

## Anthony Serafini

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**From:** Anthony Serafini  
**Sent:** Tuesday, May 02, 2017 11:17 AM  
**To:** 'john@astranis.com'  
**Cc:** cnalda@lmiadvisors.com  
**Subject:** Questions for STA 0113-EX-ST-2017, Astranis

Mr. Gedmark

Our International Bureau has the following questions and comments regarding your application. Please respond to the items below.

IB/SD has reviewed the subject request (API file/Form 442/Exhibits) and has the following questions.

- 1) Has the applicant perform any RF compatibility analysis for any of the frequency band?
- 2) Please provide an antenna pattern (or a representative one) showing both horizontal (from -180 to 180 degrees) and vertical (0 to 90 degrees) planes for the 5950-5960 MHz band.
- 3) We found a discrepancy with the 5 GHz antenna gain; in the API the gain value is 41.6 dBi, yet in other calculations in exhibit it appears that the gain could be 40.5 dBi; please verify the antenna gain for the 5 GHz uplink band and provide the correct value.

### EPFD calculation comments (5950-5960 MHz):

- 6) In the Exhibit Narrative Summary, page 4, the GSO arc distance is provided as 35786 km; however, our spreading loss calculation showed a value of 162.07 dB; the exhibit has a value for the spreading loss of 163.0 dB; could the applicant please explain the differences. If a slant distance was used, please provide the slant distance value.
- 7) We calculated the EIRP using the output power 7 dBW and antenna gain of 41.6 dBi (as provided in the API) and our calculation shows a 48.6 dBW; your EIRP value is set at 47.5 dBW; please check the antenna gain and output power value and let us know which value is correct.

As noted above in #2, we will need an antenna pattern to obtain the off-axis gain at 35 degrees.

- 8) Using the exhibit max EIRP off axis value (4.9 dBW) towards the GSO arc, our calculation could not come up with the EIRP density of -63.3 dBW/Hz using the 10 MHz emission or any other emissions shown in the API. Please show how this EIRP density value was derived or provide us which emission bandwidth was used.

- 9) Using the input values in the exhibit to calculate the EPFD for each emission in the API, we notice that only the highest three bandwidth would meet the EPFD of -183 dBW/Hz/m<sup>2</sup>; **all the other emissions exceed the ITU EPFD limit.** Please provide a technical explanation how the applicant plans to meet the EPFD limit when using the emissions bandwidth that are less than 2.5 MHz?

### Form 442 ALL frequency bands

10) We note that the API filing contains 14 emission designators and FCC Form 442 only has one emission designator of 10 MHz; please explain why all the emission were not included in the Form 442.

Form 442 UPLINK (5.9 GHz band):

11) In Form 442, we checked the UPLINK ERP value and our calculation shows an EIRP of  $(7 + 41.6) = 48.6$  dBW; convert to ERP subtract 2.15 dB = 46.45 dBW then convert to watts; **44.052 kW ERP**; currently Form 442 shows ERP value of 34.196 kW ERP; we note that if the antenna gain is 40.5 dBi, the ERP value of 34.196 kW would be correct. Please confirm the antenna gain value.

12) We also notice a small discrepancy in the antenna beamwidth provided in Form 442 of 1.5 deg and in the API file of 1.4 deg. Let us know which one is the correct value.

Form 442 UPLINK (401 MHz band):

13) In Form 442, we checked the UPLINK ERP value and our calculation shows an EIRP of  $(14 + 16.2) = 32.2$  dBW; convert to ERP subtract 2.15 dB = 30.05 dBW then convert to watts; **638.3 W ERP**; currently Form 442 shows ERP value of 764 W ERP. Please review the ERP calculation and confirm the value.

14) We also notice a small discrepancy in the antenna beamwidth provided in Form 442 of 33 deg and in the API of 30 deg. Let us know which one is the correct value.

API ALL frequency bands

15) The power spectral density calculation for each emission were off by either 1.5 dB to .5 dB in all the calculations; we used the following formula:  $PSD = Power (dBW) - 10 * \log_{10}(\text{emission bandwidth in Hertz})$ . Please review and verify the PSD calculation for each emission.

API file, UPLINK Beam (5.9 GHz band):

16) The spacecraft receive antenna has a reference of ND-SPACE which indicates an omnidirectional antenna; however, the antenna has a gain of 7.3 dBi which would have some directionality. Can the applicant provide an antenna pattern or a representative one?

17) In the associated earth station, Box C10b1 has a reference antenna of REC-465-5; however, we search the ITU website and found the most current version of REC-S.465-6; please check if we search the correct reference and update the API as appropriate.

API file, DOWNLINK Beam (2.9 GHz band):

18) The spacecraft transmit antenna has a reference of ND-SPACE which indicates an omnidirectional antenna; however, the antenna has a gain of 7.3 dBi and in Form 442 it indicates a **directional** antenna with beamwidth of 79 degree. Please provide an antenna pattern or a representative antenna pattern for this beam.

19) Please provide the minimum elevation angle (the minimum is typically 5 degrees).

API DOWNLINK (401 MHz band):

20) The spacecraft transmit antenna has an antenna gain of -1 dBi; however the spacecraft receive antenna gain is 1 dBi; please verify if the transmit antenna gain is correct.

21) Please provide the minimum elevation angle (the minimum is typically 5 degrees).

22) In the associated earth station, Box C10d6, noise temperature; we note that the noise temp is 1003 Kelvin; typically this value is in the 400 K range; please review and confirm your value of 1003 K.

Regards,  
Tony Serafini