

**Before the
Federal Communications Commission
Washington, D.C. 20554**

In the Matter of)	
)	
Audacy Corporation	)	IBFS File No. SAT-LOA-20161115-00117
	)	Call Sign S2982
)	
The Boeing Company	)	IBFS File No. SAT-LOA-20161115-00109
	)	Call Sign S2977
)	
Karousel LLC	)	IBFS File No. SAT-LOA-20161115-00113
	)	Call Sign S2980
)	
LeoSat MA, Inc.	)	IBFS File No. SAT-PDR-20161115-00112
	)	Call Sign S2979
)	
O3b Limited	)	IBFS File Nos. SAT-MOD-20160624-00060 and
	)	SAT-AMD-20161115-00116
	)	Call Sign S2935
)	
Space Exploration Holdings, LLC	)	IBFS File No. SAT-LOA-20161115-00118
	)	Call Sign S2983
)	
Space Norway AS	)	IBFS File No. SAT-PDR-20161115-00111
	)	Call Sign S2978
)	
Telesat Canada	)	IBFS File No. SAT-PDR-20161115-00108
	)	Call Sign S2976
)	
Theia Holdings A, Inc.	)	IBFS File No. SAT-LOA-20161115-00121
	)	Call Sign S2986
)	
ViaSat, Inc.)	IBFS File No. SAT-PDR-20161115-00120
)	Call Sign S2985

REPLY OF VIASAT, INC.

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REPLY OF VIASAT, INC.

ViaSat, Inc. hereby replies to the various pleadings responding to the Petition to Deny or Impose Conditions filed by ViaSat on June 26, 2017 (the “Petition”) in connection with the above-captioned applications, which were filed in the pending non-geostationary-satellite orbit

(“NGSO”) processing round covering the Ku band and the Ka band (the “Applications”). ViaSat also responds to the reply comments submitted by Hughes Network Systems, LLC (“HNS”) and The Boeing Company in connection with ViaSat’s Application.

I. INTRODUCTION AND SUMMARY

ViaSat’s Petition identifies specific concerns with respect to the potential for each of the NGSO systems proposed in this processing round to cause harmful interference into geostationary satellite orbit (“GSO”) operations. In order to protect those GSO operations, ViaSat requested that the Commission impose the following specific conditions on any Application grant that it may issue; in the absence of such conditions, ViaSat requested that the Commission deny each such Application because of the risk of harmful interference:¹

- **First**, ViaSat asked the Commission to condition any such grant on compliance with the particulars of operation—including technical parameters—specified by the applicant in its underlying Application.
- **Second**, ViaSat asked the Commission to condition the grant of any Application on the outcome of the pending NGSO rulemaking proceeding in IB Docket No. 16-408.
- **Third**, ViaSat asked the Commission to make clear that, unless and until suitable aggregate EPFD limits and related enforcement mechanisms are adopted by the Commission:
 - Each and every authorized Ka-band NGSO operator would be required to immediately implement whatever technical or operational changes might be necessary to protect GSO operations from harmful interference—including but not limited to reductions in power density or other system or operational modifications—even if the ITU’s equivalent power-flux density (“EPFD”) limits were being satisfied; and

¹ Contrary to O3b’s suggestion, ViaSat does not “seek” denial of all other Applications in this processing round. *See* Opposition and Response of O3b Limited, IBFS File No. SAT-AMD-20161115-00116, at 8 (July 7, 2017) (“O3b Opposition”). The Petition makes clear that ViaSat’s objective is simply to ensure that GSO operations are adequately protected from interference generated by proposed NGSO systems through the imposition of appropriate conditions tailored to achieve that objective.

- In the event of harmful interference, each and every authorized Ka-band NGSO operator contributing to such interference could be held jointly and severally responsible.

ViaSat is pleased that the record reflects widespread recognition of the need to protect GSO operations from harmful interference caused by NGSO systems. ViaSat also appreciates that the applicants generally accept ViaSat's proposal to condition any Application grant on the particulars of operations specified by the applicant in its underlying Application. Indeed, only two parties (Boeing and SpaceX) object to this condition, and those objections are addressed below.

