it must set these issues for hearing.[32]

B. The Commission Failed to Give Sufficient Consideration to the Department of Defense's Well-Founded Objections.

The Commission also failed to give appropriate weight to the data available from and the objections of the Department of Defense ("DoD"). Congress reserved to the Secretary of Defense responsibility for "the sustainment of the capabilities of the Global Positioning System . . . and the operation of basic GPS services" for the military,[33] and likewise tasked the Secretary with the "sustainment and operation" of GPS for civilian purposes, with consultation from and coordination with the Department of Transportation and other executive branch agencies.[34] In keeping with those obligations, Congress directed that the Secretary of Defense "may not agree to any restriction on the Global Positioning System proposed by the head of a department or agency of the United States outside the Department of Defense in the exercise of that official's regulatory authority that would adversely affect the military potential of the Global Positioning System."[35] And while the Department of Defense left the Commission with absolutely no doubt that it objected to the Applications,[36] the Commission gave those objections—objections that

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[32] 47 U.S.C. § 309(e).

[33] 10 U.S.C. § 2281(a).

[34] *Id.* § 2281(b).

[35] *Id.* § 2281(b)(5).

[36] *Order* paras. 45-46 (citing, among others, Letter from Mark T. Esper, Secretary, Department of Defense, to Ajit Pai, Chairman, FCC (Nov. 18, 2019) (stating that, pursuant to 10 U.S.C. § 2281, the Secretary of Defense may not agree to any restriction on GPS that would adversely affect the military potential of GPS); Letter from Patrick M. Shanahan, Acting Secretary, Department of Defense, to Ajit Pai, Chairman, FCC, at 1 (June 7, 2019) (same); Letter from

carry the weight of statute—short shrift; moreover, it was evident during *ex parte* meetings that the classified portions of the DOT ABC Report were not appropriately considered as part of the Commission's decision-making process.[37] There is no question that "the Commission . . . is vested with Title III authority to determine how to manage spectrum use,"[38] but that authority is tempered by the Commission's obligation under the APA to conduct reasoned decision-making by recognizing that it lacks, at a minimum, exclusive statutory competency with respect to GPS interference and protection.[39]

C. The Commission Failed to Adequately Evaluate the Costs and Benefits of Granting the Applications.

Cost-benefit analyses are and should be a critical element of Commission decision-making. Such analyses permit the agency to "intelligibly apply" the public interest standard; without it, the Commission is "essentially putting [a] finger in the wind and making it up as [it]

David L. Norquist, Deputy Secretary, Department of Defense, to Wilbur L. Ross, Jr., Secretary, Department of Commerce (Mar. 24, 2020) (citing 10 U.S.C. § 2281); Letter from Dana Deasy, Chief Information Officer, Department of Defense, and Michael Griffin, Under Secretary for Research and Engineering, Department of Defense, to Douglas W. Kinkoph, Deputy Assistant Secretary (Acting), National Telecommunications and Information Administration (Mar. 12, 2020) (citing 10 U.S.C. § 2281)). It is worth noting that the opportunity to review the *Order* as adopted did nothing to alleviate those objections. *See* Dana Deasy, Chief Information Officer, Department of Defense, Statement Before the Senate Armed Services Committee, *Department of Defense Spectrum Policy and the Impact of the Federal Communications Commission's Ligado Decision on National Security*, at 4 (May 6, 2020), https://www.armed-services.senate.gov/imo/media/-doc/Deasy_05-06-20.pdf ("Based on the tremendous risk to GPS, DoD does not agree with the FCC's decision.") (emphasis in original).

[37] *See also* Letter from Adam Smith, Chairman, House Armed Services Committee, et. al., to Ajit Pai, Chairman, FCC, *et al*., IB Docket Nos. 11-109, 12-340 at 1-2 (filed May 7, 2020).

[38] *Order* n.422.

