

Multifunction Phased Array Radar (MPAR)

FAA Research Initiatives

Presented to: MPAR Symposium II

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Federal Aviation
Administration



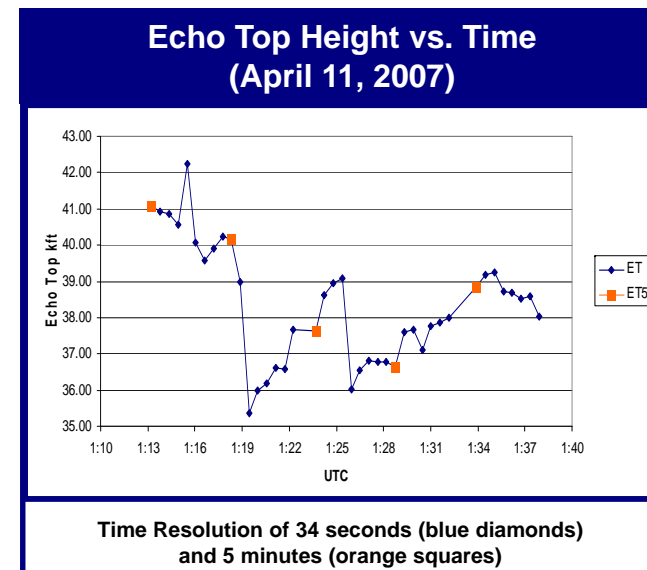
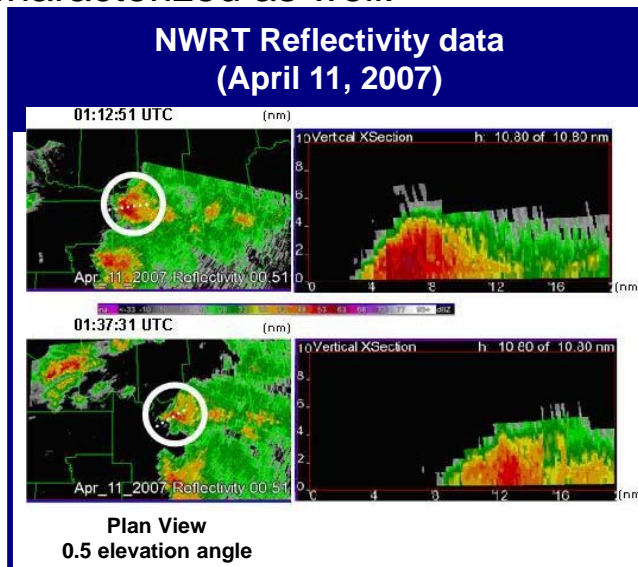
Research Accomplishments

- **Completed development, evaluation and characterization of prototype T/R module using custom chip-set from M/A-COM**
- **Completed design for 64-element front panel array**
- **Completed development of a dual-polarization strategy and architecture**
- **Completed initial T/R module Technical Requirements Document**
- **Updated cost model**



Research Accomplishments (cont'd)

- **Completed study on MPAR's impact (rapid update rate) to storm Growth & Decay algorithms (CIWS). Findings:**
 - Faster update of radar data can increase the accuracy of the growth and decay trends, which could, in turn, improve the quality of the precipitation and echo tops forecasts.
 - A higher time resolution of the echo tops field could aid route availability planning and help improve turbulence forecast, and storm motion may be better characterized as well.



Research Accomplishments (cont'd)

- **ADS-B back-up surveillance study completed**
 - Report delivered containing initial requirements
- **Initial findings indicate MPAR can achieve ADS-B ($NAC_p = 7$) surveillance accuracy**
 - 600' surveillance resolution with 3 or 6 second update rate.

* NAC_p – *Navigation Accuracy Category - Position*



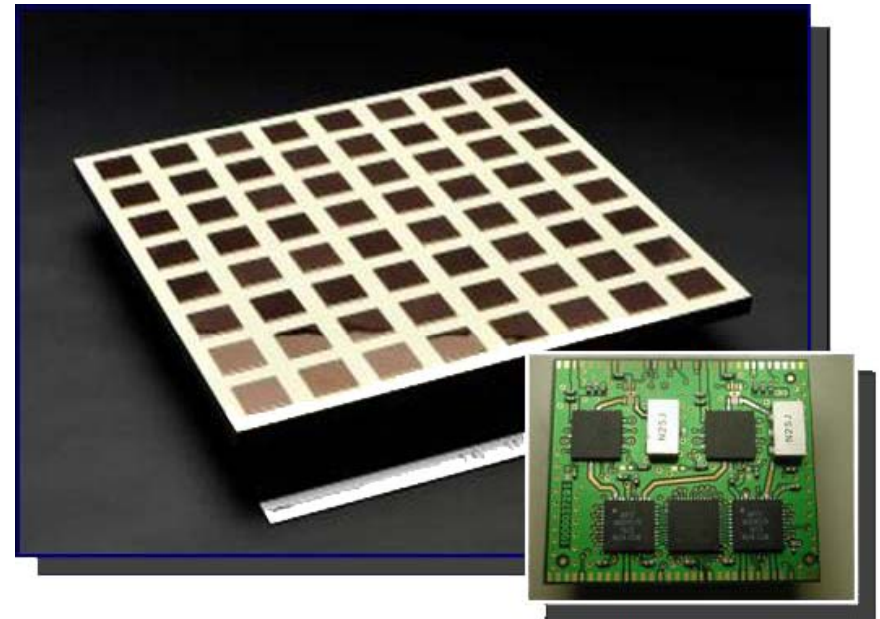
Research Accomplishments (cont'd)

- **Completed development and implementation of Target Tracker function on the NWRT Track Processor (TP)**
 - Funded by DHS through NSSL
 - Completed all hardware and software development and integration
 - Includes rehost of DSP onto multi-core open architecture
 - Provides integrated track/weather display



Research Plans

- Complete fabrication of 64 element front panel (Lincoln Laboratory and M/A-COM)
- Characterize and evaluate prototype panel (LL and M/A-COM, independent assessment)
- Update detailed cost model for low cost panel architecture
- Complete design for panel back-end (power, beam controller, interface, etc.)



** Prototype Panel Demonstrator*

Research Plans (cont'd)

- **Radar Network Analysis**

- FAA's Aviation Weather Office (AWO) is funding a task/study for the "right-sizing" of weather sensor networks.
- Ground based radar is one of the study areas and will explore network coverage.
- Gap-filler concept analysis and NextGen integration are candidate focus areas.



Research Plans (cont'd)

- **Mode-S Replacement Study**

- Define appropriate functional performance requirements
- Evaluate high level network/sensor configuration alternatives
- Assess possible performance improvements
- Investigate candidate PAR architectures that can satisfy performance specifications



Research Plans (cont'd)

- **Technology Assessment Program**
 - Multi-agency program to engage industry on technology advancements and cost
 - FAA, NSSL and OFCM
 - Currently refining project approach and acquisition strategy
 - Current approach is a multi-phase acquisition
 - Funded Architecture/Cost white papers
 - Down-select for development of technology demonstrators
 - Planned for FY11
 - Program followed by full scale Prototype Development



Summary

- **FAA research initiatives:**
 - Produced low cost T/R modules and 64 element panel
 - Analyzed the affect of faster update data on weather algorithms
 - Determined MPAR can support the back-up requirements of ADS-B
- **Continuing research to investigate MPAR as a viable solution to FAA mission needs.**

