



International Civil Aviation Organization

**Performance Based Navigation/Global Navigation Satellite System
Task Force (PBN/GNSS TF)**

Fifth Meeting
(Cairo, Egypt, 15 - 17 April 2013)

Agenda Item 5: State PBN Implementation and MID PBN Support Team Plans

RNAV1 IMPLEMENTATION IN BAHRAIN

(Presented by Bahrain)

SUMMARY

This paper presents the navigational performance specification for ATS routes within Bahrain UIR TMAs.

Action by the meeting is at paragraph 3.

REFERENCES

- Bahrain PBN Implementation plan
- IATA RNAV 1 MID Region Plan 2010
- MIDANPIRG/13 Report
- PBN Manual, Doc 9613
- PBN GNSS TF/4 Report

1. INTRODUCTION

1.1 Bahrain is located in one of the busiest sections of airspace in the MID Region, and responsible for a large volume of that airspace, with the implementation of RNAV1, Bahrain increase the Airspace capacity by 40%, from 4 AWYs to 7 AWYs within the East Region of OBBB.

1.2 The forecasted traffic for the Gulf Region averages between 5-8% per year, doubling traffic volumes of Bahrain FIR until 2016. The expected growth within the Bahrain FIR presently is as follows:

- total F.I.R. movements increased on average 11% per year from 2009 through 2015;
- traffic is expected to grow at 9% per year between 2009 - 2016 in the medium forecast;
- by 10% p.a. in the optimistic forecast; and
- by 4% p.a. in the lower forecast.

1.3 The existence of a Functional Airspace Block (FAB) in the middle of the Bahrain FIR (The Main choke point for the whole MID Region) can create a big challenge to Bahrain UIR.

1.4 This is caused because of the air traffic flows to and from Northern Africa, the Near East, Europe, Asia, Iran, India and Australia meet and cross in the airspace around Bahrain. Furthermore there is intense terminal traffic between the Gulf States in the same airspace.

1.5 The Performance Based Navigation (PBN) concept specifies aircraft RNAV system performance requirements in terms of **accuracy, integrity, availability, continuity** and **functionality** needed for the proposed operations in the context of a particular airspace concept, when supported by the appropriate navigation infrastructure. In this context, the PBN concept represents a shift from sensor-based to performance-based navigation.

1.6 The implementation of RVSM on 27 NOV 2003 in the MID Region brought significant airspace and operational benefits to the Region. However, the realization of new benefits from RVSM have reached a point of diminishing returns. The main tool for optimizing the airspace structure is the implementation of PBN, which will foster the necessary conditions for the utilization of RNAV and RNP capabilities by a significant portion of airspace users in the MID Region.

2. DISCUSSION

2.1 ATS routes, particularly in the area within UIR TMAs (north east of Bahrain) provide minimum separation between adjacent routes, therefore it is imperative that aircraft flying on these ATS routes maintain the **centerline of the route** unless otherwise cleared by ATC. Unless landing or departing from an airport located under the lateral limits of the Bahrain CTA.

2.2 When an aircraft is not able to fly RNAV as a result of in-flight failure of the RNAV system, the phrase "NEGATIVE RNAV" shall be included immediately on first contact with Bahrain ATC.

2.3 Direct benefits of the implementation is increase Airspace Capacity (40%):

- Increases traffic capacity through more efficient routes and smoother flows.
- Reduces airspace conflicts between adjacent airports and prohibited or special use airspace.
- Reduce workload and improve productivity of air traffic controllers.

2.4 RNAV1 implementation AREA within TMAs where the following are available:

- 6 En routes DME/DME which may support PBN en-route and terminal area operations based on RNAV-5, and RNAV-1 navigation specifications
- 6 VORs
- Complete VHF coverage
- Radar Overlap coverage
- Mode S
- WGS-84 implementation in accordance with ICAO Annex 15 and updated WGS-84 surveys on interval less than 4 years
- Electronic Terrain and Obstacle Data
- Procedure design project
- Operational approval
- RNAV/RNP applications for SIDs and STARs
- Safety assessment
- Airspace concept development
- Awareness and training for pilots and ATC

- CPDLC , DLC
- ATM Automation (RAM/CLM)
- INFPL

(Note.- The conventional Navaid infrastructure should be maintained to support non-equipped aircraft during a transition period until at least 2016)

2.5 In this regard, the following Programmes will be on progress:

- a) Traffic and cost benefit analyses
- b) Necessary updates on automation
- c) Operational simulations in different scenarios
- d) ATC personnel training
- e) Flight plan processing
- f) Flight procedure design training to include PBN concepts and ARINC-424 coding standard
- g) Enhanced electronic data and processes to ensure appropriate level of AIS data accuracy, integrity and timeliness
- h) Uniform classification of adjacent and regional airspaces
- i) Coordinated RNAV1 routes implementation (UAE/Qatar/KSA)
- j) RNAV1 approach with vertical guidance
- k) Establish PBN approval database
- l) IFPS within OBBB

2.6 AIRAC6 13 effective date 30th May 2013 was published on 7th March 2013 and available on BCAA/BAIMS website (<http://www.caa.gov.bh/ais/>) (84 days in advance) for Air Space user, gives a great opportunity for data suppliers to review/clarify the data.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

- a) note and discuss the information contained in this working paper;
- b) update the MID Air Navigation Plan (DOC 9708), Volume I Basic ANP Table;
- c) encourage MID State to implement RNAV 1 to increase airspace capacity in the MID Region; and
- d) update the MID Regional PBN plan accordingly.