FCC License Application Narrative and Technical Overview

For ACME AtronOmatic, LLC

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REQUEST EXPERIMENTAL AUTHORITY

ACME AtronOmatic, LLC ("ACME") herein requests an experimental license for its prototype model, "MyRadar1".

1 Ownership Operation

ACME AtronOmatic, LLC, DBA MyRadar is known for the development of the MyRadar Weather application, available since 2008. The application has been downloaded over 50 million times across iOS, Android, and Windows and has an active user base of 13 million active monthly users. In 2016, ACME began focusing more on research and development, conducting cutting edge research in the fields of atmospheric science and machine learning to develop innovative products useful to the average consumer. New services include patent-pending hyper-local precipitation alerts. In 2019, ACME launched a prototype PocketQube via Rocket Lab in New Zealand, operating with an amateur license in the UHF-band. Follow-on low-resolution PocketQubes are scheduled to launch in November in the UHF-band and in December of 2021 and in 2022 with SpaceX in the X-band and S-bands.

2 Satellite Orbital Elements

This is an experimental application to cover one (1) NGSO satellite, MyRadar1. ACME is in the process of selecting a launch provider and expects the launch to occur via ride-share with a circular sun-synchronous initial orbit at an altitude between 500 km - 550 km.

The exact altitude at which MyRadar1 will be launched specified above is still to be determined. Because MyRadar1 will most likely be a secondary spacecraft with the launch provider, this placement as well as the timing of the launch are subject to the requirements of the launch provider. ACME will notify the Commission when these determinations are made. Anticipated final orbital elements are shown in the table below. ACME will also update the Commission if there are any modifications to the following:

Table 1: Space Station Orbital Elements

MyRadar1 (1 NGSO Satellite) (MyRadar1 is a prototype and smaller PocketQube version of its HORIS Satellite Network)	Launch: November of 2021
Celestial Reference Body	Sun
Number of Planes	1
Number of Satellites per Plane	10
Inclination Angle	97.4 deg
RAAN	30 deg
Argument of Perigee	0 deg
Orbital Period	5800 sec

Apogee	500 km-550 km
Perigee	500 km -550 km

3 Program Background and Purpose of Experiment

3.1 Hyperspectral Orbital Remote Imaging System Background

MyRadar1 is the prototype model of Hyperspectral Orbital Remote Imaging System (HORIS). The HORIS satellite network will consist of 10 non-geostationary (NGSO) satellites and provide hyperspectral data for commercial applications that will focus on improving weather forecasting. ACME's research and development roadmap leverage ACME's instrument development and remote sensing expertise to engineer the HORIS platform. HORIS is expected to launch in Q1 of 2022.

The platform will use hyperspectral imaging cameras in the near-IR spectrum, as well as thermal and visible spectrum imagers. This feature-rich data acquisition will be combined with machine learning techniques to create enhanced data products both onboard and on the ground. Applications include monitoring:

- Extreme weather (tropical cyclones)
- Coral reefs, Algae Blooms and other oceanographic bioanalysis
- Geophysical characteristics
- Illegal fishing
- National security
- Wildfire analysis and prediction tools
- Data and any alerting services will be offered as products to users of the MyRadar app.

3.2 MyRadar1 - Prototype Experimental Satellite

In preparation for HORIS launch and operations (first of ten NGSO satellites to launch Q1 2022), ACME respectfully requests an experimental license to perform in-orbit testing targeted for November of 2021 for its prototype model, MyRadar1. ACME seeks to test, develop, and demonstrate the efficacy and design of the newly configured prototype. Testing will utilize one NGSO satellite (MyRadar1) and is a smaller PocketQube version of HORIS. KONGSBERG SATELLITE SERVICES (KSAT) will host and provide TT&C for the MyRadar1 prototype and HORIS satellite (KSAT will submit a modification to their license).

The launch will place MyRadar1 in a circular, sun synchronous orbit between 500 km - 550 km, with an inclination, depending on the altitude of the orbit, of approximately 97.4 degrees and the local time of ascending node (LTAN) at 12:00 (noon). Technical details regarding the space segment are described later in this document. Spectrum usage is shown in the following table:

Table 2: Frequency Employed

X-band 8050-8150 MHz downlink	Earth Exploration Satellite Service/Service Link

MyRadar1 will only transmit in X-band to KSAT's Los Angeles, CA earth station site. The ground stations are receive-only and will not transmit for the MyRadar1 prototype.

4 Ground Station Locations

As mentioned above, ACME has contracted with KSAT to provide ground-based telemetry, tracking, and command ("TT&C")/space operations for HORIS and MyRadar1. KSAT will file a separate application to modify its license to add MyRadar1 as an additional point of communication.

24-hour Contact Details: KSAT maintains a 24-hour, 7-day-per-week hotline at Tromsø Network Operation Center (TNOC), which can be reached at the following telephone number for any interference issues: +47 77 60 02 68.