[39] *Cf. The Development of Operational, Technical and Spectrum Requirements For Meeting Federal, State and Local Public Safety Agency Communication Requirements Through the Year 2010*; Establishment of Rules and Requirements for Priority Access Service, Third Memorandum Opinion and Order and Third Report and Order, WT Docket No. 96-86, 15 FCC Rcd 19844, 19877-78 para. 75 (2000).

go[es] along," which "is no basis for reasoned, evidence-based decision-making by an expert agency."[40]

The *Order*'s assessment of the costs and benefits of granting the Applications, however, is severely lacking the rigor required of a Commission decision. The *Order* contains no assessment of the costs it will impose on a wide array of affected parties, offers up remedies that are wholly insufficient to address those costs, and is overly credulous when it comes to the claimed benefits. Had the Commission conducted a rigorous cost-benefit analysis consistent with its existing policies and the Executive Branch's executive order regarding the total incremental cost of all new regulations,[41] it would have found that the costs imposed by the Applications are significant and far outweigh the at-best-speculative benefits. This is fundamentally inconsistent with the goal of ensuring that economic analysis more broadly, and cost-benefit analysis in particular, is employed more systematically in Commission orders.[42]

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[40] *See Establishment of the Office of Economics and Analytics*, Order, 33 FCC Rcd 1539, 1549 (2018) (Statement of Chairman Ajit Pai).

[41] *See id.* at 1548 ("Both the Clinton and Obama Administrations issued guidelines on this topic—guidelines which the Trump Administration's Executive Order 13771 directs agencies to follow."); Exec. Order No. 13771, 82 Fed. Reg. 9339 (Feb. 3, 2017.

[42] *See* Ajit Pai, Chairman, FCC, Remarks at the Hudson Institute, *The Importance of Economic Analysis at the FCC*, Washington, D.C., at 3-4 (Apr. 5, 2017), https://docs.fcc.gov/public-/attachments/DOC-344248A1.pdf ("Seldom does [the Commission] consider the distributional impact of these costs and benefits. For example, are the costs of a new rule simply too high to be borne by small firms that lack an army of attorneys and accountants to help with regulatory compliance? How will this impact competition or innovation in a market?"); *see also* Michael O'Rielly, Commissioner, FCC, Remarks at TPRC 44: Research Conference on Communications, Information, and Internet Policy, at 1 (Sept. 30, 2016), https://docs.fcc.gov-/public/attachments/DOC-341544A1.pdf ("it is incumbent on every federal agency to determine whether the rules it proposes will result in costs to providers, consumers or society as a whole that outweigh the purported benefits").

1. The costs imposed by the *Order* are understated—if evaluated at all.

The Commission failed in any way to quantify the costs that dozens of affected parties will incur when dealing with the impact of Ligado's operations. For example, even after inappropriately rejecting the 1 dB standard, the *Order* recognizes that seven of eleven high-precision receivers tested in the Ligado-sponsored reports by Roberson and Associates ("RAA Reports") would be impacted by Ligado's operations and that only three could be modified to ameliorate the harmful interference.[43] The Commission simply asserts that "it is technically possible and feasible to retrofit (or replace, where retrofitting is infeasible) those high-precision receivers that may experience harmful interference and that retrofitting or replacing covered receivers would remedy harmful interference,"[44] but does not even try to assess the costs incurred to "rip and replace" all of the existing, embedded private sector and government GPS receivers, let alone quantify the admitted impact that such harmful interference will have on the developing small UAS industry.[45] Meanwhile, an initial industry assessment suggests that such costs could amount to billions of dollars—and the same customers, who have come to rely upon uninterrupted GPS service, will have to unfairly bear such costs.[46]

In a similar vein, the *Order* fundamentally fails to grapple with the fact that the United States Air Force asserts that it is "practically impossible for [the Department of Defense] to identify and repair or replace all of the potentially adversely affected receivers" and that "even if

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[43] *Order* para. 80.

[44] *Id.* para. 89.

[45] *Id.* para. 72.

