EXHIBIT 7

X-band Interference Analysis

X-band Interference Analysis

Overview

The Momentus VR-5 mission plans to use a 1-megahertz channel (8199.5-8200.5 MHz) in the X-band Earth-Exploration Satellite Service ("EESS") allocation (space-to-Earth) on an unprotected and non-interference basis for Space Operations services.[1] This report demonstrates that the VR-5 spacecraft operations will not cause unacceptable levels of interference to authorized satellite systems in these X-band frequencies and, further, by maintaining a 3-degree avoidance angle with other co-frequency satellite operators will ensure protection of those systems.

This analysis relies upon the protection criteria defined in ITU-R SA.1027-6.[2] This ITU Recommendation defines both long-term and short-term protection criteria. The long-term protection criterion defines an interference power level, which cannot be exceeded 20% of the time. Because the interfering system is a single non-geostationary low-Earth orbit ("LEO") satellite,[3] it is physically incapable of causing interference into any given gateway earth station ("GW ES") 20% of the time.

The short-term protection criterion limits the interfering signal power to -133 dBW/10 MHz for no more than 0.0025% of the time. The short-term protection criterion is the focus of this analysis because it reflects the protection criterion that could be exceeded by a single LEO interferer.

Frequency band (MHz)	Interfering signal power (dBW) in the reference bandwidth to be exceeded no more than 20% of the time		Interfering signal power (dBW) in the reference bandwidth to be exceeded no more than p% of the time	
	Interfering signal path		Interfering signal path	
8 025-8 400	–167 dBW per 10 MHz	–150 dBW per 10 MHz	–133 dBW per 10 MHz $p = 0.0025$	–133 dBW per 10 MHz $p = 0.0050$

Figure 1: X-band EESS Protection Criteria - ITU-R SA.1027-6

[1] As stated in the application narrative, Momentus will also use this band for transmission of some incidental imaging and mission assurance purposes (*e.g.*, the deployment of customer payloads). *See* Application Narrative, at 11.

[2] *See* Sharing criteria for space-to-Earth data transmission systems in the Earth exploration-satellite and meteorological-satellite services using satellites in low-Earth orbit, ITU-R SA.1027-6 (2019), *available at* https://www.itu.int/dms_pubrec/itu-r/rec/sa/R-REC-SA.1027-6-201908-I!!PDF-E.pdf.

[3] While Momentus intends to operate in the X-band on future missions, each mission is expected to have only a 250-day mission duration. Furthermore, as seen from the presented results below, the long-term protection criterion is met by roughly two orders of magnitude. Therefore, the long-term protection criteria would only be exceeded if over 100 Vigoride spacecraft were simultaneously operating.

The goal of this simulation-based analysis is to demonstrate that Momentus will be able to maintain its operations in the X-band frequencies below the ITU-specified short-term protection criterion.[4] This analysis focuses on the U.S.-band GW ES site to which Momentus will be conducting X-band downlink transmissions.[5] Further, Momentus will extrapolate these results, via analysis, to demonstrate that Momentus will be able to protect authorized X-band satellites operating at or near other GW ES sites Momentus will use.

Simulation Description

The Momentus U.S. GW ES site is listed below. The station has the receive antenna gain listed below and a system noise temperature of 200K. The emissions from the VR-5 space station were simulated as 1.0 dBW of RF power, spread over 1 MHz with a peak antenna gain of 5.16 dBi.

Simulated Momentus GW ES Site	**Location**	**Antenna Gain**	**Antenna Size**
Deadhorse Alaska	148°24’36" W 70°11’36" N	48 dBi	4.5 m
Simulated “Victim” GW ES Sites	**Location**	**Antenna Gain**	**Antenna Size**
Utqiagvik, Alaska	156°48’22.0" W 71°16’30.4" N	50.9 dBi	3.7 m
North Pole, AK	147°32'10.0" W 64°47'37.0" N	53.0 dBi	7.3 m
Fairbanks, AK	147°44'0.2" W 64°48'47.4" N	43.5 dBi	2.4 m
Prudhoe Bay, AK	148°23'59.2" W 70°13'13.6" N	51.0 dBi	5.4 m
Fairbanks, AK	147°31'44" W 64°53'26.0" N	51.5 dBi	7.3 m

Table 1: Simulated GW ES Sites

Based upon a review of relevant GW ES and space station filings from IBFS that include space-to-Earth links to the U.S. GW ES site employed by VR-5, Momentus identified the following list of satellite systems that transmit co-frequency to the same or nearby GW ES sites (together, the

[4] This analysis covers both the operation of the primary X-band system and the demonstration X-band system, CHIRP. *See* Application Narrative, at 9.

