

TeleCommunication Systems, Inc. (TCS) is submitting this modification application in order to add a new frequency to Experimental License WC2XWA (the "License"). TCS submitted an application for renewal of the License on May 20, 2015 (File Number 0253-EX-RR-2015). TCS uses the License in order to provide Telemetry (TLM) services to its customer, the Japan Aerospace Exploration Agency (JAXA) at the Guam Down Range Station (GDRS) located in Yona, Guam. The License also has two S-band transmit frequencies reserved for future Command (CMD) implementation in S-band from current UHF. TCS would like to reserve a third frequency based on three TLM frequencies the rocket currently uses.

The GDRS provides critical functions for range service during the launch of rockets from Japan's Tanegashima Space Center (TSC) including for resupply missions to the International Space Station (ISS) and various science and other mission satellites. The first specific objective of the range service is receiving downlink TLM to determine the rocket is on course and has completed deployments as planned. The second specific objective of the range service includes transmitting a single uplink with CMD tones to the rockets for purposes of flight safety command. GDRS does not communicate with the satellite (payload on board of the rocket).

The GDRS was constructed in Yona because there are no obstacles to launch vehicle tracking operations such as mountains or buildings and no facility that radiates interfering radio frequencies.

The GDRS has two antennas (11M main and 5.5M back-up and running in redundant configuration) to acquire and auto track to receive S-band TLM. Although the overall launch campaign is roughly 10-days, the actual mission (rocket in Guam's view) lasts less than 20 minutes with an overlap view period of ~10 minutes with TSC. While the rocket is in sole view from Guam, GDRS, under TSC control, transmits CMD tones to keep the rocket in contact with the ground. Based on the processed data and state of health of the mission, DESTRUCT tones can be transmitted from GDRS (this has not occurred in the last 10 years of operations).

The GDRS is normally in a dormant state other than when TCS operators are dispatched for a mission. There have been between 1~ 4 missions per year.

Station 1: GDRS

North Latitude 13 25 8, East Longitude 144 44 47

- 1) 448MHz CMD: This frequency is used for testing only.
- 2) 2087.16 MHz & 2108.34MHz: These frequencies are reserved for future implementation of CMD becoming S-band although they have not been used to date.
- 3) 2093.46 MHz: This is the frequency to be added by this modification application. This frequency will be reserved for future implementation of CMD becoming S-band.

Station 2: Collimation tower for GDRS

North Latitude 13 25 58, East Longitude 144 42 47

1) 2200-2300 MHz: These frequencies are low power CW used to collimate the GDRS antennas.