

From: Beau Backus

To: Travis Nguyen

Date: February 09, 2021

Subject: FCC-File.No: 0057-EX-ST-2021

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Message:

Hi Travis,

This test and validation of the Mini-RF is to make sure that the Mini-RF is functioning correctly. The Morehead State University's 21m station is an optimum source for providing a known energy source. APL is attempting to determine the problem behind a variance between the X-band measurements made prior to flight and what we're seeing now. Mini-RF works at both S and X band, but only the X band channels are showing the lack of consistency.

So the power flux density at the antenna during Earth-pointing measurements is higher than that present due to Lunar backscatter. It is possible that the difference in power levels between these two situations is responsible for the difference in the balance of power in the two receiver channels as a result of some unknown nonlinearity in the end-to-end system. A range of power levels were injected into the Mini-RF receiver channels prior to flight did not show the imbalance observed during the Earth-pointing measurements. It is possible that some element of the receiver chain has changed behavior during flight. It is therefore of interest to vary the power flux density at the antenna across a range of levels spanning that present during lunar backscatter and that present during Earth-pointing. The LRO will be commanded to point the Mini-RF antenna to the Earth (toward Morehead, KY specifically). While this pointing is maintained, the transmit power level will be repeatably swept between two edge values. We will record the received signal level during these scans, while stepping through the receiver attenuator settings. This will allow a mapping of the input and output power levels of the two receiver channels that can be applied to re-calibration of the Mini-RF attenuators. Obtaining this is the purpose of the activity and basis for the STA request.