LOCKHEED MARTIN

Leveraging DoD Capabilities to Demonstrate Dual Pol and Multi-Mission Performance for MPAR

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Topics

- *MPAR Technical Challenges*
- *Risk Reduction Test-bed*
- *Leveraging DoD Assets*
- *Summary*

MPAR Technical Challenges

- *Dual Pol Phased Array Performance*
  - *Required polarization purity*
  - *Dual Pol Calibration*
  - *Required Dual Pol Configuration*
- *Simultaneous Multi-Mission*
  - *Consolidated CONOPS*
  - *Radar Resource Scheduling*
  - *Spectrum Allocation*
- *Cost of the Phased Array Antenna*
  - *Consolidated Requirements*
  - *Array Architecture and Size*
  - *Cost of the Electronics*

Active Dual Pol Test-bed System Reduces Key System Risks and Shapes MPAR Requirement Development

Risk Reduction Strategy

MPAR Community

- ***Technical Risk Reduction (Near Term)***
  - ***Characterize Dual Pol Phased Array Performance***
  - ***Demonstrate Multi-Mission Scheduling Capabilities***
  - ***Demonstrate Enhanced Ground Clutter Suppression***
- ***Technology Optimization (Long Term)***
  - ***Reducing MIMIC Cost***
  - ***Miniaturization of Electronics***
  - ***Reduction in Production Cost***

Industry

Near Term Technical Risk Reduction Options

DoD

Industry

Government Labs and Universities

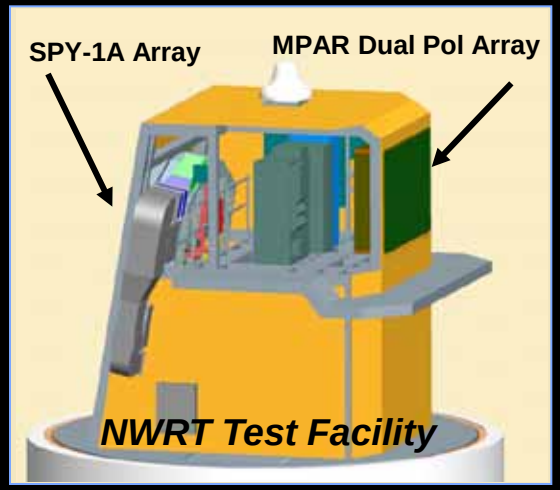
Phased Array Technology Air Cooled GaN MMICS

