Airspace Systems Program

Barry Sullivan
Airspace Systems Program NGATS Integration Manager
(nasa-asp@nasa.gov)

Revolution in the Airspace System

- Next Generation Air Transportation System cannot be realized without integrated, revolutionary technologies contributed by all of NASA's Aeronautics Programs.
- Government and Industry must develop the Airspace System for 2025 and beyond by investing in long-term research now.
- The restructuring of NASA's Aeronautics Program addresses the long-term research needed to develop technologies for the future Airspace System.

Airspace Systems Program

NGATS ATM: Airspace	NGATS ATM: Airportal

Objective

Directly address the fundamental ATM research needs for the NGATS, in collaboration with the JPDO, by developing revolutionary concepts, capabilities, and technologies that will enable significant increases in the capacity, efficiency and flexibility of the NAS.

Key focus areas

NGATS ATM: Airspace

- Dynamic Airspace Configuration
- Traffic Flow Management
- Separation Assurance
- Super Density Operations
- Performance-Based Services
- Trajectory Prediction, Synthesis & Uncertainty

NGATS ATM: Airportal

- Safe & Efficient Surface Operations
- Coordinated Arrival/Departure Operations
- Airportal Transition and Integration Management

- Both projects will conduct system-level design and analysis.
- Substantial leveraging of research across the two projects will occur.
- Results of the two projects will be integrated to ensure gate-to-gate solutions that are aligned with NGATS needs.

NGATS ATM: Airspace

- ***Dynamic Airspace Configuration:*** Increase capacity through dynamic allocation of airspace structure and controller resources
- ***Traffic Flow Management:*** Effectively allocate demand through departure times, route modification, adaptive speed control, etc., in the presence of uncertainty
- Reduce capacity-limiting impact of human-controlled separation assurance
  - ***Automated Separation Assurance:*** (sequential processing of sequence and merging with separation) for transition and cruise airspace
  - ***Airspace Super Density Operations:*** (simultaneous sequencing, spacing, merging, and de-confliction) for terminal airspace
- ***Trajectory Prediction, Synthesis & Uncertainty:*** Accurate trajectory predictions that are interoperable with aircraft FMS trajectory generations using prediction uncertainty growth and propagation
- ***Performance-Based Services:*** Research that enables us to understand and quantify the performance-enhancing effects of emerging airborne technologies.

NGATS ATM: Airportal

- ***Safe & Efficient Surface Operations:*** develop trajectory-based automation technologies to optimize ground operations.
- ***Coordinated Arrivals/Departure Operations Management:*** maximize throughput by means of an optimal balancing of arrivals, departures and surface operations.
- ***Airportal Transition and Integration Management:*** investigate the dynamic response to airportal operational constraints including regional airport solutions, weather transition and change in traffic demand.

NGATS ATM: Foundational Research

Foundational Research Areas critical to advancements in both projects:

- Airspace complexity and equity metrics
- Optimization (organize, schedule and regulate) based on user needs and airspace constraints
- Separation assurance and collision avoidance compatibility
- Trajectory modeling
- Human model development and validation
- Optimization with multiple uncertain variables

NRA Awards

- Completed awards for 15 selected proposals totaling $5.7M
- Current NRA is open through late August
  - Evaluate the work underway via prior NRA awards to determine if they should be extended for a second year
- Airspace Project expects to have an additional series of subtopics released between January and August 2007 (approximately a 4-month process from release to proposal submission to evaluation, selection, and award)
  - Subtopic drafts are under development in areas of Dynamic Airspace Configuration and Performance Based Services
- Airportals Project has plans for initial NRA release in FY07
  - Work with the Airspace Project to develop a joint subtopic in metroplex operations for release in late January
  - Develop a series of NRA subtopics with phased release from February through August 2007
- Airspace Systems Program plans to award approximately $9.4M in FY07 through NRA competitions