Table 3: KSAT 3.7-m Ground Sites

Site	**Latitude**	**Longitude**	**Altitude (m)**
Svalbard, Norway (SG184)	78.22702	15.38624	493
Punta Arenas, Chile (PA51)	-52.93508	-70.87073	23
Los Angeles, CA (LB1)	33.82439	-118.14646	5

Ground antenna specifications are provided in the table below:

Table 4: Ground Antenna Specifications

Earth Station Characteristics	**3.7-m Diameter**
Channel Bandwidth	10 MHz
Radiation Pattern	ITU-R S.465-6
Peak Power	25.1 W
EIRP	44.8 dBW
Maximum Gain	36.78 dBi
Minimum Elevation	5 deg
Azimuthal Range	360 deg
Polarization	RHCP or LHCP
Antenna Pointing Error	< 2 deg
Antenna Rotational Error	< 0.5 deg

5 Space Station

5.1 X-band 8050-8150 MHz Downlink - Earth Exploration Satellite Service

The MyRadar1 space station utilizes a TAOGLAS UWC.20 ultra-wide band SMD chip antenna.

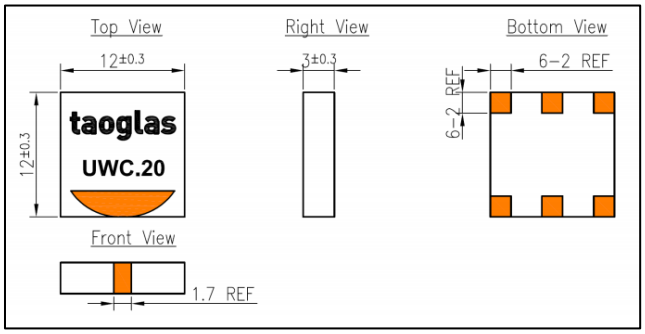

Figure 1: X-Band Antenna Drawing (mm)

The UWC.20 antenna specification and radiation patterns are located in Attachment A and parameters are summarized below.

Table 5: X-Band MyRadar1 Antenna Specifications

Space Station Characteristics	
Center Frequency	8100 MHz
Channel Bandwidth	100 MHz
Peak Power	2 W
EIRP	5.551 dBW
Maximum Gain	2.5 dBi
Polarization	Linear
Antenna Pointing Error	< 2 deg
Antenna Rotational Error	< 0.5 deg

The antenna beam profile, average gain, and radiation pattern for MyRadar1 in the X-band are provided in the following figures.