Although some parties object to ViaSat's proposal to impose conditions to address concerns with respect to aggregate interference, those objections are generally procedural rather than substantive. Essentially, the objecting parties maintain that ViaSat's concerns should be addressed through the ongoing NGSO rulemaking proceeding, and not in the context of the individual Application proceedings. But those parties ignore that the Commission is *required* by the Communications Act to address ViaSat's concerns before granting the Applications.

For these reasons, and those set forth below, ViaSat reiterates its request that if the Commission decides to grant any Application, any such grant should be subject to the conditions specified in ViaSat's Petition.

II. THERE IS GENERAL CONSENSUS THAT PROPOSED NGSO SYSTEMS MUST ADEQUATELY PROTECT GSO OPERATIONS

ViaSat's Petition raises concerns about the potential for NGSO operations in the Ka band to cause harmful interference into GSO operations. Among other things, the Petition explains that compliance with the EPFD limits that the Commission has proposed to extend across the Ka

band, alone, would not adequately mitigate the potential for NGSO systems to cause such interference.²

The record reflects strong support for ViaSat’s position. In addition to HNS and Inmarsat—GSO operators that have long expressed support for ViaSat’s views in this matter³—several other parties explicitly recognize the need to protect GSO operations through appropriate EPFD limits. For example, Audacy acknowledges that the “rise in EPFD levels” expected to result from proposals to “use FSS spectrum for service links, delivering broadband to theoretically millions of customers from hundreds or thousands of spacecraft blanketing the Earth’s surface with beams” justifiably may concern existing GSO systems.⁴ Space Norway explains that it “agrees with the basic thrust” of ViaSat’s proposals.⁵ Boeing acknowledges that “the launch and operation of NGSO FSS systems should not endanger the successful operation of GSO networks, which must continue to be protected.”⁶ For its part, O3b recognizes the risk that

² ViaSat Petition at 8-9.

³ *See* Comments of Inmarsat Inc., IB Docket No. 16-408, at 8 (Feb. 27, 2017) (addressing need for new aggregate EPFD limits); Reply Comments of Inmarsat Inc., IB Docket No. 16-408, at 6 (Apr. 10, 2017) (agreeing with ViaSat that “managing NGSO interference into GSO systems should be a critical element of this proceeding”); Reply Comments of EchoStar Satellite Operating Corporation and Hughes Network Systems, LLC, IB Docket No. 16-408, at 8 (Apr. 10, 2017) (noting the “high likelihood that compliance by individual NGSO systems with single entry EPFD limits will be insufficient to protect GSO FSS operations”).

⁴ Opposition and Response of Audacy Corporation, IBFS File No. SAT-LOA-20161115-00117, at 4-5 (July 7, 2017) (“Audacy Opposition”).

⁵ Response of Space Norway as to Comments and Opposition to Petitions to Deny, IBFS File No. SAT-PDR-20161115-00111, at 11 (July 7, 2017) (“Space Norway Opposition”).

⁶ Opposition and Response of The Boeing Company, IBFS File No. SAT-LOA-20161115-00109, at 15 (July 7, 2017) (“Boeing Opposition”).

NGSO systems may cause aggregate interference into GSO operations and proposes conditions that it believes will curtail that risk.⁷

Other operators—including Theia Holdings and Karousel—recognize that the Commission should carefully evaluate the need to implement protections for GSO operations, but argue that the Commission should do so through the ongoing NGSO rulemaking proceeding.⁸ Although ViaSat disagrees with this approach, for the reasons discussed below, ViaSat is pleased that these parties acknowledge the legitimacy of ViaSat’s concerns and the fact that they must be addressed in *some* context.

III. MOST PARTIES HAVE NO OBJECTION TO AUTHORIZING EACH NGSO SYSTEM TO OPERATE ONLY IN ACCORDANCE WITH THE UNDERLYING APPLICATION

ViaSat’s Petition demonstrates that while NGSO operations at (or even near) the ITU Article 22 EPFD limits could create a significant risk of harmful interference into ViaSat’s GSO operations, “the NGSO operations proposed in each Application—when considered in isolation—are unlikely to generate harmful interference to ViaSat’s existing and proposed GSO operations” as long as those applicants actually abide by the specific operational parameters they describe, including operations at EPFD levels below ITU limits, and/or the maintenance of adequate isolation from the GSO arc.⁹ For this reason, ViaSat asked the Commission to

⁷ O3b Opposition at 8.

