Air Traffic Management

Embry-Riddle and Lockheed Martin Aim To Cut Thunderstorm-Related Delays

Aviation Week & Space Technology
11/03/2008 , page 60

David Hughes
Washington

Industry, academic researchers partner to cut delays caused by convective weather

Printed headline: Ahead of the Storm

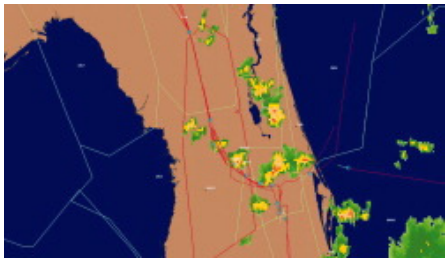
Embry-Riddle Aeronautical University, Lockheed Martin and a host of other industry partners are about to demonstrate to the FAA how NextGen air traffic control techniques can help controllers anticipate convective weather and reroute aircraft early to avoid massive delays.

Thunderstorms are some of the most disruptive phenomena for air traffic, and finding better ways to deal with weather is a key goal of the FAA's NextGen ATC modernization effort. The idea is to feed forecast data onto displays of arrival routes so controllers can make better strategic and tactical decisions about how to reroute air traffic more efficiently.

The demonstration to technical experts on Nov. 18 at a new Embry-Riddle/Lockheed Martin research and development facility at the Daytona Beach International Airport in Florida will rely on archived data from a few hours of arrivals into Orlando International Airport. The computer simulation will add a new dimension to how aviation weather information is handled by ATC, an area in which some ATC specialists say real breakthroughs are needed if the FAA expects to handle three times as much air traffic by 2025. The aim is to simulate feeding convective weather forecasts to flow control specialists at the Jacksonville Air Route Traffic Control Center.

By knowing an hour ahead specifically how convective weather is likely to impact three arrival fixes feeding traffic onto two runways at Orlando, the researchers can show how some of the delays on the day in question could have been avoided. Traffic can be rerouted even before it reaches the Ocala sector northwest of Orlando where the fixes are located, says Todd Waller, a senior researcher at **Embry-Riddle** who is working on the project.

A hardware-in-the-loop demonstration is planned, starting with a system developed for the FAA including the Weather and Radar Processor (WARP). This software tool collects real-time weather data for use in Air Route Traffic Control Centers such as Jacksonville. Ensco Inc., one of the partners in the demonstration, will use WARP to create a forecast 1 hr. in advance of convective weather activity in the Ocala sector. On the day being studied, thunderstorms affected these feeder fixes and controllers had to vector aircraft around, causing considerable delays.



***Embry-Riddle** and Lockheed Martin are using Weather and Radar Processor software to show how weather impacts arrivals at the Orlando airport.Credit: **EMBRY-RIDDLE** AERONAUTICAL UNIVERSITY*

Next, the forecast thunderstorm activity data will be fed to the FAA's Traffic Management Advisor (TMA) system to show on an LCD where to expect trouble in a particular sector 1 hr. hence. Polygons will show thunderstorm activity in a time-lapse like a satellite loop, only showing the forecast rather than a history. The TMA system is a new software tool used by traffic flow management specialists at centers like Jacksonville that helps controllers sequence aircraft from cruising levels into the airspace around major airports by calculating their precise routes as well as the minimum safe distances between aircraft.

The demonstration will also include Lockheed Martin's En Route Automation Modernization (ERAM) system now being installed in en route centers like Jacksonville to replace the aging, 1980s-era IBM Host computer system.

The R&D demonstration will be conducted at a new 5,000-sq.-ft. facility at Daytona Beach International Airport. The industry and university effort has been included under the FAA's umbrella of NextGen testbed activity in Florida, an effort to accelerate the rollout of benefits to aircraft operators over the next few years rather than waiting for NextGen completion in 2025. Miami International Airport is also involved in other early rollout work with the FAA.

Christina M. Frederick-Recascino, vice president for research at **Embry-Riddle**, says a second demonstration of this initial capability will be given in early December. Other partners in the NextGen research include Computer Sciences Corp., Boeing, Barco, Frequentis, Mosaic ATM, Harris Corp.,

Jeppesen, Sensis Corp., TransTech Systems Inc. and the Volpe National Transportation Systems Center.

The partners have invested $5 million so far in this three-phase NextGen research project and the FAA has contributed $2.5 million. After working on integrating weather and 4D (the three spatial dimensions plus time) trajectories on controller's computers, the partners will start Phase 2 next year, which may focus on integrating airport surface monitoring and departure and arrival and management into one system. This phase would exploit System-Wide Information Management (SWIM) middleware that allows disparate automated ATC systems to communicate with one another, even if they are employing different computer technologies. The Nov. 18 demonstration makes some use of SWIM-type technology.

The final phase in 2010-11 focuses on handling greatly increased air traffic anticipated by 2025 and the use of continuous-descent approaches at near idle power to reduce fuel burn, emissions and noise.

Frederick-Recascino says the partners in the project also want to establish a second demonstration center near the Orlando International Airport. Once proof-of-concept demonstrations are conducted at the Daytona R&D center, similar exercises can be run at Orlando to show government, FAA and international officials how they will work at a major airport.