System Architecture and Integration

Algorithm Development and Performance Evaluation

MPAR Test-bed

Fixed Site Demonstrator



Mobile Demonstrator

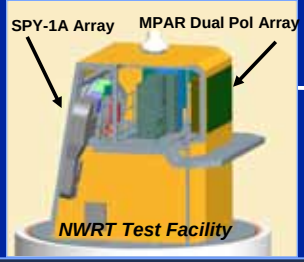
Option 1

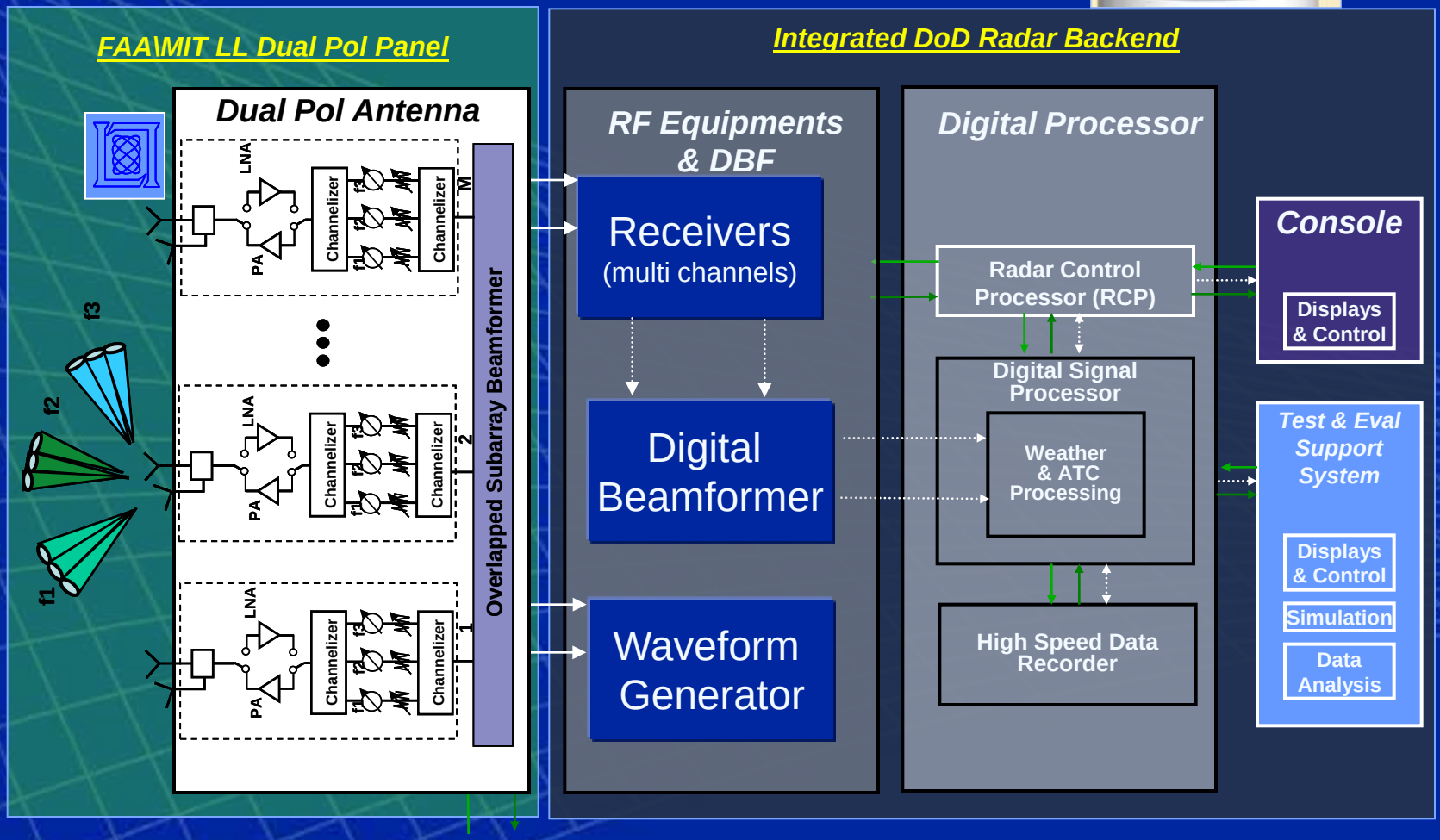
- *Use Existing NWRT Facility*
- *Maintain NWRT Operation*
- *Build Dual Pol Active Array With Digital Beamforming backend*
- *De-Risk MPAR Technical Challenges*
  - *Dual Pol Performance*
  - *Simultaneous Multi-Mission*
  - *Co-Site Interference*

Option 2

- *Modify EQ-36 Based antenna frontend to Dual Pol*
- *De-Risk MPAR Technical Challenges*
  - *Dual Pol Performance*
  - *Simultaneous Multi-Mission*

FAA\MIT LL and DoD Backend Demo Overview (Option 1)





Leveraging existing developments to build active dual pol Test-bed with DBF capabilities

Potential Mobile Demonstrator (Option 2)

Dual Pol Technical Risk Reduction (Modify Existing Radar System)

EQ-36 Prototype Features

- ***S-Band Solid State Array Electronic Scanning in Azimuth and Elevation***
- ***Mechanical Scanning in Azimuth***
- ***Single HMMWV Mobility / C-130 Transport – Towed 35kW Generator***
- ***Live Testing Completed***

EQ-36 Prototype

Dual Pol Multi-mission PAR Demonstrator Option

Modified Dual Pol Demonstrator Features

- ***Dual Pol element design***
- ***Sequential dual pol operation mode***
- ***High Performance T/R modules***
- ***Weather and Aircraft surveillance and track missions***
- ***Mobile Radar***

Summary

- *Building on the NWRT Success*
- *Provides the Research Tool to Better Understand*
  - *Dual Pol Phased Array Performance*
  - *Radar Scan Strategy for Multi-Mission*
  - *Ground Clutter Suppression*
- *Leveraging Existing DoD Developments*
  - *Minimizes Demo Cost*
  - *Minimizes Integration Risks*
  - *Minimizes Implementation Time*