⁸ Consolidated Opposition and Response of Theia Holdings A, Inc., IBFS File No. SAT-LOA-20161115-00121, at 20 (July 7, 2017) (“Theia Holdings Opposition”); Karousel LLC’s Response to Comments and Opposition to Petitions, IBFS File No. SAT-LOA-20161115-00113, at 10 n.24 (July 7, 2017) (“Karousel Opposition”).

⁹ ViaSat Petition at 6-7. Telesat does not respond to ViaSat’s technical analysis, but instead erroneously asserts that ViaSat “does not allege that Telesat’s application violates or is inconsistent with any Commission rule or policy[.]” Telesat Canada’s Opposition to the Petition to Deny or Impose Conditions of ViaSat, Inc., IBFS File No. SAT-PDR-

authorize *only* operations that are consistent with the particulars of operation set forth in the underlying Applications.¹⁰ As ViaSat explained in its Petition, its request is consistent with decades of Commission precedent. Indeed, ViaSat’s Petition establishes that the Commission has routinely imposed this condition in previous satellite grants.¹¹

Most parties submitted comments that do not address ViaSat’s request for this condition, perhaps indicating that it is so fundamental as to be largely noncontroversial.¹² Other parties express tacit support for ViaSat’s broader efforts to protect GSO operations.¹³ Only two parties—Boeing and SpaceX—express anything approaching opposition to the condition ViaSat proposed regarding compliance with applied-for operating parameters.¹⁴

20161115-00108, at 2 (July 7, 2017) (“Telesat Opposition”). ViaSat’s technical analysis actually explains why Telesat’s proposed NGSO system would pose a significant risk of harmful interference into ViaSat’s GSO operations, such that grant of Telesat’s Application without appropriate conditions would be flatly inconsistent with the Communications Act, the Commission’s implementing rules, and Commission policies more broadly. *See* Comments of ViaSat, Inc., IB Docket No. 16-408, at 12-15 (Feb. 27, 2017); Reply Comments of ViaSat, Inc., IB Docket No. 16-408, at 6-15 (Apr. 10, 2017).

¹⁰ The relevant parameters in each Application are summarized in Exhibit A of ViaSat’s Petition. No party contests the accuracy of Exhibit A, although Space Norway specifies a missing parameter that ViaSat had been unable to ascertain from its review of Space Norway’s Application. *See* Space Norway Opposition at 11 (identifying GSO arc isolation angle).

¹¹ ViaSat Petition at 6-7.

¹² *See, e.g.*, Theia Holdings Opposition at 20; Karousel Opposition at 10 n.24; Telesat Opposition at 3 (exclusively discussing other conditions requested by ViaSat).

¹³ *See, e.g.*, Space Norway Opposition at 11 (noting that Space Norway “agrees with the basic thrust of [ViaSat’s] proposals”); O3b Opposition at 8 (agreeing that “the Commission must develop effective regulatory measures and enforcement mechanisms to protect GSO satellites from the potential for aggregate interference from multiple NGSO systems”).

¹⁴ Although LeoSat does not object to the condition requested by ViaSat, it should be noted that LeoSat grossly mischaracterizes ViaSat position in other respects. More specifically, LeoSat suggests that ViaSat asks the Commission to require Applicants to meet the EIRP requirements set forth in Article 22 of the ITU Radio Regulations to protect GSO

For its part, Boeing suggests only that such a condition “would likely be unnecessary” because the ongoing NGSO rulemaking proceeding “can be expected to resolve [EPFD] issues” and “may in fact result in updates to the EPFD regulations that would render the applicability” of such a condition moot.¹⁵ But Boeing’s argument does not address the possibility that certain critical matters may go unaddressed (or be addressed only after significant delays have occurred) in the NGSO rulemaking proceeding.¹⁶ And, notably, Boeing does not assert—let alone establish—that the condition ViaSat requested would somehow harm any NGSO applicant.¹⁷ To the contrary, Boeing appears to recognize that adherence to the particulars of operation set forth in the Applications is critical to ensure that NGSO systems do not cause harmful interference into GSO operations.¹⁸

operations in this band.” Opposition and Response of LeoSat MA, Inc., IBFS File No. SAT-PDR-20161115-00112, at 12 (July 7, 2017) (“LeoSat Opposition”). This is *not* ViaSat’s position; rather, as explained in its Petition, compliance with Article 22 EPFD limits, alone, may be inadequate in any given case to ensure that GSO operations are protected. More is needed. *See* ViaSat Petition at 6.

