



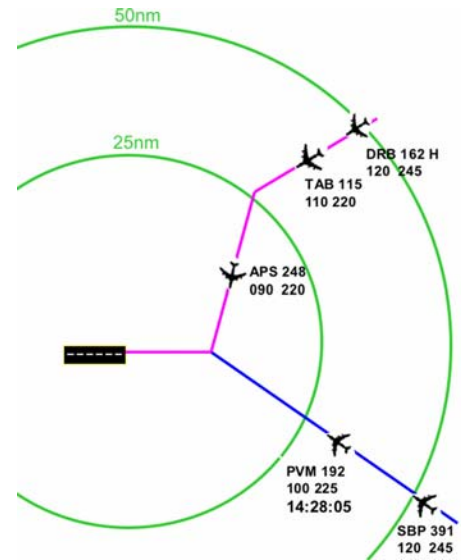
# Using RTA for Arrival Sequencing

As the Federal Aviation Administration (FAA) heads towards the Next Generation Air Transportation System (NGATS), aircraft will be assigned to Required Navigation Performance (RNP) area navigation (RNAV) routes and have modern avionics that include Flight Management Computers (FMCs) that are capable of executing Required Time of Arrival (RTA) instructions. The FMCs will also be able to downlink Estimated Time of Arrival (ETA) and 4D Intent information.

The FAA's Roadmap for Performance-based Navigation calls for enhanced reliability, repeatability, and predictability via use of RNAV/RNP and for reduced workload and improved productivity. Aircraft flying RNP/RNAV routes have improved predictability and repeatability so that use of time domain information such as ETA or RTA can be used to reduce the controller's workload and improve overall productivity. For the mid-term, the Roadmap mandates "...procedures with 3D RNP and time of arrival control" for RNAV arrivals. Because of these identified needs, The MITRE Corporation's Center for Advanced Aviation System Development (MITRE/CAASD) is conducting research via lab prototypes that leverage the avionic capabilities of modern aircraft in a way that time domain control can be seamlessly integrated into the Air Traffic Control (ATC) system.

The concept for using RTA involves new ground automation that will receive or calculate ETAs for the aircraft of interest. An initial local schedule is developed and analyzed for the predicted separation at a given

point in space. This can be done in units of time or distance. The schedule is then adjusted as needed so that the predicted inter-aircraft spacing meets the desired spacing. Any aircraft that require a change in the local schedule will then receive RTAs that meet the objective. The RTA clearances will be voiced by the controller to the respective aircraft. The mid-term concept does not depend on data link but could take advantage of the capability if it were available. Other aircraft are given timed-speed control commands (voiced by the controller) to achieve the same effect of an RTA so that the concept can work in a mixed-equipment environment.



CAASD's research involves (a) use of time-domain control by ATC personnel, (b) the required accuracy of the ETAs, including use of down-linked ETA information and/or ETAs calculated from surveillance data, (c) the robustness of the concept, i.e., under what conditions (geometry, wind uncertainties, etc.) can the concept be expected to provide benefit, and (d) the appropriate computer human interface (CHI) for the controller. The concept is currently being examined for application in the terminal area for merging and sequencing of aircraft on RNP/RNAV arrival routes and approaches.

## For more information, contact:

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