

Initiate Trajectory-based Operations

Summary Description:

Trajectory-based Operations (TBO) represent a shift from clearance-based to trajectory-based control. Aircraft will fly negotiated trajectories and air traffic *control* moves to trajectory *management*. The traditional responsibilities and practices of pilots/controllers will evolve due to the increase in automation, support, and integration inherent in management by trajectory.

This solution set focuses primarily on en route cruise operations, although the effects of the trajectory-based operations will be felt in all phases of flight.

Background:

Flights are managed in today's Air Traffic Control (ATC) system primarily by voice communication. Clearances and vector coordinates are all handled by two-way radio. Separation is handled by controllers using radar screens to visualize trajectories and make cognitive operational judgments with some automation decision support to help identify and support the resolution of future conflicts. With the diversity of aircraft characteristics and navigational performance, a single set of equipment-based separation procedures and standards for all aircraft encounters is becoming increasingly inefficient and limits capacity. Human limitations constrain efficiency and expansion of service. In particular the need for low content complexity in voice communication limits capacity and efficiency. Although many aircraft are capable of precision flight, today a flight's trajectory is still based on a series of charted and published airspace points with flexibility in-flight usually limited to the removal of intermediate points. Human limitations drive costs as well. The ability to handle diverse traffic at lower cost with less impact to operator-desired performance profiles is demanded.

Operational Capability Description:

TBO is a critical NextGen capability that addresses performance gaps in the areas of capacity, productivity, efficiency, and safety. A major advantage of TBO is the ability to integrate trajectory planning, management, and execution from strategic planning to tactical decision-making. Strategic aspects of trajectory management include the planning and scheduling of flights and the corresponding planning and allocation of NextGen resources to meet demand. Overall flows are managed strategically and tactically to ensure safety, security, and efficiency of operations. Tactical components of trajectory management include the evaluation and adjustment of individual trajectories to provide appropriate access to airspace system assets (depending on aircraft capabilities) and separation assurance to ensure safe separation among all aircraft. The flexible management of aggregate trajectories enabled by TBO allows maximum access for all traffic, while giving advantage to those aircraft with advanced capabilities that support the Air Traffic Management (ATM) system.

TBO represents a shift from clearance-based control to trajectory-based control. In the new high-performance ATM environment, aircraft will transmit and receive

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precise digital data to include aircraft routes and the times aircraft will cross key points in the airspace.