¹⁵ Boeing Opposition at 13.

¹⁶ For example, the Commission has suggested that it will not develop or implement certain aggregate EPFD limits prior to the adoption of such limits by the ITU—a process that could take many years, and has not even begun yet.

¹⁷ Audacy’s suggestion that its proposed system generally should not be subject to the conditions proposed by ViaSat because it “involves discrete feeder links . . . fall[ing] significantly below ITU-R recommendations” and thus “will not contribute to any increase in EPFD levels,” Audacy Reply Comments at 6, can be addressed in similar fashion. Audacy’s argument is entirely dependent on its proposed NGSO system operating in the manner described in Audacy’s Application. And, if Audacy’s system operates in the manner specified, the conditions ViaSat requested would protect ViaSat and other GSO operators without constraining Audacy’s ability to operate as it has proposed.

¹⁸ Boeing asserts that it will ensure that GSO networks are protected from NGSO systems through “operational measures”—including specific power, power-flux density, and arc avoidance angles specified in Boeing’s Application. Boeing Opposition at 14.

SpaceX objects to ViaSat’s requested condition based primarily on a misreading of Commission precedent. Specifically, SpaceX asserts that the Commission has not imposed such a condition in the NGSO context—an assertion that is demonstrably false.¹⁹ Tellingly, the Commission actually imposed this condition in the only two cases that SpaceX cites for the opposite proposition:

- The O3b grant cited by SpaceX provides explicitly that “[c]ommunications between U.S. licensed earth stations and O3b Limited’s NGSO system must be in accordance with the terms, conditions, and technical specifications set forth in O3b Limited’s application”²⁰
- Similarly, the contactMEO grant cited by SpaceX provides explicitly that it “is subject to the technical specifications in contactMEO Communications, LLC’s application”²¹

The references in these grants to compliance with Article 22 EPFD limits in no way obviate the conditions in those grants that *also* constrain operations to those described in the underlying applications.

Finally, SpaceX asserts that the condition ViaSat requested “would freeze innovation and potentially prevent NGSO operators from responding to changes in the EPFD limits or the algorithms used to determine EPFD compliance.”²² But SpaceX fails to specify any limiting principle whatsoever for its position. Similarly, SpaceX fails to explain how the Commission could adopt this position without eviscerating Section 25.114 of its rules (which requires

¹⁹ Consolidated Opposition to Petitions and Response to Comments of Space Exploration Holdings, LLC, IBFS File No. SAT-LOA-20161115-00118, at 27 (July 7, 2017) (“SpaceX Opposition”).

²⁰ See *O3b Limited*, Grant Stamp, IBFS File No. SAT-AMD-20150115-00004 (corrected Mar. 12, 2015).

²¹ See *contactMEO Communications, LLC*, 21 FCC Rcd 4035, at ¶ 61 (2006).

²² SpaceX Opposition at 27.

applicants to provide specific technical information to facilitate review of a proposed system by the Commission and other interested parties) or the space station application process generally.²³

In any event, the approach suggested by SpaceX is not legally sustainable. Apart from the fact that SpaceX's approach is inconsistent with decades of practice and precedent, that approach is also contrary to the notice requirements of the Communications Act and the Commission's implementing rules. Among other things, Section 309(b) of the Act requires the Commission to provide 30-days' notice of any application "or substantial amendment thereof" prior to grant.²⁴ For this purpose, the Commission has clarified that an amendment is substantial—or "major"—whenever it "increases the potential for interference."²⁵

Therefore, the Commission may not simply authorize an applicant to operate in accordance with parameters not specified in the underlying application—particularly where (as here) those new parameters lead to increased interference risk. Notably, the Commission has specifically found that an increase in transmitting power levels constitutes precisely the sort of "major" or "substantial" amendment that is impermissible without further public notice (and which therefore may be impossible to effect after the cut-off date in a processing round).²⁶ Similarly, allowing applicants to operate at power density levels higher than those specified in their Applications, or GSO arc isolation angles smaller than those specified in their Applications,

²³ See 47 C.F.R. § 25.114.

