

Exhibit B - Interference Study

Interference and Electromagnetic Compatibility Study

The experimental Swarm satellite network, which includes satellites and US ground stations and ground devices, employs the 137-138 MHz band for space-to-earth links¹ and the 148-150.05 MHz band for earth-to-space links, consistent with the US and International Table of Frequency Allocations. To demonstrate compliance with an experimental system's obligation to operate on a non-interference basis with other authorized operators in the bands, this report provides a study of compatibility with other systems operating in the 148-150.05 MHz band.

Statement of Satellite Service System Compatibility

For this experimental deployment, Swarm proposes to operate on the 148.300-148.420 MHz band in the Earth-to-space direction (accommodating four channels; see accompanying Exhibit A: Narrative for additional details).

From the ITU Space Network Systems Online (SNS), a list of satellite systems using the 148-150.05 MHz band was collected and shown in Table 1. For each satellite system, the table indicates the administrative jurisdiction, service areas, frequency overlaps, and ultimately a disposition for a coordination requirement. Most satellites have either no frequency overlap with Swarm satellites, have no area coverage overlap, or have no apparent earth stations in the USA. In addition, a search of the FCC IBFS for the 148-150.05 MHz band show that only Orbcomm is licensed for a space system using these space services links within the United States. In summary, only Orbcomm requires some form of coordination for operations in the USA. Swarm will seek consent from Orbcomm regarding those systems.

There are several other satellite systems shown in Table 1 deserving additional attention: EBSAT-LEO-1, EBSAT-LEO-1B, MNSAT, and NSL-1. In each of these cases there is potential frequency overlap and the USA is a designated coverage area in the ITU notices. However, none of these systems have launched yet, and no US licenses or applications were submitted to the FCC as of November 2018. The EBSAT-LEO-1 and -1B systems are planned Mobile Satellite Service constellations by Thales Alenia Space filed through the French administration. The MNSAT system is a planned Mobile Satellite Service constellation filed through the Australian administration. The NSL-1 system is a planned constellation by NSLComm, filed through Israel. For each of these systems, the status of the launch authorization licensing and construction progress of the systems is unknown by Swarm, and the systems have no space system licensing within the United States. As such, no coordination is required with these systems.

Two additional satellite systems listed in Table deserving additional discussion are KELYPSIS and HOL-MG-A006. The KELYPSIS system is a planned constellation by Kepler Communications with an

¹ The ground stations and ground devices for which authorization is requested will receive transmissions from previously authorized satellites (see 1140-EX-ST-2018 and 0976-EX-ST-2018) on the downlink frequencies granted in the respective STAs or experimental licenses. As such, this application and interference study reflects only the uplink frequencies.

ITU filing through Canada. Kepler filed for US market access (IBFS File No. SAT-PDR-20161115-00114), but only requested access to the 10.7-12.7 GHz and 14-14.5 GHz frequency bands in the United States. No request was made to the Commission for access to frequencies in the 148-150.05 MHz band, so coordination with Kepler will not be required. The HOL-MG-A006 system is a planned constellation by Hiber (formerly Magnitude Space), licensed by the Netherlands. Hiber filed for US market access (IBFS File No. SAT-PDR-20180910-00069), but only requested access to the 399.9-401 MHz bands. No request was made to the Commission for access to frequencies in the 148-150.05 MHz band, so coordination with Hiber will not be required.

In these tables, red-colored boxes indicate frequency overlap between the respective system in the row and the Swarm satellite. Green rows indicate some level of coordination or additional consideration is required for the system.

Table 1: List of Satellite Systems in the ITU SNS, transmitting 148-150.05 MHz.