[5] The United States site was selected for this simulation effort because of the greater ease of access to the information necessary to conduct the analysis. Also, as discussed below, the U.S. ground station site is likely to be the worst-case scenario because the other ground station locations are not customarily used for EESS systems.

"Simulated GW ES Sites").[6] To be conservative, all satellite systems were assumed to operate co-frequency with full spectrum overlap. Because VR-5 only uses 1 megahertz of bandwidth in the 375 MHz EESS band, this assumption is very conservative and was made only for purposes of this simulation. During operations, spectrum overlap will be taken into account to avoid unnecessary operational constraints.

Satellite Constellation Name	Number of Satellites
BlackSky	18 (including 2 pathfinders)
Planet SkySat	21
Maxar WorldView	3
Maxar GeoEye	2
Ikonos	1
Quickbird-1	1
Maxar Legion	12
ICEYE XR	6

Table 2: Relevant Authorized X-band Satellite Systems

The Momentus VR-5 spacecraft will be operating in a variety of orbital configurations during its 6-month operational life. The three "nominal" operational orbits are listed below.

- 538 km x 538 km SSO and 541 km x 541 km SSO[7]
- 550 km x 550 km SSO (max. nominal insertion orbit)
- 538 km x 350 km, 98-degree inclination

Because VR-5 is a secondary payload, the launch parameters could change, and the spacecraft will be maneuvering for most of brief mission lifetime, representative simulations were conducted at four representative orbits, 500 km x 500 km, 538 km x 538 km, 538 km x 350 km, and 600 km x 600 km,[8] in order to simulate the envelope of potential operational altitudes. In general, the interference curves look very similar.

Simulation Results

Simulations were conducted for each of the satellite systems listed in **Error! Reference source not found.** above operating with their respective Alaska GW ES site to determine the interference power statics caused by VR-5 downlinking to the Deadhorse, AK GW ES site and comparing the results against the defined short-term protection criterion. The VR-5 spacecraft

[6] As a conservative measure, Momentus treated GW ES sites in Alaska as nearby for purposes of the simulation.

[7] Because there can be no material differences from an interference perspective for operations at these two orbits, Momentus has included only one representative analysis.

[8] *See also* Application of Momentus Space LLC, IBFS File No. SAT-STA-20211216-00195, Letter from Tony Lin, Counsel to Momentus Space LLC, to Marlene Dortch, FCC, at Exhibit 2 (April 13, 2022) (conducting the same interference analysis for the Vigoride-3 spacecraft at the 525 km x 525 km, 537 km x 537 km, 550 km x 550 km, and 1050 km x 350 km orbits).

was assumed to attempt to communicate with the Deadhorse, AK GW ES site any time it is within line of sight and above a minimum elevation angle of 5-degrees. This is another conservative assumption, translating to ~92 minutes/day of contact time with Deadhorse, AK. By contrast, as an operational matter, Momentus anticipates averaging much closer to 20 minutes/day of contact time.