[46] *See, e.g.*, Comments of Aircraft Owners and Pilots Association et. al., IB Docket Nos. 11-109 & 12-340 (filed May 23, 2016) ("Such interference would result in . . . loss of billions of dollars in Federal Aviation Administration ("FAA") and commercial aviation sector GPS investments.").

a solution were shown to be feasible, could take on the order of billions of dollars . . . ."[47] Indeed, the "information-sharing and cooperation conditions" the Commission assumes will make harmful interference "limited and manageable"[48] require affected government agencies to "identify the devices that could be affected"—the very thing the Air Force says is "practically impossible."[49]

The Commission also fails to weigh the costs that Ligado will impose on service providers in adjacent bands. For example, despite an explicit acknowledgement that harmful interference impacting Iridium's MSS and AMS(R)S operations around airports and other use cases may present "unique interference concerns," the Commission simply directs the parties to "engage in further discussions" to address those issues "with the aim of concluding arrangements that may be satisfactory to both parties."[50] There is no explanation of how the Commission concludes that there are greater incentives in place for resolution of this interference from having licensed Ligado than there were prior to licensing when both parties had incentives to negotiate. Nor is there any consideration for the impact that such harmful interference will have on platforms that rely on MSS and AMS(R)S functions as an input, including platforms maintained by Lockheed Martin and used by its customers.

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[47] Memorandum from Thu Luu, Department of the Air Force, Executive Agent for GPS, to IRAC Chairman, National Telecommunications and Information Administration, at 3 (dated Feb. 14, 2020) ("Air Force Memorandum") (Memorandum attached as exhibit to Letter from Douglas W. Kinkoph, Associate Administrator, Performing the Delegated Duties of the Assistant Secretary for Communications and Information, National Telecommunications and Information Administration, to Ajit Pai, Chairman, FCC, IB Docket Nos. 11-109 & 12-340 *et al*. (filed Apr. 10, 2020)).

[48] *Order* para. 127.

[49] *Id.* para. 144; *see also infra* section I.C.2.

[50] *Order* para. 118.

The *Order* also fails to consider the broader economic costs imposed across numerous critical commercial sectors of the U.S. economy that rely on the integrity of GPS receivers, ranging from precision farming to passenger and cargo airlines. Moreover, there is inherent economic and policy value in ensuring that the U.S.-developed and deployed GPS navigation service remains the preeminent reliable, global standard. From an economic perspective, the Department of Commerce's National Institute of Standards and Technology estimated that GPS generated "roughly $1.4 trillion in economic benefits . . . since it was made available for civilian and commercial use" in the U.S. alone,[51] and that "the loss of GPS service would have a $1 billion per-day impact."[52] From a policy perspective, the *Order* unfortunately benefits foreign competition to GPS, particularly foreign national efforts to promote an "additional" global navigation standard (*e.g.*, BeiDou). By needlessly injecting technical doubt into the reliability of GPS receivers, the Commission unintentionally opens the policy door to other non-U.S. systems.[53]

Finally, the *Order* fails to grapple with the significant, nonpecuniary costs that will be imposed by the FCC's decision to allow harmful interference from any future deployed Ligado network. While it may be difficult to place a dollar value on the impact the Department of Defense says Ligado's network will have on military readiness, the Commission's failure to even acknowledge the United States Air Force's concern that the *Order* will impact warfighters'

[51] RTI International, *Economic Benefits of the Global Positioning System (GPS)*, Final Report, RTI Project Number 0215471, at ES-1 (June 2019) (sponsored by the National Institute of Standards and Technology).

[52] *Id.* at ES-4

[53] *See, e.g.*, Pratik Jakhar, *How China's GPS 'rival' Beidou is plotting to go global*, BBC Monitoring (Sept. 20, 2018), https://www.bbc.com/news/technology-45471959.

ability to "respond to rapidly evolving threats *by decades*" not only beggars belief, but is another flaw in the cost benefit analysis and public interest determination.[54]

2. The *Order*'s remedies are not sufficient to offset its costs.

The "remedies" the Commission adopts are not sufficient to offset the costs already outlined. As discussed above, the power levels and operating restrictions and out of channel emission limitations adopted by the *Order* are insufficient to address the harm that Ligado's operations would have on GPS and services in adjacent bands.[55] Government agencies that are subject to harmful interference must "identify the devices that could be affected," which the Air Force says is "practically impossible," and then incur the costs of "working with" (*i.e.*, negotiating with) Ligado to reach an agreement on whether harmful interference is actually occurring and "developing a program" to repair or replace affected receivers – but only to the extent "applicable statutes and regulations relating to the ability of those agencies to accept this type of support" allow.[56] Further, in an unprecedented step, the Commission directs other victims of harmful interference to direct their complaints to Ligado, and empowers Ligado—the same company that will be generating the harmful interference—to determine whether those complaints are "credible."[57] Under this novel approach, it is unclear how many times and for how long unrelated users will be required to suffer harmful interference while Ligado receives and adjudicates its first complaint. And Lockheed Martin fully agrees with the Commission that the three GPS manufacturer agreements with Ligado do not address all harmful interference

