

# Towards an Operational Demonstration of the First Full-Scale Polarimetric Phased-Array Radar

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The National Oceanic and Atmospheric Administration (NOAA) has identified evolutionary radar mission capabilities aimed at addressing current and future mission needs to support National Weather Service warning operations. Important requirements driving the next generation of weather surveillance radars include improvements in data quality, access to rapid-update volumetric data, and the ability to perform focused and tailored weather observations. Systems based on phased array antennas are promising solutions, and significant R&D investments over the last two decades have contributed to a growing understanding of this technology and to reducing risk associated with Phased Array Radar (PAR) technologies. As a major milestone in this quest, NOAA partnered with the Federal Aviation Administration to develop the Advanced Technology Demonstrator (ATD). The ATD is the first full-scale, S-band, dual-polarization, multifunction, active, electronically scanned PAR for weather observations; it is currently being tested at the National Weather Radar Testbed in Norman, Oklahoma. The ATD leverages several prior investments to provide a flexible and affordable radar system with which to evaluate performance and identify residual risk areas. The ATD will become operational in early 2020 and is expected to provide important information about PAR polarimetric performance (including calibration) and the maturity of this technology and its suitability to meet NWS mission-critical requirements. In this presentation, we will provide an overview of the planned operational capabilities of the ATD, an update on progress to date, and a roadmap for engineering and meteorological research that will help prepare NOAA for the next generation of weather-surveillance radars.

Keywords: Phased array radar, Operational demonstration, Dual-polarization calibration, Multi-function radar

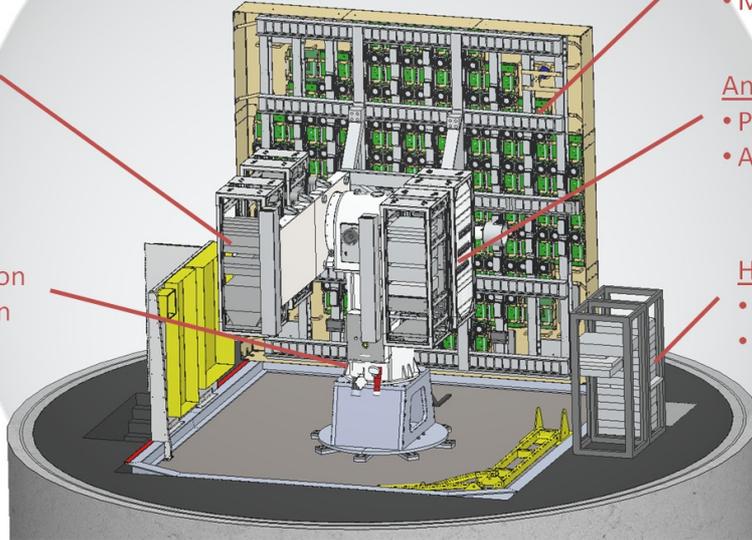
## Rendering of integrated ATD in facility

### Radar backend

- Exciter
- 48 (24x2) receivers
- Digital beamformer

### Motion

- Elevation pedestal supports 180° rotation
- Entire floor rotates in azimuth



### Active antenna

- 4864 radiating elements
- Modular architecture

### Antenna electronics

- Power distribution
- Antenna comm/control

### High-performance servers

- Digital signal processing
- Application software