

# NCAR's Phased Array Line Replacement Unit Demonstrator: calibration, beamforming and observations

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A C-band, 8 by 8 phased array line replacement unit (LRU) was developed to explore the current phased array radar technology and serve as a risk reduction effort toward the Airborne Phased Array Radar (APAR) development effort at the National Center for Atmospheric Research. The 8x8 LRU underwent initial calibration in collaboration with the University of Oklahoma in 2018. The calibration effort includes the conventional element characterization and equalization and embedded element synthesis to form the transmit and receive beam patterns. The 8x8 LRU was also extended to a technology demonstrator (LRU Demonstrator) by adding a radar back-end. The backend consists of the following components: a radio frequency (RF) transceiver, a digital receiver, waveform generation, and real-time moments computation and data visualization.

This paper details the design and development of the 8x8 LRU and the LRU Demonstrator. The results of two initial calibration methods will be shown. Sample weather observations taken when the unit was located on the roof will also be presented. Although a small phased array radar does not provide a sufficiently narrow beamwidth or adequate sensitivity to obtain meaningful weather data, the preliminary observations confirm the capability and agility of the LRU Demonstrator.

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