

Reference:

Callsign: WO2XME

File Number: 0143-EX-CM-2026

Requested Amendment:

LeoLabs would like to request an amendment to our existing experimental license (Callsign WO2XME) to modify both the number of antenna elements and the ERP at the existing site. The specifics of the request are to increase the number of antenna elements from 512 to 576 and upgrading the power amplifier with the effect on ERP increasing from 17.6MW to 35.1MW.

All other technical specifications of the license would remain the same (other than the requested increase of the ERP) as below:

Frequency	Station Class	Emission Designator	Authorized Power	Frequency Tolerance (+/-)
430-449 MHz	FX	10M0Q9W	Request increase to 35.1MW (ERP)	0.001 %

Purpose of the Modification:

The purpose of this request is to support a critical proof-of-concept phase of the program, specifically to validate the end-to-end link budget assumptions that underpin the system design. The proposed changes are not intended to alter the fundamental operating concept of the system, but rather to enable controlled experimental verification of performance margins that cannot be fully assessed at the current antenna element count and ERP levels.

Justification for Increasing the Number of Elements:

The increase from 512 to 576 antenna elements is required to more accurately represent the intended operational architecture of the system. At 512 elements, the array is sufficient for preliminary testing however, it does not adequately capture several second-order effects that materially influence link performance, including:

- Array gain scaling and effective aperture growth
- Beamforming efficiency and sidelobe behavior at higher element densities
- Mutual coupling effects and their impact on realized gain
- Calibration stability and phase coherence across a larger array

Validating these characteristics at 576 elements is essential to confirm that the

assumed array gain and beamforming performance used in the link budget analysis are achievable in practice, rather than remaining theoretical assumptions.

Justification for Increasing ERP:

The requested increase in ERP is directly linked to the objective of validating the link budget under representative conditions. Specifically, the increased ERP enables:

- Verification of predicted link margins at operationally relevant ranges
- Assessment of signal-to-noise ratio (SNR) performance under realistic propagation conditions
- Measurement of system sensitivity to atmospheric, environmental, and installation losses
- Confirmation of fade margins and performance stability across expected operating scenarios

Without the proposed ERP increase, the system cannot be driven into the operating regime required to confirm whether the design link budget closes with sufficient margin. The current ERP limit constrains testing to conditions that under-represent the intended performance envelope.

Proof-of-Concept Focus:

This experimental activity is explicitly limited to proof-of-concept validation. The objectives are to:

- Correlate measured field performance with analytical link budget models
- Identify discrepancies between predicted and measured gain, losses, and margins
- Inform future design optimization and risk reduction

Contribution to Radio Methods:

The proposed modification will contribute to radio methods by enabling controlled experimentation with a larger-scale UHF phased-array configuration than presently authorized. The increase from 512 to 576 elements and from 17.6MW ERP to 35.1MW ERP will support additional study of array gain scaling, calibration stability, beamforming performance, RF power distribution, and measurement repeatability under field conditions. These experiments are intended to generate engineering data that improves practical understanding of large-aperture electronically steered radar systems and informs future system design, deployment, and safe operation.

Interference and Compliance Considerations:



The proposed increase in elements and ERP will remain within the bounds of the experimental license framework. Transmissions will be limited to the authorized frequencies, location, and will be coordinated to minimize the potential for harmful interference. The increase in ERP is necessary for technical validation but will be applied to the extent required to meet the stated experimental objectives.

Summary:

In summary, the requested modifications are necessary to enable meaningful validation of the system link budget and overall feasibility. Increasing the number of antenna elements to 576 and the ERP at the specified site will allow the engineering team to demonstrate, through measurement rather than assumption, that the system performs as intended. This represents a critical step in proving the technical viability of the design and reducing risk prior to any future development phases.