National Aeronautics and Space Administration

Aeronautics

Aircraft Passback Restrictions for Spacing Constraints

Miles-in-Trail Passback Restrictions for Spacing Constraints in Air Traffic Management

NASA has developed a unique innovation to compute passed back spacing requirements in air traffic management.

The air traffic managers of the National Airspace System (NAS) in the United States regularly implement various Traffic Management Initiatives (TMI) to handle traffic in a safe and efficient manner. One such initiative is the Miles-in-Trail restriction. Imposed Miles-in-Trail is the value of spacing required between aircraft flying along a certain path. They help air traffic managers control the flow of aircraft into and out of an air traffic control facility. Miles-in-Trail can be implemented independently or in conjunction with other TMIs (e.g., a severe weather avoidance plan route, or a Playbook route). This model computes passback restrictions given the imposed constraint, the start and end times, the boundaries at where those restrictions need to be passed back, and the amount of maximum ground and airborne delay allowed.

BENEFITS

- Allows for computation of passback restrictions for current and changing traffic patterns
- Allows for multiple merging streams and dynamically drawn passback boundaries
- Computed values are highly efficient for current conditions
- Aids the traffic manager
- Provides significant improvements in guidance

technology solution

THE TECHNOLOGY

Generally, FAA managers employ miles-in-trail as a traffic management initiative when downstream traffic congestion at airports is anticipated. In order to successfully implement the miles-in-trail as airspace fixes or navigational aids, it is desired that restriction values be computed for passing back to upstream facilities at specific boundaries. When a Miles-in-Trail constraint is imposed at an airspace location, due to congestion, some spacing constraints are passed back to upstream air route traffic control centers. Additional operational considerations required by the traffic managers to implement the passback restrictions are maximum ground delay and absorbable airborne delay, both incorporated in this model. The ability to implement multiple restriction locations, multiple merging streams of traffic, permits speed control, vectoring or airborne holding and passback of restrictions to upstream facilities aids the traffic manager significantly. This model improves upon a previous version using traffic manager feedback resulting in significant improvements in guidance.

Runway line-up due to delays- FAA managers employ miles-in-trail as a traffic management initiative when downstream traffic congestion at airports is anticipated

APPLICATIONS

The technology has several potential applications:

- Air Traffic Management
- Airline flight dispatch operations
- Aeronautics

PUBLICATIONS

More Information

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