[54] Air Force Memorandum at 5 (emphasis added).

[55] *See supra* section I.A; *see also e.g.*, ASRI Reply Comments; Coalition of Aviation July 2018 Letter.

[56] *Order* para. 144.

[57] *Id.* para. 92 & n.232.

recognized in the *Order* to be caused by Ligado's system to those manufacturers' products,[58] let alone the products of other GPS manufacturers that do not have agreements with Ligado.[59]

3. The *Order* overstates the benefits of Ligado's service.

Given the Commission's failure to grapple with the costs that granting the Applications imposes, it is perhaps unsurprising that the *Order* reflects little effort to evaluate Ligado's claimed public interest benefits. Over the course of a scant two pages, the Commission readily accepts assertions that do not stand up to even moderate scrutiny.

After noting that approving the Applications will allow Ligado to provide service as described in the Applications,[60] the Commission goes on to quote a series of Ligado's marketing claims to support the proposition that Ligado "*could* develop as a key infrastructure component of the digital economy."[61] With one word—"could"—the Commission tacitly acknowledges that those claimed benefits are entirely speculative. As well it should; the record clearly demonstrates that Ligado's pending proposal differs dramatically from what was considered in 2011, and differs even more dramatically from the ATC offerings that the Commission contemplated in 2003 when it first adopted ATC rules.[62] In the past year alone Ligado has suggested multiple new operational models for its network,[63] and is now discussing plans to pair its spectrum with

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[58] *Id.* paras. 80, 88.

[59] *See, e.g.*, *id.* para. 26 ("Ligado has reached several co-existence agreements with major GPS device manufacturers"); *id.* para. 27 (noting that Garmin, Trimble, and Deere "represent the majority of the GPS device markets.").

[60] *Id.* paras. 19-20.

[61] *Id.* para. 21 (emphasis added).

[62] *Flexibility for Delivery of Communications by Mobile Satellite Service Providers in the 2 GHz Band, the L-Band, and the 1.6/2.4 GHz Bands*, Order on Reconsideration, 18 FCC Rcd 13590 (2003).

[63] *See* Letter from Gerard J. Waldron, Counsel to Ligado Networks LLC, to Marlene H. Dortch, Secretary, FCC, IB Docket No. 11-109 *et al*. (filed Aug. 6, 2019) (listing several different

mid-band spectrum in the C-band[64]—a proposal wholly absent from its Applications or earlier filings. Given Ligado's ever-evolving business plan and its failure to deliver on prior promised business plans, its claims in this regard do not in any way outweigh the myriad costs—financial, operational, and safety, among others—imposed on the GPS community.

The Commission then simply restates Ligado's own arguments in support of the claim that "Ligado's deployment of its ancillary terrestrial network furthers our goal of efficiently using spectrum to support services that comprise the 5G ecosystem."[65] Lockheed Martin fully recognizes the importance of the global race for 5G, and quite frankly, beyond. The company is engaged across multiple technical spaces to leverage 5G capabilities, but also to explore how to increase spectrum sharing capabilities between 5G and critical U.S. technologies. To the extent the Commission relied on the advancement of 5G as a justification for this decision, that reliance is misplaced: Ligado's proposed IIoT service does not meet any definitions of 5G.[66] Ligado's frequency bands are not part of Commission's 5G FAST Plan,[67] they are not part of 3GPP 5G standards or any other recognized 5G standard,[68] and they are not identified within the ITU for IMT operations.[69] This *Order* authorizes Ligado to implement what is, at best, a non-standard,

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deployment approaches that Ligado is considering, including using its spectrum for carrier aggregation, supplemental uplinks, and downlink/uplink decoupling).

