Exhibit A - Narrative Statement

Introduction:

Swarm Technologies Inc ("Swarm") is a California based corporation seeking to deploy 1U CubeSat sized two-way communications satellites to serve as a cost-effective low-data rate Internet of Things (IoT) network connectivity solution for remote and mobile sensors. The initial experimental space deployment is comprised of four satellites, each with a 1U form factor. As a test of a new passive radar retro-reflector technology, we will also mount radar retro-reflectors on the surface of four of the six faces of each CubeSat satellite, see Section 9 of Exhibit B ODAR. The four satellites will be weighted slightly differently so that they naturally spread out in orbit over time due to differing ballistic coefficients.

Each satellite will use VHF band frequencies for communications. There will also be an experimental deployment of 2 ground stations in the United States for communications with the space units. The VHF frequency proposed in this application, more specifically in the 137-138 MHz and 148 - 149.9 MHz bands, is allocated on a primary basis for space to ground Mobile Satellite Service (MSS) communications for non-Federal, non-voice non-geostationary orbit (NGSO) systems and capable of low data rate ground to space and space to ground communications with low power and antenna gain and ideally suitable for the proposed service of the Swarm satellites.

Swarm requests experimental authority to demonstrate the capabilities of these microsatellites for serving low data rate communication relays for remote sensors and data collectors. Experimental operation is scheduled to begin upon launch, currently scheduled in March 2018.

Experimental Program Description:

The proposed architecture is comprised of both space and ground units for the collection of ground based remote sensor data, radio relay to space units, and radio relay to Internet connected ground stations for data dissemination to the end user. The network of satellites is comprised of Basic Electronic Elements ("BEEs") which are 1U form factor satellites, made out of an aluminum frame, PCBs, a single 12.5 Whr battery and solar panels for recharge. The satellites include radar return enhancement technology as a test for enhanced radar signatures (much larger than a typical 1U would experience). Ground stations include Wi-Fi for intercommunications with ground-based sensors and connection to the Internet. Figure 1 provides a pictorial description of the satellites and their characteristics.

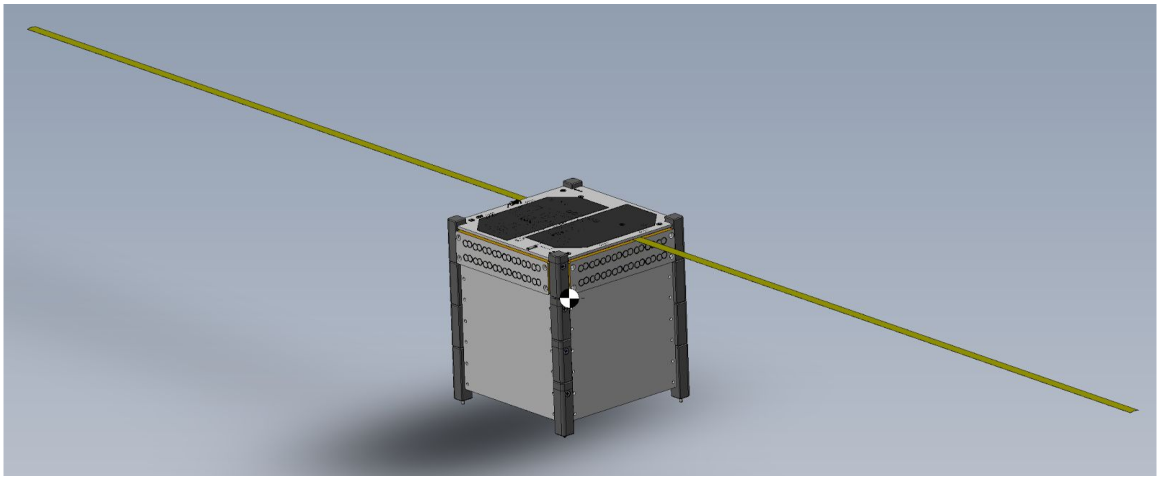

Figure 1: Image of a single satellite.

