

MULTI_REGIONAL TRAJECTORY BASED OPERATIONS PROJECT (MR TBO) DEMONSTRATION



As the global Air Traffic Management (ATM) continues to evolve to Trajectory Based Operations (TBO), precise trajectory predictions will require enhancement and expansion of current capabilities to preserve or increase available airspace capacity and efficiency while also maintaining safety standards.

TBO OVERVIEW

TBO is an ATM initiative that enhances strategic planning under changing conditions, providing the information and capabilities to help expedite aircraft movement between origin and destination airports. Current capabilities like Performance Based Navigation (PBN) and Time-Based Management (TBM) are already in place to support TBO, while additional capabilities are being developed to reduce vectoring in terminal airspace by focusing on enhanced speed control. Knowledge of specific information for each flight shared with stakeholders increases effective strategic planning for both Airspace Users and ANSPs. The Connected Aircraft makes this possible and is an important element of TBO, which will result in improved strategic planning with a reduction of more costly tactical changes. With this enhanced information, TBO will shift from a voice-based set of exchanges between participants to an environment primarily involving data sharing and exchange across interoperable systems supported by global data standards.

MR TBO PROJECT

PROJECT OVERVIEW

Building on previous Lab Demonstration activities, the MR TBO team, consisting of the Federal Aviation Administration, the Aeronautical Radio of Thailand (AEROTHAI), Civil Aviation Authority of Singapore (CAAS), and Japan Civil Aviation Bureau (JCAB) have undertaken the MR TBO project to collaborate and demonstrate TBO concepts with a live flight demonstration. The MR TBO team developed operational scenarios that align with the TBO concept and highlight operational value across the regions.

LIVE FLIGHT DEMONSTRATION

The MR TBO Live Flight Demonstration will take place over 6 days, comprised of four scenarios, highlighting flights between the various regions. Demonstration events are scheduled to be conducted in, Florida NextGen Testbed, Daytona Beach, Florida; Tokyo, Japan; Bangkok, Thailand; and Singapore, Singapore. The FAA and JCAB will collaborate to conduct flight segment 1 during the live flight, while segments 2 and 3 are in collaboration between JCAB, AEROTHAI, and CAAS, and segment 4 will be a collaboration between the FAA, JCAB, and AEROTHAI.



INFORMATION DOWNLINK/EXCHANGE

- Leverage flexibility of the current global exchange standards
- Support negotiation between the ground and aircraft
- Improve performance of trajectory prediction



COMMUNICATIONS

- Demonstrate the use of various communication services and the providers consistent with the Connected Aircraft concept



MULTIPLE EASP EXCHANGE

- Demonstrate exchanges and associated procedures focused on cross - Flight Information Region (FIR) needs to share, manage, and use the agreed trajectory
- Demonstrate the use of the trajectory as a shared common view of the flight across diverse disparate actors



- Aircraft: B787-10
- Schedule: 6 days, June 2023
- Test Flight Plan

Tokyo → Singapore overflying Thailand

Bangkok → Seattle



Scenario 1 explores the benefits of TBO as the live flight crosses several FIR boundaries through nine separate use cases. This trans-Pacific flight departs from the United States, enroute to Narita, Japan, showcasing interactions associated with En Route Automation Modernization (ERAM) and Advanced Technologies and Oceanic Procedures (ATOP) airspace within the NAS, and JCAB airspace as they share, maintain, and use trajectories. This flight segment will cross from the FAA into JCAB airspace, with both eASPs supporting TBO.

In Scenario 2, the live flight crosses several FIR boundaries within the Asian Pacific, including the overflight of Thailand airspace, through seven separate use cases. This flight departs from Narita, Japan, enroute to Singapore, Changi Airport. This scenario illustrates interactions between JCAB, AEROTHAI, CAAS as they demonstrate regional ATFM and Information sharing. This flight segment crosses numerous FIRs including Japan, Thailand and Singapore .

In Scenario 3, the live flight crosses several FIR boundaries within the Asian Pacific through 1 use case due to its relatively short time airborne. This flight departs from Singapore, Changi Airport enroute to Bangkok, Thailand. This scenario illustrates interactions between CAAS and AEROTHAI as they demonstrate regional ATFM and Information sharing. This flight segment crosses Singapore and Thailand FIRs.

Scenario 4 explores the benefits of TBO as the live flight crosses several FIR boundaries through six separate use cases. This trans-Pacific flight departs from Bangkok, Thailand, enroute to Seattle, Washington. This FAA-lead scenario will show interactions between AEROTHAI, JCAB and NAS airspace as they share, maintain, and use trajectories. This flight segment will cross from AEROTHAI, JCAB, and NAS airspaces, with all three eASPs supporting TBO. The MR TBO Live Flight will demonstrate the use of modern aircraft with existing equipage (FANS1/A, PBN, etc.), IP connectivity, and flexible auxiliary devices (i.e., EFB approval AC120-76D) to share, negotiate, manage, and use the trajectory with multiple eASPs/ASPs during all phases of flight in operational environments to achieve the optimum flight-fleet-flow operation efficiency.