Satellite	Country	Service Area	Freq. Overlap (closest freq. shown)	Coordination requirement	Notes
AGILE	Italy	XVE space-to-space link	149.0 (2 MHz)	None	Equatorial NGSO, no orbital access to USA
ATS-5	USA	GEO NC ES	148.26 (30 kHz)	None	No frequency overlap
CASSIOPE-1A	Canada	XAA	150.005	None	No frequency overlap
EBSAT-LEO-1	France	XAA	148-150.05	None	Not launched yet? No US license/stations
EBSAT-LEO-1B	France	XAA	148.150.05	None	Not launched yet? No US license/stations
GOES West	USA	GEO Wallops VA	148.545	None	No frequency overlap
HOL-MG-A006	Netherlands	XAA	148-149.9	None	Not launched yet? Magnitude Space (Hiber). Filed for US market access (IBFS File No. SAT-PDR-20180910-00069), but only requested access to 399.9-401 MHz bands. No area overlap for 148-149.9 MHz band.
IMP-J	USA	AK, NC ES	148.98 (30 kHz)	None	No frequency overlap Inactive, 1970's
IPS	Netherlands	HOL	148.118	None	No area or frequency overlap
IRS-1B, 1E	India	India	149.522 (12 kHz)	None	No area or frequency overlap
KELYPSIS	Canada	XAA	148-150.05	None	Kepler Communications, filed for US market access (IBFS File No. SAT-PDR-20161115-00114), but

					only requested access to 10.7-12.7 GHz and 14-14.5 GHz frequency bands. No area overlap for 148-150.05 MHz band.
KITSAT-3	Korea	Korea	148.025,148.9 (20 kHz)	None	No area or frequency overlap
LEOTELCOM-1	USA	XAX	148-150.05	Orbcomm Consent	To be coordinated with Orbcomm
LEOTELCOM-2	USA	XAX	148-148.905	Orbcomm Consent	To be coordinated with Orbcomm
LEOTELCOM-3	USA	XAX	149.81-149.9	None	No frequency overlap
LEOTELCOM-5	USA	XAA	148-150.05	Orbcomm Consent	To be coordinated with Orbcomm
LUOJIA-1A	China	CHN	148.35-148.4	None	No area overlap
LUX-NGSO -1/2/3	Luxemb ourg	XAA	149.0-151.0	None	No frequency overlap
MCSCS	China	XAA	149.025 (44 kHz)	None	No frequency overlap No US stations
MNSAT	Australia	XAA	148-150.05	None	Not launched yet? No US license/stations
NSL-1	Israel	XAA	148-149.9	None	Not launched yet No US license/stations
QS-1	China	CHN	...148.025	None	No area or frequency overlap
RS-D2	India	IND (India)	...148.265	None	No area or frequency overlap Inactive, 1980's
SAMSON-2	Israel	ISR	148.8...	None	No area or frequency overlap
S4P	Swiss	HOL, SUI	148.2635 -148.5865	None	No area overlap
SAUDISAT-1C	Saudi Arabia	ARS (Saudi Arabia)	149.025 (44 kHz)	None	No area or frequency overlap
SAUDISAT-4, -5, -6	Saudi Arabia	ARS	148.035, 148.085, 149.035 (30 kHz)	None	No area or frequency overlap
SEO BHASKARA-1	India	IND	...148.265, 148.595...	None	No area or frequency overlap Inactive, 1980's
SEO BHASKARA-2	India	IND	...148.265, 148.595...	None	No area or frequency overlap Inactive, 1980's
SIMBA	Belgium	HOL	...148.118	None	No area or frequency overlap
SI-SAT-BILIKIK I	Solomon Island	XAA	149.025 (100 kHz)	None	No frequency overlap No US license/stations
SROSS-1,-3	India	IND	149.272...	None	No area or frequency overlap
TELEOS-1	SNG	SNG	148.6875...	None	No area or frequency overlap
TSYKADA	Russia	XAA	149.903...	None	No frequency overlap
YOUTHSAT	India	XAX	149.995...	None	No frequency overlap

Conclusion

Swarm's experimental testing with ground stations and ground devices poses no risk of creating harmful interference with any known system with the exception of Orbcomm. Swarm will seek specific consent from Orbcomm to mitigate any potential for interference with their system.²

² On November 29, 2018, Swarm contacted Orbcomm, the only mobile satellite service provider licensed to conduct commercial operations in the United States in the 148-150.05 MHz bands, to initiate coordination to prevent interference with Orbcomm's system. Coordination between Swarm and Orbcomm remains ongoing. Swarm appreciates that operations in the proposed VHF frequencies must occur on a sufferance basis, and Swarm cannot create interference and must accept interference from other authorized users. Should the Commission act prior to the conclusion of discussions with Orbcomm, Swarm will accept a condition on its grant of experimental authority that requires successful coordination prior to the initiation of communications.