²⁴ See 47 U.S.C. § 309(b); see also 47 C.F.R. § 25.151(d) (providing that satellite applications generally will not be granted "until the expiration of a period of thirty days following the issuance of the public notice listing the application, or any major amendment thereto").

²⁵ See 47 C.F.R. § 25.116(b) (defining a "major amendment," requiring a new public notice period, to include any change that "increases the potential for interference").

²⁶ See *Final Analysis Communication Services, Inc.*, 13 FCC Rcd 6618, at ¶¶ 64-65, 66-67 (1998).

would increase interference potential and impermissibly deny parties the opportunity to assess the impact of any modifications to the parameters in the Applications, and thus violate the public notice requirements of the Act.

IV. AGGREGATE INTERFERENCE SHOULD BE ADDRESSED THROUGH APPROPRIATE CONDITIONS ON ANY APPLICATION GRANT

ViaSat's Petition raises concerns regarding the potential for the NGSO operations proposed in the Applications to cause harmful interference into GSO operations.²⁷ To avoid this result, ViaSat's Petition requests that the Commission impose specific conditions intended to cabin the risk of aggregate interference into GSO operations from the many Ka-band NGSO systems proposed in the Applications. As discussed above, a number of parties express support for ViaSat's efforts in this regard.

Other parties object to the *forum* in which ViaSat seeks to address its aggregate EPFD concerns (although no party disputes the legitimacy of ViaSat's underlying concerns on the record of these Application proceedings). More specifically, those parties assert that ViaSat's interference concerns should be deferred to and (potentially) resolved in the ongoing NGSO rulemaking proceeding. For example, Boeing suggests that it would be "inappropriate for the Commission to attempt to consider the potential adoption of new regulations of general applicability in the context of individual licensing adjudications."²⁸ Similarly, Karousel suggests that "ViaSat's concerns related to potential interference into adjacent GSO operations and the

²⁷ Telesat erroneously asserts that "ViaSat offers no engineering analysis to demonstrate that . . . its GSO operations will suffer harmful interference as a result of these NGSO systems' operations." Telesat Opposition at 3. The technical basis for ViaSat's concerns with respect to aggregate interference is well-established on the record—including through the comments and reply comments filed by ViaSat in the NGSO rulemaking proceeding and incorporated into the record of each Application proceeding through inclusion in ViaSat's Petition as Exhibits B and C.

²⁸ Boeing Opposition at 13-14.

need for aggregate EPFD limits are better left to the NPRM.”²⁹ And Theia Holdings suggests that an individual license application proceeding “is not the appropriate forum to address broad interference and sharing concerns”³⁰

These arguments ignore that the Commission is *required* to resolve the interference concerns ViaSat has raised in each Application proceeding, before granting such Application. ViaSat’s Petition is a valid petition to deny that sets forth “specific allegations of fact sufficient to show that [ViaSat] is a party in interest and that a grant of the application would be prima facie inconsistent” with the public interest, convenience, and necessity.³¹ More specifically, ViaSat’s Petition raises concerns regarding the potential for the NGSO operations proposed in the Applications to cause harmful interference into GSO operations. If left unresolved, these concerns would raise “a substantial and material question of fact” as to whether grant of the Applications would, in fact, serve the public interest, convenience, and necessity—requiring the Commission to designate the Applications for hearing under Section 309(e) of the Act (or impose appropriate conditions to avoid this result and eliminate the “substantial and material question of fact” ViaSat has raised³²).

That said, ViaSat agrees that any Application grant should also be subject to the outcome of the ongoing NGSO rulemaking. Indeed, ViaSat specifically requested that the Commission impose a condition to this effect, and ViaSat’s Petition clearly explains its intent that the

²⁹ Karousel Opposition at 10 n.24.

³⁰ Theia Holdings Opposition at 20; *see also* LeoSat Opposition at 13.

³¹ *See* 47 U.S.C. § 309(d).