The satellites will orient themselves with the VHF antenna wires in the zenith and nadir directions for maximizing the antenna gain along the horizon.

The satellites contain a battery with enough stored energy for several days of operation in normal duty cycle sensing/networking mode without any recharge. There are solar panels that provide recharge maintaining a positive orbit average net power and the satellite potentially remains operational for up to 10 years (longer than the expected orbital lifetime).

Communication between space and ground elements use VHF frequencies. The two quarter-wavelength (split dipole, linear polarization) deployed antenna wires provide a donut-shaped antenna gain pattern that maximizes gain along the horizon, which is ideal for long distance communications with ground stations.

The experimental program is designed to meet the following objectives and validations:

- Demonstrate satellite spreading over time due to each of the 1U satellites being weighted slightly differently, and therefore having differing ballistic coefficients.

- Demonstrate the effectiveness of the radar return signal enhancement technology.

- Demonstrate the use of low power and low data rate VHF communications between Earth and space for remote sensor data relay services, which include Earth to space uplink of data from remote sensors and space to Earth data relay to Internet-connected ground stations.

- Demonstrate the feasibility of the Swarm system to meet low data rate communications objectives, as further described in the Public Interest Consideration section.

General Description of the Overall System and Operations:

The Swarm satellite network consists of 4 data relay satellites, 2 ground stations connected to remote sensors and data collectors, and they are Internet-connected for data relay back to the Internet. The satellites are data relay satellites only and do not employ any remote sensors themselves.

The system architecture consists of ground stations that receive data from nearby or connected sensors and transmit this data to satellites in space. The satellites receive and store messages onboard, and download these messages when they pass over ground stations in the future using a store-and-forward delay tolerant networking approach. All transmissions will be scheduled *a priori* and uploaded to all satellites and downloaded to all ground stations in advance of the schedule execution. The satellites and ground stations will only transmit at designated time slots according to the schedule (they employ on-board GPS to ensure accurate timing and positioning information), and will be listening during the times they are scheduled to receive messages. All uplink and downlink transmissions will be one-way.

The satellites and ground stations will transmit only upon command from the ground and and persist only during active data transmissions. The satellites do not employ an autonomous data beacon feature, which is not required for tracking purposes. Any transmission can be immediately terminated by ground command if interference is detected or reported. Transmission durations are short and infrequent, on average approximately 1 minute durations, 4 times per day per satellite for each earth station (with 4 satellites, 16 transmissions per day with each of the two ground stations).

Public Interest Consideration:

The commission's grant of this application will serve the public interest by allowing Swarm to demonstrate the above described very low-cost satellite technology which aims to serve the growing need for a transmission medium to collect and disseminate remote sensor data from anywhere on the Earth at very low cost to the user, including Earth weather data for environmental monitoring. This technology expands market access to low cost remote sensor data networks.

Swarm has partnered with 2 Fortune 100 companies in paid pilot programs to study the effectiveness of our network architecture. Significant market demand for our data rates and ground hardware from these two large companies exists, and from 15 medium and smaller companies exists if a Swarm space network existed.

In addition to commercial partnerships, we are working with several Federal agencies on various initiatives. The first is with NASA Ames in a paid grant and hardware delivery services program. NASA wants to test new satellite interlinking technology that they are developing in collaboration with Swarm. Second, Swarm was recently awarded a National Science Foundation Phase II SBIR grant to develop new network technology to provide very low cost connectivity to commercial and humanitarian efforts around the world. Related, is significant interest from two agriculture companies and two maritime shipping companies that have expressed interests in Swarm services. Third, Swarm has a CRADA in place with the US Navy and SPAWAR to test radar retroreflectors in space to enhance tracking of small satellites, and better tracking of orbital debris. Finally, USSOCOM, the US Army, and the US Air Force have expressed interest in the use of Swarm's network services for tracking and geo-locating a large number of items on the ground and at sea.

