

Special Temporary Authority Request SatLab duplex transceiver module Operations

Lynk Global, Inc.

18 November 2020

Introduction

The following document details a Special Temporary Authority (STA) Request to operate with an additional frequency pairing the authorized SatLab duplex transceiver module on board the Lynk Global, Inc. (Lynk) satellite, *Lynk the World*. This request is substantially similar to the SatLab duplex transceiver module operations, which was granted the call sign **WQ9XDP** under file number 1433-EX-ST-2020. **This request is necessary to support SatLab operations** [REDACTED]

Lynk the World commenced operations on May 13, 2020, and the SatLab module permits a second method for spacecraft commanding and spacecraft telemetry. Additionally, the SatLab module provides a higher data rate and timely T&C delivery, which is desired for uploading code scripts and downloading large log files. These capabilities improve the test capability and data exchange, expand the testing parameters, and increase the testing [REDACTED]

The SatLab module can be turned off for coordination activities with other S-band users. If necessary, it can be commanded off using the GlobalStar T&C, which can use time based commands to disable the SatLab module or to activate a Kill switch in the Lynk spacecraft, which terminates power to the SatLab module. The Kill switch will be actuated via the same process and with the same means of contact as the Lynk mission spacecraft.

The S-band SatLab transceiver module uses separate transmit and receive antennas. Each antenna is a small patch (55 by 55 mm), which is mounted to the nadir deck of the Lynk spacecraft and a small distance from the UHF payload mission antenna.

The host vehicle for the payload is a small satellite about 6U in size, deployed into space from the Cygnus ISS resupply spacecraft on May 13, 2020. During testing, Lynk's free-flyer smallsat points toward the Earth with its field of view sweeping across the Earth as the spacecraft flies in an approximately 450 km circular orbit inclined at about 51.6 degrees.

The SatLab module will communicate between the Lynk spacecraft and ground stations using licensed commercial TT&C ground stations already approved for similar use. These service providers maintain global shared networks, which include ground sites in the United States and other countries. The only change from SatLab's currently licensed operations with other small satellites will be the chosen S-band frequency. **We are requesting that this STA cover the new frequency pairing described in the following section.**

Special Temporary Authority Request Parameters

- (1) **Name, address, phone number (also email address and facsimile number, if available) of the applicant.**

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- (2) **Explanation of why an STA is needed.**

The *Lynk the World* satellite (under Call Sign **WQ9XDP**) is currently coordinated and operating with frequency pairing Rx 2260 MHz and Tx 2080 MHz under File Number 1433-EX-ST-2020. Lynk recently discovered the possibility that the authorized satellite S-band radio (SatLab SRS-3) may reset to the factory settings with frequency pairing Rx 2029.5 MHz and Tx 2229.5 MHz.

Accordingly, Lynk respectfully requests special temporary authorization to transmit at 2229.5 MHz.

- (3) **Description of the operation to be conducted and its purpose.**

In the case that the satellite S-band radio resets, to resume normal operations under current FCC authorizations, Lynk would need to use a series of bursts during an overpass of the designated ground station at the factory settings with frequency pairing Rx 2029.5 MHz and Tx 2229.5 MHz to re-program the S-band radio to the originally coordinated frequency pairing Rx 2260 MHz and Tx 2080 MHz under 1433-EX-ST-2020.



- (4) **Time and dates of proposed operation.**

Proposed start date December 2, 2020, through March 21, 2021—i.e., the duration of 1433-EX-ST-2020.

- (5) **Class(es) of station (e.g., fixed, mobile, or both) and call sign of station (if applicable).**

Space Station (mobile)

Earth Stations (fixed)

(6) Description of the location(s) and, if applicable, geographical coordinates of the proposed operation.

Location	Latitude	Longitude	Proposed Operation
██████████ USA	██████████	██████████	Only 2260 MHz / 2080 MHz approved pairing
██████████ USA	██████████	██████████	Only 2260 MHz / 2080 MHz approved pairing
██████████ USA	██████████	██████████	Only 2260 MHz / 2080 MHz approved pairing
██████████ Ireland	██████████	██████████	Only 2260 MHz / 2080 MHz approved pairing
██████████ Italy	██████████	██████████	Both 2260 MHz / 2080 MHz and 2229.5 MHz / 2029.5 MHz



(7) Equipment to be used, including name of manufacturer, model, and number of units.

SatLab SRS-3 transceiver	SRS	1
S-Band spacecraft patch antenna	Custom	1
SatLab compatible S-band Ground Station transceiver	Custom	1

(8) Frequency (or frequency bands) requested.

Space Station		Earth Station	
Tx	Rx	Tx	Rx
2229.5 MHz	2029.5 MHz	2029.5 MHz	2229.5 MHz

(9) Maximum effective radiated power (ERP) or equivalent isotropic radiated power (EIRP).
See Table below.

(10) Emission designator (see §2.201) or describe emission (bandwidth, modulation, etc.).
563KG1D

The Emissions Designator signifies a wireless radio which transfers data over a modulated wave using Digital, on-off or quantized, no modulation signal. This signal transmits at a 563.2 KHz maximum bandwidth based on a bit rate of 512 kbps and a BT=0.5 (Time- Bandwidth factor).

(11) Overall height of antenna structure above the ground (if greater than 6 meters above the ground or an existing structure, see part 17 of this chapter concerning notification to the FAA).
Not applicable.

(12) Supplemental Information.

Parameters	Space Station		Earth Station	
	Tx	Rx	Tx	Rx
Authorized Frequencies (1433-EX-ST-2020)	2260 MHz	2080 MHz	2080 MHz	2260 MHz
Requested Frequencies	2229.5 MHz	2029.5 MHz	2029.5 MHz	2229.5 MHz
EIRP * at 2260 MHz	5.37 dBW 3.44 W	-	43 dBW	-
ERP * at 2260 MHz	3.22 dBW 2.1 W	-	40.85 dBW 12171.7 W	-
Output Power	0.904 W	-	10.7 W	-
Antenna Gain	5.81 dBi	5.65 dBi	32.7 dBi at 2025 MHz	33.7 dBi at 2250 MHz
Fixed / Mobile	Mobile		Fixed	
G/T at 5°	-		10.7 dBW at 2250 MHz with 70 K of Antenna Temperature	
Frequency Tolerance	0.00001%			
Modulating Signal	Digital on/off quantized			

* Tx Space-to-Earth EIRP and ERP are each reduced by 3 db at the 2229.5 MHz frequency.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]