

DESCRIPTION OF EXPERIMENT

0090-EX-CN-2020

INTRODUCTION

Theia Holdings A, Inc. (Theia) seeks to develop an L-Band (1215-1300 MHz) Synthetic Aperture Radar (SAR) technology and requests authorization to conduct a SAR technology demonstration and market trials for sale of SAR data associated with the demonstration. Grant of this application will serve the public interest by allowing Theia to validate the effectiveness and operating parameters of the L-band SAR technology to be used in the Theia Satellite Network (TSN)¹ and to assess the market for SAR data products, including price and commercial interest.² The TSN platform will enable an array of new applications that combine remote sensing and analytics delivered anywhere via broadband satellite connectivity, providing value to users in diverse fields of science, agriculture, natural resource exploration and development, insurance and finance, infrastructure monitoring and integrity assurance, domestic and international trading, transportation management and other similarly core sectors of the economy.

EXPERIMENTAL PROGRAM DESCRIPTION

Tests will be conducted using an L-band (1215-1300 MHz) SAR system aboard an aircraft flying over the areas specified below. The plane will be flying between 6,000 and 10,000 ft AGL. The radar will be pointed down towards the ground and not towards any other known radars.

The radar has an adjustable center frequency from 1200 -1400 MHz and an adjustable bandwidth up to 25 MHz. Theia has selected frequencies and bandwidths to minimize potential interference to known FAA radars. Nonetheless, Theia is flexible as to the specific frequencies and bandwidths assigned and would be willing, as a result of frequency coordination, to amend its radar transmission parameters.

Testing will occur over the period of 24 months starting from the grant of this application. For all flights, Theia will acquire the necessary permits and flight certifications from the Federal Aviation Administration and/or other entities, including relevant military bases.

Locations:

The Naval Weapons Systems Training Facility Boardman
Boardman, OR, within 25 km, centered around NL 45-44-54; WL 119-47-38
Frequency: 1315 – 1335 MHz

SRC Inc. Laboratory
Syracuse, NY, within 50 km, centered around NL 43-07-44; WL 75-05-03.

¹ See *Theia Holdings A, Inc.; Request for Authority to Launch and Operate a Non-Geostationary Satellite Orbit System in the Fixed-Satellite Service, Mobile-Satellite Service, and Earth-Exploration Satellite Service*, Memorandum Opinion and Order, IBFS File Nos. IBFS File No. SAT-LOA-20161115-00121 and SAT-AMD-20170301-00029, FCC 19-42 (rel. May 10, 2019); Application of Theia Holdings A, Inc., IBFS File No. SAT-LOA-20161115-00121 (filed Nov. 15, 2016).

² See Market Trial section below.