Launch, Orbital Parameters, and Lifetime:

The experimental deployment space launch is planned for the Rocket Lab launch vehicle scheduled March 1, 2018 into a near-polar Sun Synchronous Low Earth Orbit (LEO) at approximately 500 km altitude. Swarm satellites do not employ propulsion or other active orbit maintenance technology and with its low mass, the orbit will naturally decay and re-enter the atmosphere within approximately 3.9 years (nominal scenario, see ODAR in Exhibit B for more details) and completely burn-up before reaching the ground. Table 1 details the anticipated orbit parameters.

Orbital Parameters	Values	Accuracy
Inclination Angle (deg.)	85	+/- 1
Apogee (km)	500	+/- 50
Perigee (km)	500	+/- 50
Semi-major Axis (km)	500	+/- 50
LTDN	10:30 am	+/- 60 min

Table 1. Anticipated Orbit for Swarm satellites

Orbital Debris and Assessment Report (ODAR) and Radar Tracking:

Exhibit B attached to this application describes fully the orbital debris and assessment report requirements pursuant to 47 C.F.R. § 5.64. In addition, Section 9 of this exhibit provides an engineering assessment of the ability to passively track the 1U satellites from ground radar with a radar enhancing device onboard.

Non-Interference Criterion:

Pursuant to 47 C.F.R. § 5.84 and 5.85, it is understood that a grant of authority for this experimental program will be on a non-exclusive and non-interference basis to both Federal and non-Federal authorized users of the VHF spectrum proposed in this application. Operations under the experimental program will be conducted only at the two coordinated ground stations. Exhibit C attached to this application describes fully the electromagnetic compatibility of the Swarm system with other users and services in the VHF frequencies proposed in this application, more specifically in the 137-138 MHz and 148 - 149.9 MHz bands.

Power Flux Density Calculation at Earth's Surface:

Pursuant to Commission rules 25.142, in the 137-138 MHz band the power flux density (PFD) at the Earth's surface produced by the satellites will not exceed -151.5 dB(W/m^2) in any 4 kHz band at any angle of arrival. The ground stations transmit with a power spectral density (PSD) of -21.0 dBW/4kHz.

The out of band emissions are minimized by digital modulation techniques and filtering with at least 20 dB spectral rolloff at 120% of signal bandwidth in any 4 kHz band, 40 dB at 200% bandwidth, 55 dB at 300% bandwidth, and more than 60 dB beyond 4 times the bandwidth. A center frequency of 137.920 MHz is chosen to remain within the band allocated to NGSO MSS minimizing potential for interference into adjacent services, including allowance for Doppler shift and frequency tolerance.

Radio System Technical Characteristics:

Both satellites and ground stations share similar antenna and radio frequency characteristics and link parameters which are further characterized in the link budget provided in Table 2.