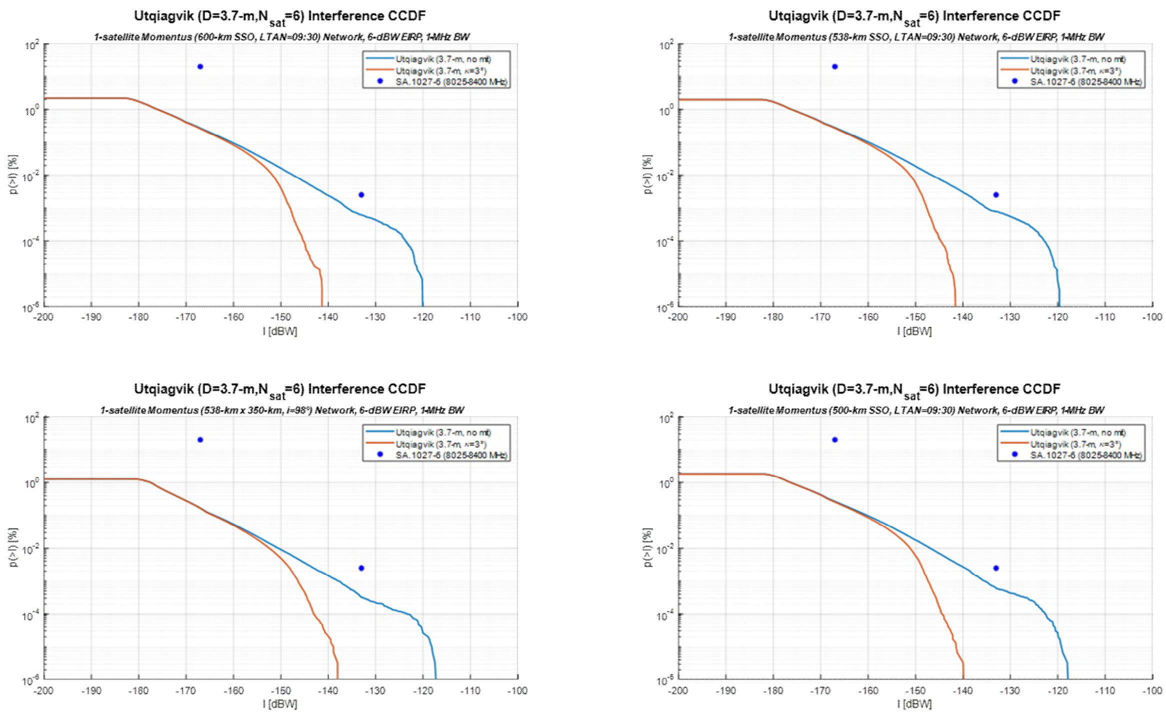

Figure 2: X-band Spectrum Sharing Simulation – ICEYE at Utqiagvik, AK

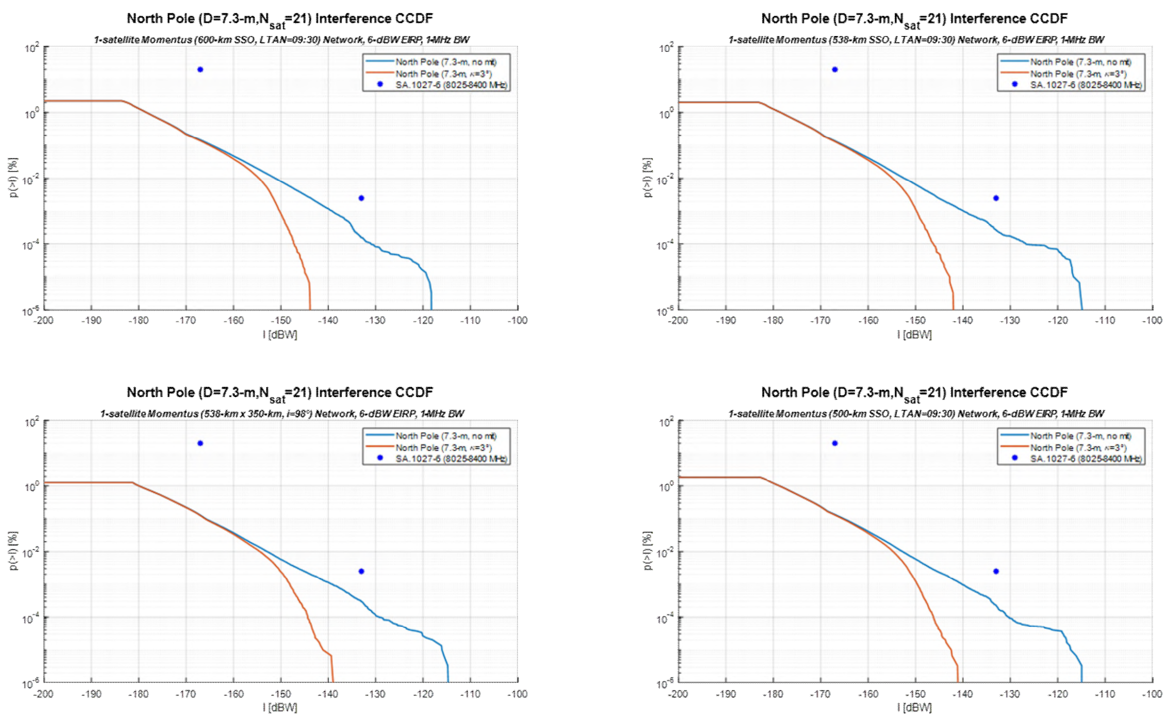

Figure 3: X-band Spectrum Sharing Simulation – Blacksky, WorldView & GeoEye at North Pole, AK