[64] *See* Letter from Gerard J. Waldron, Counsel to Ligado Networks LLC, to Marlene H. Dortch, Secretary, FCC, IB Docket No. 11-109 *et al*. (filed Dec. 16, 2019).

[65] *Order* paras. 22-23.

[66] *Id.* para. 23; Press Release, FCC, FCC Unanimously Approves Ligado's Application to Facilitate 5G and Internet Of Things Services (rel. Apr. 20, 2020), https://docs.fcc.gov/public/attachments/DOC-363823A1.pdf.

[67] *See* FCC, The FCC's 5G FAST Plan, https://www.fcc.gov/5G (last visited May 21, 2020).

[68] 3GPP, Release 16, https://www.3gpp.org/release-16 (last updated Mar. 23, 2020).

[69] *See* ITU, International Telecommunication Union – Radiocommunication Sector ITU-R FAQ on International Mobile Telecommunications (IMT) (updated Apr. 27, 2020) at 7-8.

narrow bandwidth service that could, perhaps, be paired with another carrier's higher-band spectrum through some commercial partnerships.[70] But there is no evidence of such partnerships or any actual demand for such a service, and the mere possibility of either is insufficient to offset the financial, operational, and safety costs this *Order* imposes. Further, based on the Commission's own record, grant of Ligado's Applications does nothing to achieve the Commission's major 5G policy goals, like bridging the digital divide. Given the system characteristics as approved, it is unclear how Ligado could deploy economically in non-urban areas that are most in need of connectivity.[71] And, at the end of the day, the record demonstrates that "an inability to deploy terrestrial 5G or related services using the frequencies involved in the Ligado Applications will not hold back the timely deployment of 5G across the United States."[72]

Finally, the Commission "notes" Ligado's investment and jobs claims without examination,[73] but does not apply its own standard to assess such claimed public interest benefits.[74]

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[70] *Order* para. 23.

[71] *See Inquiry Concerning Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion*, 2020 Broadband Deployment Report, GN Docket No. 19-285 para. 37, Figs. 2a, 2b (rel. Apr. 24. 2020) (showing that even 5/1 Mbps LTE coverage in rural and tribal areas lags behind coverage in urban areas); *id.* para. 94 ("While deployment is improving in all geographic areas, we recognize that there is still significant work to do to encourage deployment to rural areas, where 22.3% of Americans lack access, and Tribal lands, where 27.7% of Americans lack access.").

[72] Letter from Douglas W. Kinkoph, Deputy Assistant Secretary for Communications and Information (Acting), National Telecommunications and Information Administration, to Ajit Pai, Chairman, FCC, IB Docket Nos. 11-109 & 12-340 *et al*., at 2 (filed Dec. 6, 2019).

[73] *Order* para. 24.

[74] *See, e.g.*, *Applications of T-Mobile US, Inc. and Sprint Corp. for Consent To Transfer Control of Licenses and Authorizations*, Memorandum Opinion and Order, Declaratory Ruling, and Order of Proposed Modification, 34 FCC Rcd 10578, 10720 para. 321 (2019) ("when Applicants assert that a number of U.S. jobs will be created as a result of a proposed transaction and ask the Commission to consider this as a creditable benefit, the Applicants have the burden of proof regarding transaction-specificity, quantification, and verification.") (citation omitted);

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In short, the Commission's *Order* fails to address multiple substantial and material questions of fact consistently raised by commenters, and particularly fails to give adequate consideration to the studies relied on or provided by Ligado's opponents. Also, the Commission should have given rigorous consideration to the costs and benefits associated with granting the Applications. The Commission instead improperly and unlawfully elided over these fundamental questions. Given these fundamental errors, the Commission should reverse the *Order*.

