

Advanced Navigation Focus Team meeting minutes

Day 1 – 3/29/99

Attending the 1st day were:

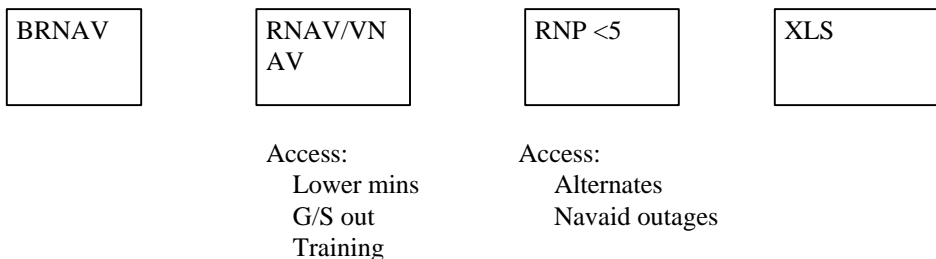
Brian Harkness	Air Canada	Team Leader
Dave Nakamura	Boeing	Boeing focal
Frank Alexander	NWA	
David Oliver	Qantas	
Robert Rovinsky	FAA	
John Ackland	Boeing	
Ken Simmons	Boeing	
Tim Murphy	Boeing	
Gary Lawson-Smith	Ansett	
Frank Tung	Volpe	

The group decided that the benefits based on navigation should be examined in progressive steps. An airplane conforming to the requirements for operating in B-RNAV airspace was designated the baseline airplane. Eurocontrol document TGL2 rev 1 specifies the B-RNAV requirements.

The mission of the ANFG is ultimately to investigate benefits for navigation capabilities starting with BRNAV all the way to CAT IIIB approaches. Its recognized that there a several different ways to follow that path in steps which can yield different levels of landing, takeoff and en-route benefits and costs.

Bob Rovinsky presented an Investment Analysis for satellite navigation programs. The analysis scope is a re-baseline of satellite navigation programs including a “lease vs buy” WAAS satellite analysis. The group was moist interested in the alternatives being analyzed which covers a range of functionality from maintaining the current ground navaids with no augmentation to GPS to a robust 4 GEO WAAS and the planned LAAS coverage. Complementary alternatives are shown for the user (airplane) side. Bob said that they are actively soliciting comments and data from the users (airlines, manufacturers, etc..) to help more accurately determine the costs and benefits associated with the outlines alternatives. The analysis is scheduled to be completed on June 30th. There are public meetings planned for April 6 and sometime in June.

We started looking at our version of the logical alternatives for a transition from BRNAV to CAT III. We assigned some benefits for some of the alternatives.



These alternatives shouldn't imply a path since there are several ways to go. For example, a BRNAV airplane doesn't need to add VNAV to achieve an RNP<5. A description of each alternative is shown below.

BRNAV: An airplane meeting the requirements defined by TBD for European airspace.
Requirements are:

RNAV/VNAV: An airplane capable of Random (Area) navigation combined with a vertical navigation function based on the performance of the airplane. VNAV systems are primarily found in modern FMSs in integrated flight decks. An after market FMS system retrofit on to a post production analog airplane would not currently provide airplane performance based closed loop vertical navigation.

RNP<5: An airplane capable of operating in airspace with RNP's of less than 5nm. Since BRNAV is essentially RNP5 airspace, everything less can require additional capability (equipment) on the airplane. This category will probably require RNP altering and annunciation on the airplane. Lower RNP values will drive better navigation performance on the airplane.

RNP: Required Navigation Performance as pertaining to the airplane is a feature that can calculate the Actual Navigation Performance (Boeing) or Estimated Position Error (Airbus) and provide an annunciation to the crew when the ANP/EPE exceeds a specified RNP value. The RNP value can be entered by the pilot or part of a Navigation Data Base. Airplanes with RNP have had that feature certified by the RNP. In the case of Boeing aircraft, the Airplane Flight Manual (AFM) defines the minimum demonstrated RNP values the airplane is capable of based on the mode of flight and whether GPS is being used.

XLS: Either a GLS, MLS or ILS system providing precision navigation. Precision navigation can be categorized as Category I, II or III level.

Day 2. – 3/30/99

Attendees:

Brian Harkness
Tim Murphy
David Oliver
Gary Lawson-Smith
Ken Simmons
Kathleen Pirrote
Frank Tung

The group worked on a plan whose goal is to produce a CBA ready to be presented at the next all-airline meeting in Toulouse. We selected two benefit scenarios to work:

- 1) RNAV/VNAV procedures. Procedures requiring an Airplane with RNAV and VNAV capability. These procedures primary benefits are for cost avoidance to allow:
 - a) Overlays of ILS procedures which would allow a G/S look alike approach for an G/S out scenario
 - b) Commonality of training for airlines – reduces possible procedures to ILS or RNAV/VNAVData will be gathered from:
 - a) FAA – can provide ILS outage numbers
 - b) QAN and Ansett have outage and outage costs data
 - c) UAL and NWA – can estimate training savings and provide cost savings for outages in South America

- 2) RNP arrivals and departures. The use of RNP would allow more efficient Arrival and Departure transitions through complex airspace and terrain. GPS may be required for low RNP paths. There are benefits for capacity, efficiency and environmental.
 - a) Capacity: May increase runway access for some airports
 - b) Efficiency: Can shorten arrival and departure path lengths
 - c) Environmental: Less fuel burn and more repeatable paths to avoid noise issues.

Data: No specific data is available. There is no know study based on these procedures. Possible collateral data sources may be found from the NeSS program in Frankfurt, the Newark Datalink study to show the effect on reduced comm on capacity and a MITRE study on FMS approaches.

Schedule:

4/15 – Data to Boeing from the FAA

4/30 – Airline data to Boeing

5/13 – Meeting at Boeing review the benefits model

TBD – Cost data to Boeing based on the model review

August – meeting to finalize the analysis

October – all airline meeting in Toulouse.