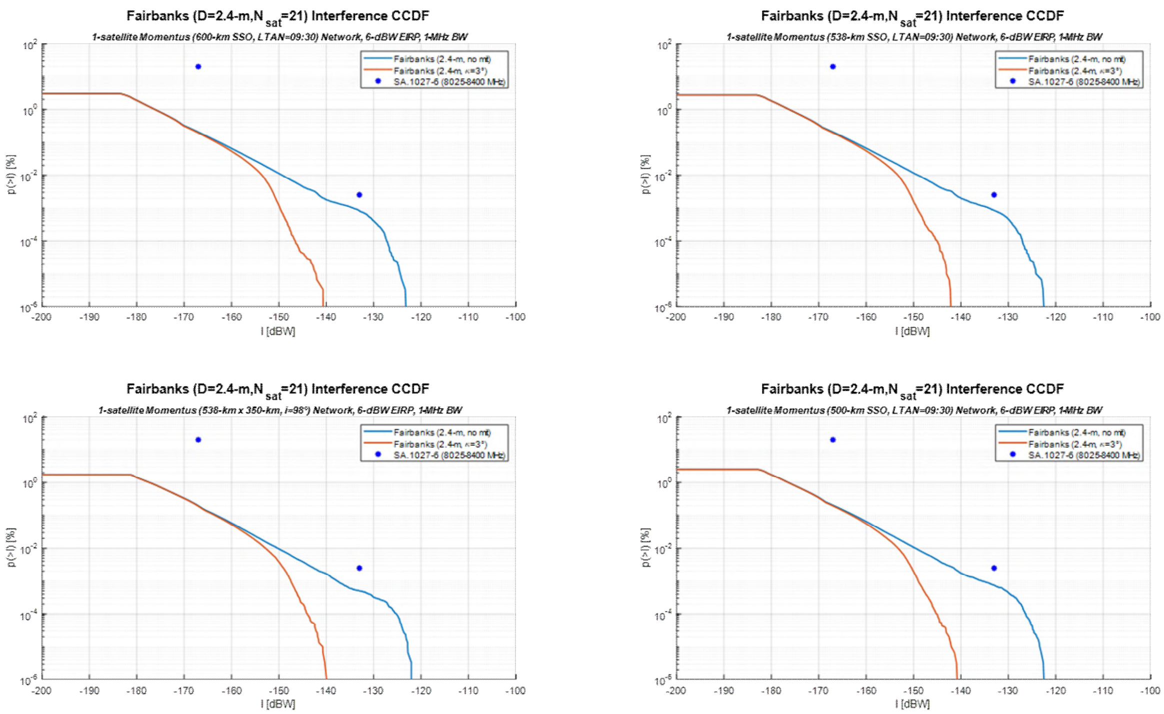

Figure 4: X-band Spectrum Sharing Simulation – Planet SkySat at Fairbanks, AK