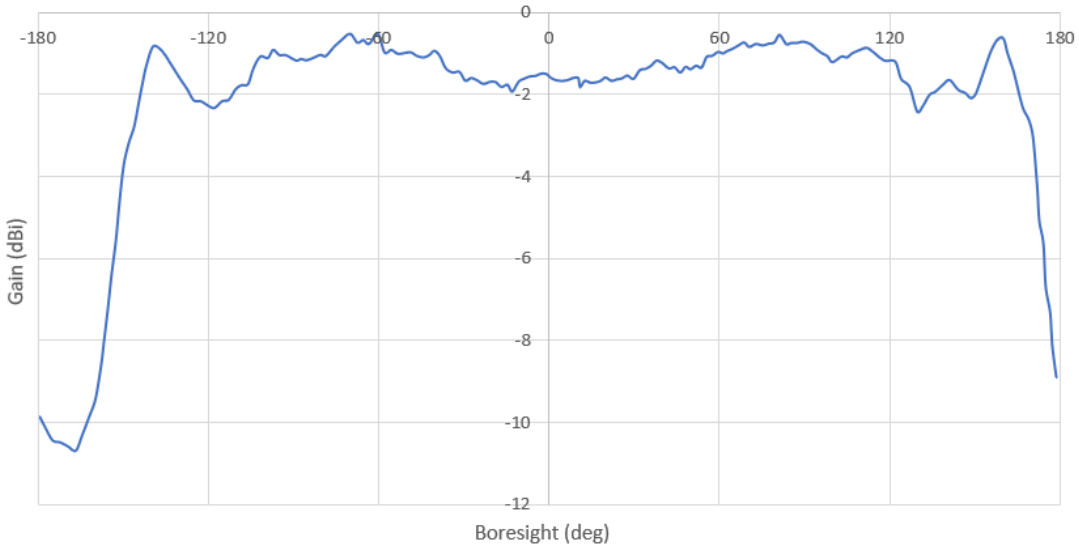

Figure 2: Antenna Beam Profile for X-Band

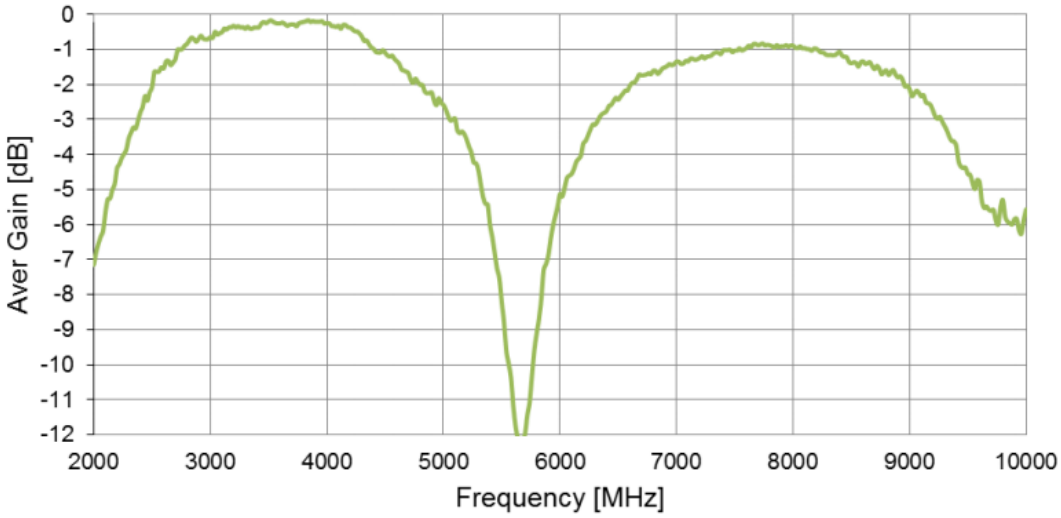

Figure 3: MyRadar1 Average Gain

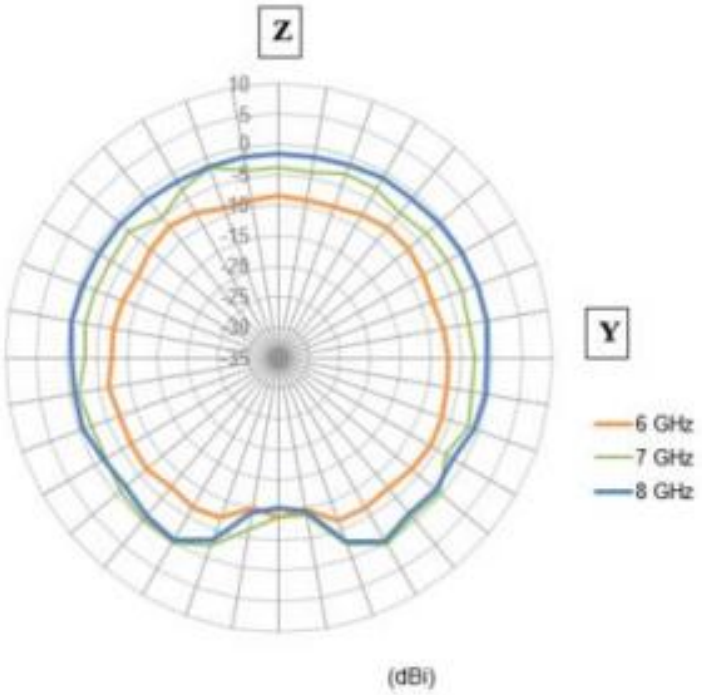

Figure 4: MyRadar1 Radiation Pattern (XZ Plane)

6 Orbital Debris Assessment Report

The Orbital Debris Assessment Report ("ODAR") is presented in Attachment B, assuming an altitude of 550 km and has additional information regarding the satellite design.

ACME certifies that HORIS and MyRadar1 will release no operational debris. The satellite will stay in one part through the whole orbital lifetime. No objects will be separated by the deployment of the antenna. The ARES part of the DRAMA software was used to calculate the annual probability of collision. The radius of the satellite has been set to 17cm to make sure that the deployed antenna is taken into the equation. The results confirm a probability smaller than 0.001 during the orbital lifetime.

7 Regulatory

ACME's application utilizing streamlined process for small satellites is in process. HORIS was introduced and pre-coordination was initiated with the following entities:

Table 6: Summary of Regulatory Introductions

Agency	**POC**	**Date**

FCC	Mr. Karl Kensinger	September 2020
NTIA	Mr. Brandon Mitchell	September 2020
NASA	Ms. Lisa Cacciatore	November 2020
NOAA	Mr. Carlos Flores	December 2020
Air Force	Mr. Jimmy Nguyen	February 2021

ACME Technical Point of Contact:

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8 Attachments

Attachment A

Space Station Antenna Specification (TAOGLAS UWC 20)
File:
MyRadar1 Antenna Specification_UWC.20

Attachment B

Orbital Debris Assessment Report ("ODAR")
Files:
Updated & Signed ODAR for TRSI networks
Updated & Signed ODAR for MyRadar networks