II. THE COMMISSION IS REQUIRED TO DESIGNATE THE APPLICATIONS FOR HEARING.

Separate and apart from its lack of reasoned decision-making, the Commission erred by failing to comply with the statutory mandate to designate this matter for hearing. Section 309(e) specifies that an application made under Section 309(a) of the Act will be designated for hearing where a substantial and material question of fact is presented *or* the Commission is unable to make the necessary public interest findings.[75] In other words, Section 309(e) triggers the need for a hearing in one of two ways: a party may raise substantial and material factual questions or the

Applications of SOFTBANK CORP., Starburst II, Inc., Sprint Nextel Corporation, and Clearwire Corporation For Consent to Transfer Control of Licenses and Authorizations, Memorandum Opinion and Order, Declaratory Ruling, and Order on Reconsideration, 28 FCC Rcd 9642, 9670 para. 70 (2013) (Finding that the proposed transaction's "potential public interest harms regarding jobs are speculative and unsubstantiated"); *Applications of Charter Communications, Inc., Time Warner Cable Inc., and Advance/Newhouse Partnership For Consent to Assign or Transfer Control of Licenses and Authorizations*, Memorandum Opinion and Order, 31 FCC Rcd 6327, 6526 para. 444 (2016) (Declining to credit applicants pledge to return jobs to the U.S. despite "considerable support in the record. . . ."); *SBC Communications, Inc. and AT&T Corp. Applications for Approval of Transfer of Control*, Memorandum Opinion and Order, 20 FCC Rcd 18290, 18390 para. 198 (2005) (rejecting claimed investment synergies as "speculative" after detailed analysis); *Verizon Communications Inc. and MCI, Inc. Applications for Approval of Transfer of Control*, Memorandum Opinion and Order, 20 FCC Rcd 18433, 18537 para. 213 (2005) (Affording no credit to "[c]ertain other claimed cost synergies [that] are unexplained.").

[75] 47 U.S.C. § 309(e).

Commission may lack sufficient information on which to make an informed judgment. Conversely, "a hearing is not necessary where the Commission's decision is based on inferences and conclusions drawn from *undisputed facts*."[76] Thus, Section 309(e) requires the Commission to determine whether, "on the basis of the application, the pleadings filed, or other matters which [the Commission] may officially notice," a substantial and material question of fact has been raised as to whether grant of the application would serve the public interest.[77] And, where such factual disputes arise, the Commission may not grant the application, but must designate the matter for hearing.

In this case, it is clear that there are substantial disputes as to material facts upon which the Commission's determinations were predicated which must be designated for hearing under Section 309(e). As discussed above, the record reflects substantial disputes over critical matters such as power restrictions and the introduction of terrestrial operations in certain spectrum.[78] There are also substantial disputes as to material facts related to the costs and benefits of granting the Applications.[79] The Commission did not resolve these issues on the record before it and must, therefore, designate this matter for hearing under Section 309(e).

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[76] *Network Project v. FCC*, 511 F. 2d 786, 796 (D.C. Cir. 1975) (emphasis added); *Marsh v. FCC*, 436 F. 2d 132, 136 (D.C. Cir. 1970) ("Only where the public interest cannot be determined without resolution of *disputed facts* has Congress dictated that the Commission must conduct a hearing.") (emphasis added).

[77] *Astroline Commc'ns Co., Ltd. P'ship v. FCC*, 857 F.2d 1556, 1561(D.C. Cir. 1988); *see also generally Mobile Commc'ns Corp. of Am. v FCC*, 77 F.3d 1399, 1410 (D.C. Cir. 1996) (quoting *Citizens for Jazz on WRVR v. FCC*, 775 F.2d 392, 394 (D.C. Cir. 1985)).

[78] *See supra* sections I.A, I.B.

[79] *See supra* section I.C.

III. CONCLUSION

For the reasons discussed above, the Commission should reconsider the *Ligado Order*, reverse its grant of the Applications, deny the waiver request, and designate the Applications for a hearing.

Respectfully submitted,

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May 22, 2020

CERTIFICATE OF SERVICE

I, Jennifer Warren, Vice President, Technology Policy & Regulation, Lockheed Martin Corporation, hereby certify that on this 22nd day of May, 2020, pursuant to an agreement with the counsel to Ligado Networks LLC made on May 20, 2020 to accept service by email, I caused a copy of the foregoing Petition for Reconsideration of the Lockheed Martin Corporation to be served via email on:

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