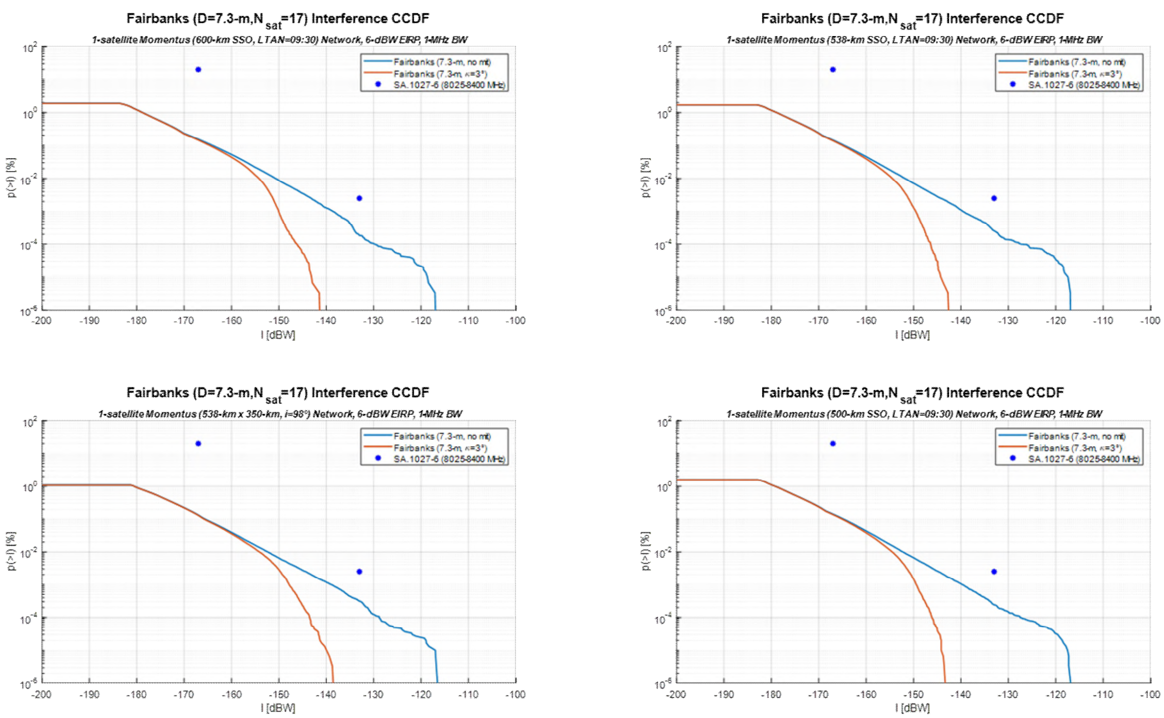

Figure 5: X-band Spectrum Sharing Simulation – WorldView, GeoEye and Legion at Fairbanks, AK

