Relative Position Indicator

Relative Position Indicator (RPI) is a near-term spatial projection tool which will aid air traffic controllers in merging and spacing on terminal Area Navigation (RNAV) and Required Navigation Performance (RNP) procedures allowing controllers to use speed control to keep aircraft on the path, maintain predictability, and improve efficiency.

The current terminal area airspace design philosophy centers on defining Performance-based Navigation (PBN), RNAV, and RNP routes to provide flexibility and efficiency.

Reduction in required voice communications, aircraft fuel burn and emissions, and increased predictability due to these procedures is only realized if aircraft are not vectored off of these procedures. For arriving efficiency and throughput of merging arrival streams while allowing aircraft to remain on PBN procedures.

RPI is a near term tactical tool that could assist both the controller and the Traffic Management Coordinator (TMC) in managing the flow of traffic through the terminal area. RPI is a spatial projection that leverages the structure and predictability of PBN procedures to provide a controller with passive situation awareness. RPI does not require any equipage changes on aircraft or Air Traffic Control (ATC) procedural changes.

RPI places an indicator on the controller’s display to indicate the position of aircraft on merging routes as if they were in-trail or in a line. It does this by calculating the flight path distance to the merge of aircraft at busy airports, maintaining aircraft on these procedures for merging traffic can be difficult, because merge conflicts are often addressed through vectoring.

The MITRE Corporation’s Center for Advanced Aviation System Development (MITRE/CAASD) has researched different tools to address this need providing a tactical controller tool to maximize the

Vectors to Sequence Terminal Merges and Downwind Elongation can be Mitigated with RPI

RPI is a Passive Spatial Projection that Leverages PBN Procedures to Provide Controllers with Situation Awareness
RPI Models RF Turns Accurately

the source aircraft and places the indicator at that distance as measured along the merging route. RPI takes into account all of the non-linear segments and turn arcs of both routes prior to the merge point. RPI’s projection algorithm accounts for circular arcs defined by Radius-to-Fix (RF) legs. Since RF legs provide a fixed ground path, RPI projections are even more accurate when used with RNP procedures. With the use of RPI, controllers can determine what early control actions can be taken, such as speed control that will keep the aircraft from being vectored off its route.

RPI has been demonstrated to numerous controllers and facility managers and has received positive feedback. Controller acceptability evaluations were conducted at Southern California Terminal Radar Approach Control (TRACON) (SCT) and Phoenix TRACON (P50) in 2010 and an Early User Involvement Event (EUIE) for operations at Seattle TRACON (S46) and Denver TRACON (D01) is scheduled for early 2012.

How did the predictability of traffic change with RPI availability?

Controller Feedback from RPI Controller Acceptability Evaluations

Methodology Used for Vetting RPI