Frequency: 1275 – 1295 MHz

Fort Drum

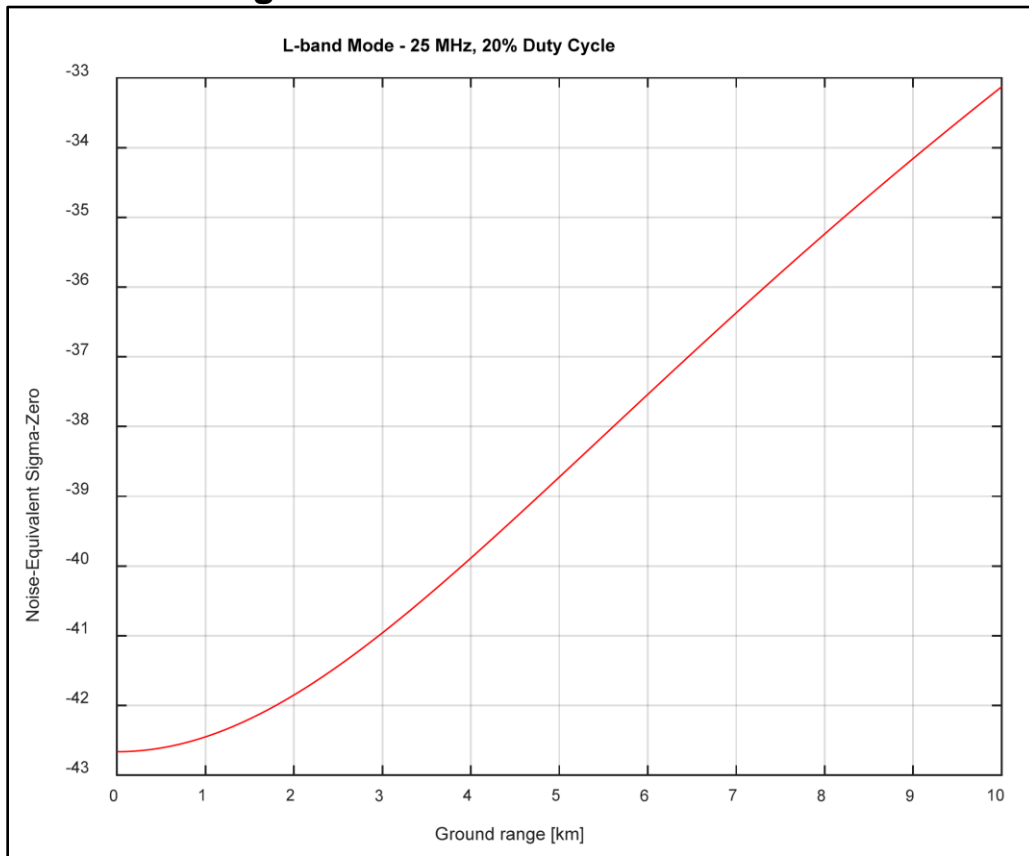
Fort Drum, NY, within 15 km, centered around NL 44-07-44; WL 75-38-32.

Frequency: 1250 – 1280 MHz

Theia will take steps to avoid interference to other authorized operations in this band and cease operations upon notice of any interference.³ Theia will select flight paths that will minimize the interference to incumbent operations in the 1215-1300 MHz frequency band. In those situations in which the flight path must cross known incumbent operations in the relevant band, Theia will take all necessary actions, including shutting down SAR transmissions, to avoid causing harmful interference.

The SAR performance goals are shown in Figure 1.

Figure 1: Goal Pulsed Mode NESO



³ In the 1215-1240 MHz band, non-Federal earth exploration satellite service (EESS) operations are permitted on a secondary basis to Federal EESS, radiolocation, radionavigation-satellite (RNSS) and space research services (SRS) operations. See 47 C.F.R. § 2.106. Additionally, in the 1240-1300 MHz band, non-Federal EESS operations are secondary to Federal EESS, radiolocation, SRS, and aeronautical radionavigation operations, as well as non-Federal aeronautical radionavigation operations.

SUMMARY OF SAR RADIOFREQUENCY PARAMETERS

Parameter (units)	Theia L-band SAR
Center frequency (MHz)	1215-1300
Peak transmitter power (dBW)	23
Transmitter antenna gain (dB)	15
Pulse Width (µsec)	12.8
Pulse Repetition Frequency (Hz)	1490
Transmit Duty Cycle (%)	20

The SAR sensor will operate in a pulsed mode. The modulation can be notched. The sensor can operate up to 25 MHz of instantaneous bandwidth.

The peak output power of the transmitter is 200W. The average power will be 40 watts. The radar has the ability to reduce the transmitted power. The transmitter will be onboard an aircraft and when testing the transmitter will range from nadir pointing to -50 degrees from the horizon. The SAR beamwidth in degrees at the half-power point is 40°.

The orientation of the transmitter in the horizontal plane will be +/- 90 degrees from the aircraft nose. The orientation of the transmitter in the vertical plane is as follows:

Nadir: -90 degrees from horizon

Extended: -50 degrees from horizon

WAIVER REQUEST FOR STATION IDENTIFICATION

Theia requests a waiver of the station identification requirement under 47 C.F.R § 5.115. The SAR transmitter is an active radar and thus does not convey station identification information.

MARKET TRIAL

As part of the experimental application, Theia also intends to assess the market for SAR data products, including price and commercial interest.⁴ The information from such market trials may facilitate design and other decisions with respect to the company's proposed commercial satellite system.⁵

⁴ 47 C.F.R. §§ 5.3(k), 5.601, 5.602.

⁵ See *supra* note 1.

EXHIBIT

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