

**From:** Karl Kensinger

**Sent:** Wednesday, April 05, 2017 5:45 PM

**To:** 'Carlos Nalda' <[cnalda@lmiadvisors.com](mailto:cnalda@lmiadvisors.com)>; Jose Albuquerque <[Jose.Albuquerque@fcc.gov](mailto:Jose.Albuquerque@fcc.gov)>

**Cc:** Joseph A. Godles ([jgodles@G2W2.com](mailto:jgodles@G2W2.com)) <[jgodles@G2W2.com](mailto:jgodles@G2W2.com)>; 'pmarchesiello@wbklaw.com' <[pmarchesiello@wbklaw.com](mailto:pmarchesiello@wbklaw.com)>; 'wwiltshire@hwglaw.com' <[wwiltshire@hwglaw.com](mailto:wwiltshire@hwglaw.com)>

**Subject:** RE: Theia Holdings Inquiry - Request for Clarification

Carlos,

Jose asked that I respond to your inquiry concerning the request included in his March 15 letter for an analysis of collision risk resulting from satellites that experience failures that render them unable to perform collision avoidance activities.

We would expect that this analysis would address collision risk involving failed Theia satellites and the background debris population, which may be the single largest category of risk. One method for assessing this risk is to utilize the NASA debris assessment software for a single satellite, and “scale up” the results based on the estimated number of failed satellites. While this method does not capture all categories of risk, it can provide a rough assessment of one of the likely most significant categories. You are of course free to utilize other methods, particularly if you believe they would provide an improved assessment.

You may wish to assess as well the risk of collision between failed Theia satellites.

We would expect that the risk of collision between failed Theia satellites and controlled Theia satellites would be zero or near zero, but this is something that we would expect you to confirm and state in the analysis.

If you choose to provide an analysis for other altitudes (e.g. injection) it appears reasonable to us, unless you have information to the contrary, to assume zero or near zero risk with respect to satellites that have maneuver capability.

With respect to collision risk with other constellations in the processing round, the stated parameters for the mission altitude for those constellations would not conflict with your mission altitude. While we would welcome any analysis that assumes deployment of multiple constellations, and assesses risk with respect to uncontrolled satellites resulting from those constellation deployments, we recognize that this may require complex modelling, and would consider your answer complete if it simply recognized but did not further address such scenarios.

Because this response may be of general interest, a copy of this email will be placed in the Theia file. I am also copying counsel for applicants that received a similar question.

Best regards.

Karl

Karl Kensinger  
Deputy Chief, Satellite Division  
FCC International Bureau

**From:** Carlos Nalda [<mailto:cnalda@lmiadvisors.com>]  
**Sent:** Wednesday, April 05, 2017 8:37 AM  
**To:** Jose Albuquerque <[Jose.Albuquerque@fcc.gov](mailto:Jose.Albuquerque@fcc.gov)>  
**Cc:** Karl Kensinger <[Karl.Kensinger@fcc.gov](mailto:Karl.Kensinger@fcc.gov)>; [cnalda@lmiadvisors.com](mailto:cnalda@lmiadvisors.com)  
**Subject:** Theia Holdings Inquiry - Request for Clarification

Jose,

I would like to ask a quick clarifying question regarding Question 2 in the attached letter to Theia Holding. In assessing collision risk associated with spacecraft failures at the constellation's operational orbit, Theia assumes it should examine the collision risk relative to other satellites in the Theia constellation. In other words, because different NGSO system presumably will be assigned different altitudes, Theia can only examine intra-constellation collision risk at its operational orbit.

Just want to ensure this interpretation is correct.

Best regards,

Carlos

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