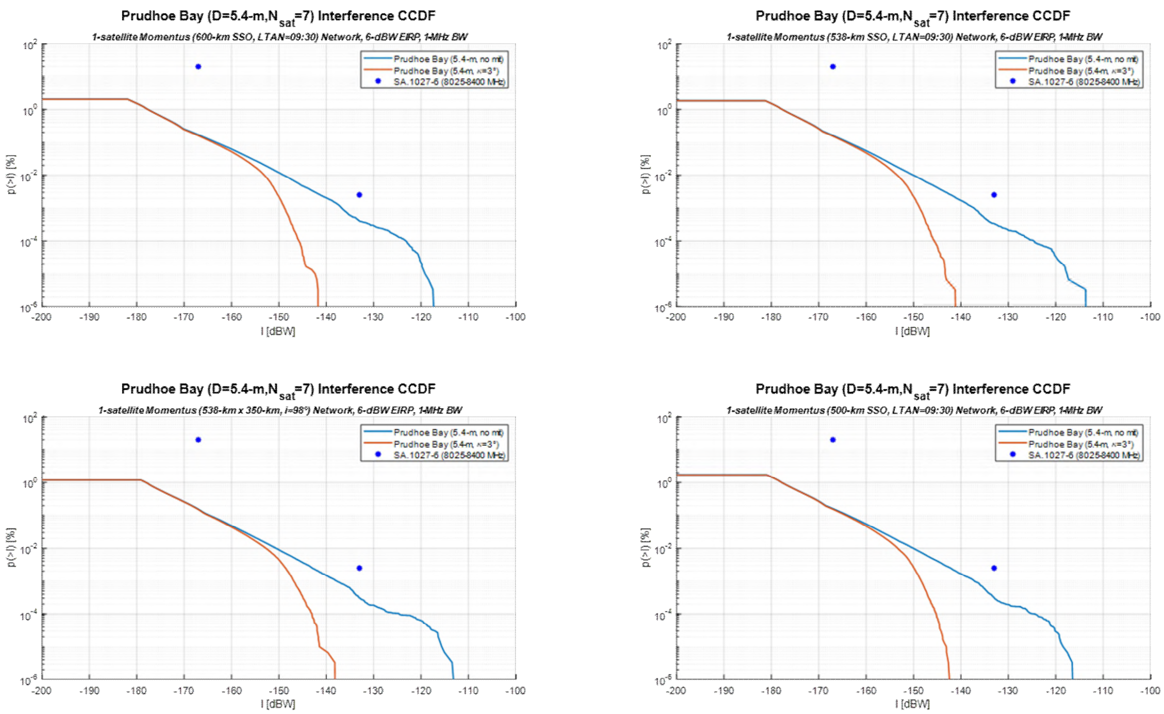

Figure 6: X-band Spectrum Sharing Simulation – WorldView, GeoEye and QuickBird at Prudhoe Bay, AK

Conclusions

The X-band spectrum sharing simulations show that VR-5 could operate without operational restrictions and meet the protection criteria specified by ITU-R SA.1027-6. The Deadhorse, AK GW ES site is the closest to either pole and therefore, given the highly inclined nature of the orbit, has the most opportunity each day for contact and, thus, will cause interference into other X-band downlinks the greatest percentage of time. Furthermore, the other Momentus GW ES sites were specifically selected in locations that are not in proximity to customary EESS GW ES sites. Therefore, the simulation results should, in fact, reflect the worst-case interference scenario into other X-band downlinks. Therefore, even if an authorized user of the X-band spectrum is not properly identified and included in the batch analysis process to modify the contact plan to avoid inline-interference events, the resultant interference CDF caused by the VR-5 satellite would most likely not exceed the protection criteria.

Nevertheless, out of an abundance of caution, Momentus intends to avoid authorized EESS satellite operators in the X-band spectrum whenever they are within 3-degrees of an inline interference event. As can be seen from the simulations results, when a 3-degree avoidance angle is applied, the maximum interference power stays ~5-6 dB below the maximum interference level allowed by the short-term protection criterion. Since the maximum interference power remains safely below the maximum allowed interference level, any changes in the location of the victim GW ES would only affect the time-percentage statistics of the interference CDF (effectively only shifting the curve in the y-axis on each of the graphs). Therefore, by maintaining a 3-degree avoidance angle during operations, one can extrapolate these simulation results to any GW ES location supporting any number of authorized X-band satellites and never exceed the protection criteria.

Finally, the avoidance of inline interference event with all of the identified systems combined only results in ~ 1-2% reduction in access opportunities for the VR-5 downlink, ensuring that the VR-5 will not be unduly constrained operationally.

Next Steps

Having demonstrated, via simulations at the U.S.-based GW ES in Deadhorse, AK, that authorized users of X-band spectrum (space-to-Earth) can be fully protected by applying a 3-degree inline interference avoidance angle, the next step will be to expand the U.S.-based analysis to identify all authorized co-frequency users of this spectrum band. To collect this data, Momentus has determined that there are ~200 ITU-notified non-geostationary-satellite orbit systems and 4 ITU-notified geostationary-satellite orbit systems in this band. Momentus intends to analyze each of these ITU notifications to determine which satellite systems have both spectrum and service area overlap. Momentus will engage in coordination with the identified systems to understand which satellites each system has in operation, collect TLE information for all applicable space stations that must be avoided and establish relationships to receive notifications when new space stations are added to the constellations. Momentus will analyze inline-interference events (within 3-degrees) and modify the satellite contact plan to cease X-band emissions (space-to-Earth) as part of the satellite contact plan.