

## Radio Astronomy Service (RAS) Analysis

Think Orbital Flight-2 will be flying eight Iridium 9603 modems and two 9770 modems contained within two (2) cEDGE modules supplied by Cryptosat. 9603 modems are installed such that modem antennas' field of views (FOV) are non overlapping. In addition, 9770 modems are installed such that modem antennas' FOV are non overlapping. However the 9770 and 9603 modems' FOV do overlap to some extent.

When considering simultaneous operation of all 10 modems and their Out-Of-Band Emissions (OOBE) measurements, we found that the worst case interference scenario is when one 9770 modem antenna pointed at nadir and towards an RAS site.

We have provided a static interference analysis that assesses the worst-case, instantaneous geometry, i.e., at the minimum separation distance between the satellite and RAS site of 525 km, when in reality, during the pass of the satellite over an RAS site (assuming it is even transmitting at the exact time it is passing over an RAS site), the slant range distance between the satellite and RAS site will be much greater than 525 km . Furthermore, during the satellite pass, the Iridium modem antenna main beam will not always be pointed at the RAS site. We have assumed the worst-case geometry of the satellite orbital plane being perfectly aligned with the RAS site such that the satellite will pass directly overhead. In addition, we introduce a 3dB power increase to account for the worst case scenario where a 9603 and 9770 modem with overlapping FOVs are transmitting at the same time. The analysis below takes into account measurements of the maximum OOBE within the 1610.6-1613.8 MHz RAS band.

### Link Budget

9770 maximum OOBE within 1610.6-1613.8 MHz RAS band	-38.43	dBm/50kHz
Convert power density to dBW/Hz	-115.42	dBW/Hz
Worst case multiple modem overlapping transmission	3.00	dB
Iridium duty cycle reduction (8.28 ms burst per 90 ms frame)	-10.40	dB
Worst-case cEDGE antenna gain	2.00	dBi
cEDGE altitude	525.00	km
Worst-case, instantaneous power flux density at Earth's surface	-246.21	dBW/m <sup>2</sup> /Hz
cEDGE maximum time in view of RAS site (900 sec) during 2000 sec integration time factor	-3.47	dB
Time averaged power flux-density	-249.68	dBW/m <sup>2</sup> /Hz
RAS power flux density limit (Rec. ITU-R RA.769)	-238.00	dBW/m <sup>2</sup> /Hz
<b>Margin</b>	<b>11.68</b>	<b>dB</b>



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