³² Notably, where the Commission has authorized parties to operate subject to the outcome of another process intended to address interference issues, the Commission has made clear that such operations must proceed on a non-interference basis with respect to other operators with protected spectrum rights. *See, e.g., AMSC Subsidiary Corp. v. FCC*, 216 F.3d 1154 (D.C. Cir. 2000).

contemplated conditions with respect to aggregate interference would be *interim* in nature, applying “unless and until” the Commission adopts aggregate EPFD limits in both the uplink and downlink directions, a means is developed to apportion those limits among multiple NGSO systems, and suitable enforcement mechanisms are adopted.³³

Finally, several parties specifically object to ViaSat’s request that authorized NGSO operators be held jointly and severally responsible for any aggregate interference collectively caused by NGSO systems to GSO operations, largely due to the perception that it may be difficult to administer such an approach to responsibility.³⁴ These comments ignore that an approach incorporating joint and several responsibility is needed *because* it may be difficult—or even impossible—to determine which operator is “causing” any harmful interference that may arise. For these reasons, the Commission has used the concept of joint and several responsibility to ensure that potentially affected entities are protected in other regulatory contexts.³⁵

V. VIASAT’S PROPOSED SATELLITE-TO-SATELLITE LINKS ARE CONSISTENT WITH THE COMMISSION’S RULES AND COMPATIBLE WITH OTHER SATELLITE OPERATIONS

In reply comments filed in connection with ViaSat’s Application, HNS reiterates its earlier suggestion that ViaSat’s proposed satellite-to-satellite links may not be able to coexist with other NGSO and GSO operations.³⁶ ViaSat fully addressed these arguments in the Consolidated Opposition and Reply Comments it filed on July 7, 2017, which included a detailed

³³ ViaSat Petition at 9.

³⁴ *See, e.g.*, LeoSat Opposition at 14; Space Norway Opposition at 11.

³⁵ *See, e.g.*, 47 C.F.R. § 1.1307(b)(3) (providing that compliance with RF safety requirements is the shared responsibility of all licensees in a location at which multiple fixed transmitters are located).

³⁶ Reply Comments of Hughes Network Systems, LLC, IBFS File No. SAT-PDR-20161115-00120, at 3 (July 7, 2017), citing Petition to Deny of Inmarsat, Inc., IBFS File No. SAT-PDR-20161115-00120, at 4 (June 26, 2017).

supplemental demonstration that these links will be fully compatible with a two-degree GSO environment and the operation of NGSO systems in the Ka band—particularly as such links will transmit at power levels lower than those of a typical VSAT operating in the band. In contrast to ViaSat’s thorough technical analyses demonstrating that ViaSat’s satellite-to-satellite links would not pose any risk of harmful interference to other satellite systems, HNS simply characterizes ViaSat’s proposed operations as being “complicated,” and then asks the Commission to deny or defer ViaSat’s request without providing any supporting analysis.

Boeing, on the other hand, supports ViaSat’s request for authority for satellite-to-satellite links, agreeing that these proposed operations appropriately are within the FSS allocation.³⁷ ViaSat disagrees, however, with Boeing’s assessment that ViaSat’s Application does not include sufficient data to evaluate its proposed operations. Boeing itself provides a high-level analysis to support its conclusion that communications between MEO and GSO spacecraft would not cause harmful interference. Boeing’s analysis is consistent with the technical analysis in ViaSat’s Consolidated Opposition and Reply Comments, demonstrating the compatibility of the proposed satellite-to-satellite links with other satellite operations. Based on ViaSat’s comprehensive technical analyses, there simply is no need to require additional technical information, impose any conditions specifically requiring coordination of the satellite-to-satellite links, or initiate a supplemental rulemaking proceeding, as suggested by Boeing.

VI. CONCLUSION

The Commission should impose the conditions requested by ViaSat on any Application that the Commission otherwise chooses to grant. The record reflects widespread recognition of

³⁷ Response of The Boeing Company, IBFS File No. SAT-PDR-20161115-00120, at 2 (July 7, 2017).

the need to protect GSO operations from harmful interference that may result from the implementation of NGSO systems, and the conditions ViaSat has proposed would ensure such protection while allowing the Commission to grant the Applications and retain ample flexibility to examine related issues through the ongoing NGSO rulemaking proceeding.

Respectfully submitted,

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July 14, 2017

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I, Jarrett S. Taubman, hereby certify that on this 14th day of July, 2017, I served true and correct copies of the foregoing Reply of ViaSat, Inc. via first-class mail upon the following:

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