Multifunction Phased Array Radar (MPAR)

FAA Research Initiatives

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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.)
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.**