	ground station to BEE Uplink		BEE to ground station Downlink		
Item	**Nominal**	**Worst-Case**	**Nominal**	**Worst-Case**	**Units**
Satellite Orbital Altitude	**500**	**500**	**500**	**500**	km
Earth Radius	6371	6371	6371	6371	km
Frequency	0.149	0.149	0.138	0.138	GHz
Elevation Angle to Satellite	30	5	30	5	deg
Satellite Angle from Nadir	53.42	67.47	53.42	67.47	deg
Theta Angle	6.58	17.53	6.58	17.53	deg
Transmitter Power	**0.20**	**0.20**	**0.20**	**0.20**	Watts
Transmitter Power	-6.99	-6.99	-6.99	-6.99	dBW
Transmitter Line Loss	-1.00	-1.00	-1.00	-1.00	dBW
Peak Transmit Antenna Gain	2.15	2.15	2.15	2.15	dBi
Transmit Antenna Pattern Loss	-1.25	-0.03	-1.25	-0.03	dB
Transmit Total Gain	-0.10	1.12	-0.10	1.12	dB
Eq. Isotropic Radiated Power	**-7.09**	**-5.87**	**-7.09**	**-5.87**	**dBW**
Propagation Path Length	909.42	2077.09	909.42	2077.09	km
Path Loss	-135.09	-142.26	-134.42	-141.60	dB
Polarization Loss	-0.03	-0.21	-0.03	-0.21	dB
Power @ Receiver Antenna	**-142.21**	**-148.34**	**-141.54**	**-147.68**	**dBW**
Peak Receive Antenna Gain	2.15	2.15	2.15	2.15	dBi
Receive Antenna Line Loss	-1.00	-1.00	-1.00	-1.00	dB
Receive Antenna Pattern Loss	-1.91	-0.69	-1.91	-0.69	dB
Rx Gain with pointing error	-0.76	0.46	-0.76	0.46	dB
Rx Power	**-142.96**	**-147.88**	**-142.30**	**-147.22**	**dBW**
Rx Antenna System Noise	728	728	728	728	K
Rx Antenna G/T	-29.38	-28.16	-29.38	-28.16	dB/K
Received C/No	57.01	52.09	57.68	52.76	dB-Hz
Bandwidth	125	125	125	125	kHz
BW Spreading Factor	7	7	7	7	
Received C/N	5.55	0.63	6.22	1.30	dB
Target Data rate	5.47	5.47	5.47	5.47	kbps
Target Rx Level	-155	-155	-155	-155	dBW
Implementation Margin	6	6	6	6	dB
C/No Objective	50.97	50.97	50.97	50.97	dB-Hz
C/N Objective	0.00	0.00	0.00	0.00	dB
Remaining Margin	**5.56**	**0.64**	**6.22**	**1.30**	**dB**

Table 2, space and ground link budget.

The satellite antenna is a ¼ wave dipole with a donut shaped antenna pattern oriented with maximum gain toward the horizons and minimum gain in the nadir direction. The ground station is a vertically polarized dipole antenna. Figure 2 and Figure 3 show the space and ground antenna patterns and characteristics respectively, applicable for both transmit and receive.

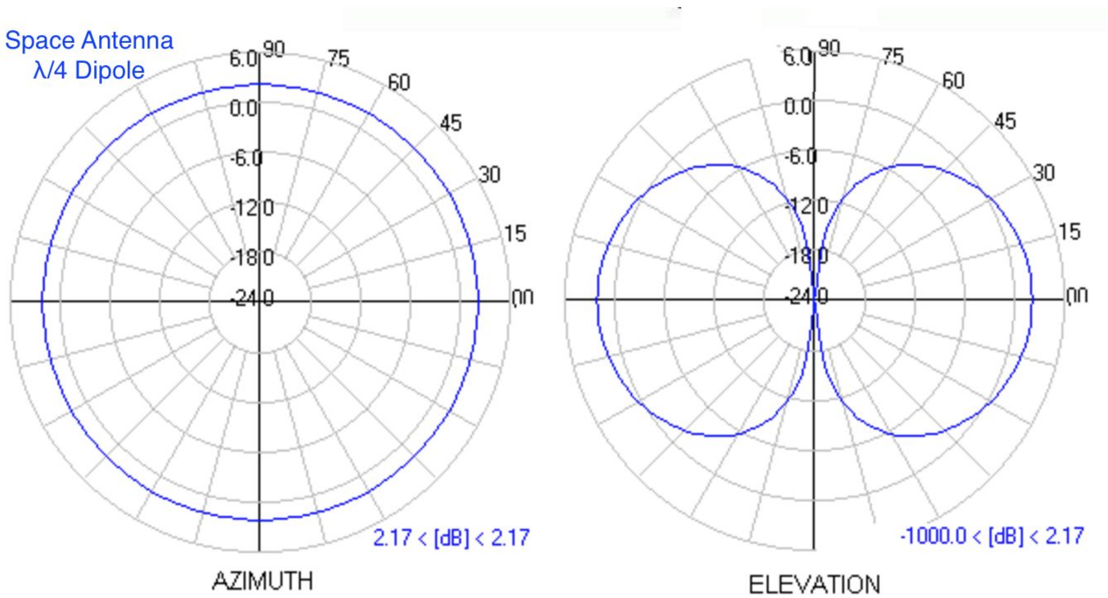

Figure 2: Space BEE (satellite) Transmit and Receive Antenna pattern.

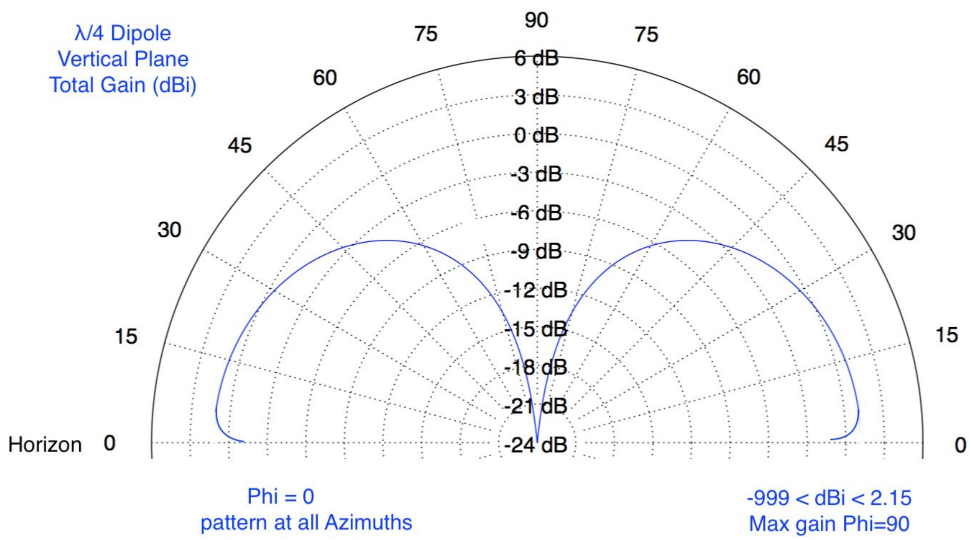

Figure 3: Ground Station Transmit and Receive Antenna pattern.

All satellite to ground station communications initiate upon command and self terminate at the completion of the data transmission. If any deviation from the authorized technical requirements of the transmission is detected, the ground system will not initiate further transmissions until the deviation is understood and can be corrected.

Swarm requests a waiver of rule 47 C.F.R. §§ 5.115 related to station identification as already waived under rule 47 C.F.R. §§ 25.206 for space stations not under the requirements of rule 25.281 (video transmissions). More specifically Swarm requests a waiver to the requirement for periodic station identification in the interest of minimizing transmission durations and activity. Grant of such waiver serves the public interest, as compliance with the station identification requirement unnecessarily adds additional data and modulation changes during transmissions. Grant of such waiver does not adversely affect the spectrum rights of any third party and is consistent with Commission's longstanding commitment to spectral efficiency.

Ground Station Locations:

Ground Station 1
321 Camino Al Lago
Menlo Park, CA 94027
lat/long (NAD83): 37.4363, -122.2123, 40m
Antenna height, 3 meters above ground level
Antenna type: VHF vertical dipole

Ground Station 2
4015 Biltmore Cove Way
Buford, GA 30519
lat/long (NAD83): 34.0847, -83.9476, 366m
Antenna height, 3 meters above ground level
Antenna type: VHF vertical dipole

ITU Advance Publication and Cost recovery:

Pursuant to 47 C.F.R. §§ 25.111 for space systems, it is understood that the commission will submit filings to the ITU on behalf of the applicant pursuant to international obligations for the coordination and registration of space network systems. Swarm will provide the commission the appropriate electronic files for submission to the ITU and hereby provides its commitment to the cost recovery of any such filings to the ITU.