International Civil Aviation Organization

The Second Meeting of the APANPIRG ATM Sub-Group (ATM /SG/2)

Hong Kong, China, 04-08 August 2014

Agenda Item 5: ATM Coordination (Meetings, Route Development, Contingency Planning)

IMPLEMENTATION OF PBN (RNP1) DOMESTIC ROUTES

(Presented by Maldives)

SUMMARY

This paper presents information on Maldives' effort to implement a route structure based on RNP1 to cater for increasing IFR domestic traffic.

1. INTRODUCTION

1.1 The concept of Performance Based Navigation (PBN) Domestic routes was first discussed in 2012.

1.2 The increasing domestic air traffic, associated with new domestic airports, have made provision of safe, orderly and expeditious flow of air traffic using the conventional separation standards a huge burden for air traffic controllers and a heavy fuel penalty for the operators.

1.3 Several meetings were held involving Maldives Airports Company Limited (represented by Air Traffic Services), the operators and Maldives Civil Aviation Authority (MCAA). Participants came up with the idea of "parallel routes" with reduced lateral separation.

1.4 Various design concepts and Navigation specification were discussed such as RNP4, RNAV 5, RNAV1 and RNP1 (then called Basic-RNP1).

1.5 During the COSCAP PBN Operational Approval Course in Male in 2013, the Performance Based Navigation (PBN) experts who conducted the training suggested us to select RNP1 for domestic PBN routes.

1.6 Their point was although the PBN Manual says RNP1 is for terminal routes, it can be applied outside Terminal airspace. That using Autopilot or Flight Director, aircraft will be able to maintain lateral deviation tolerance required for RNP1— Flight Technical Error (FTE) within +/- 0.5NM. But that the "RNP1 required" must be mentioned on the charts.

1.7 Soon after, the initial design of the route structure was made available. But it took one year for the domestic carriers who operate Dash 8 and ATR airplanes to obtain RNP1 operational approval and complete the necessary trainings for pilots

2. DISCUSSION

Key points considered in the designing of the routes

- optimum route;
- optimum cruising level;
- continuous climb operation (CCO) and continuous descend operations (CDO);
- minimum ATC intervention;
- reduced controller and pilot workload

Design criteria

- navigation specification: RNP-1;
- minimum lateral separation: 8NM (½ Area Width 3.5 NM between the routes; and 1 NM separation buffer)

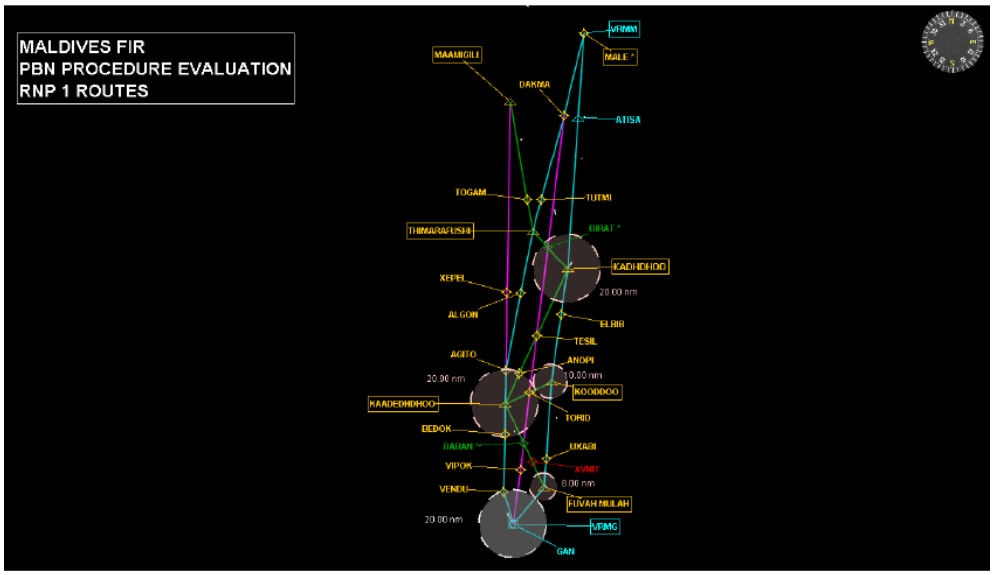
Risk Assessment

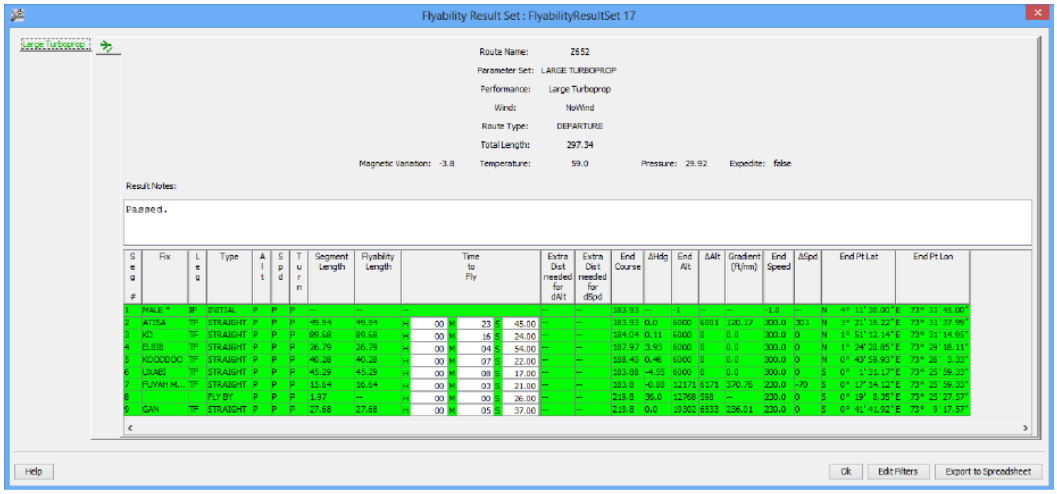
- Loss of RAIM (ABAS) while en-route;
- Inability to maintain a CDI scaling of +/- 1 NM along routes;
- GNSS signal interference;
- Loss of direct controller pilot VHF communication

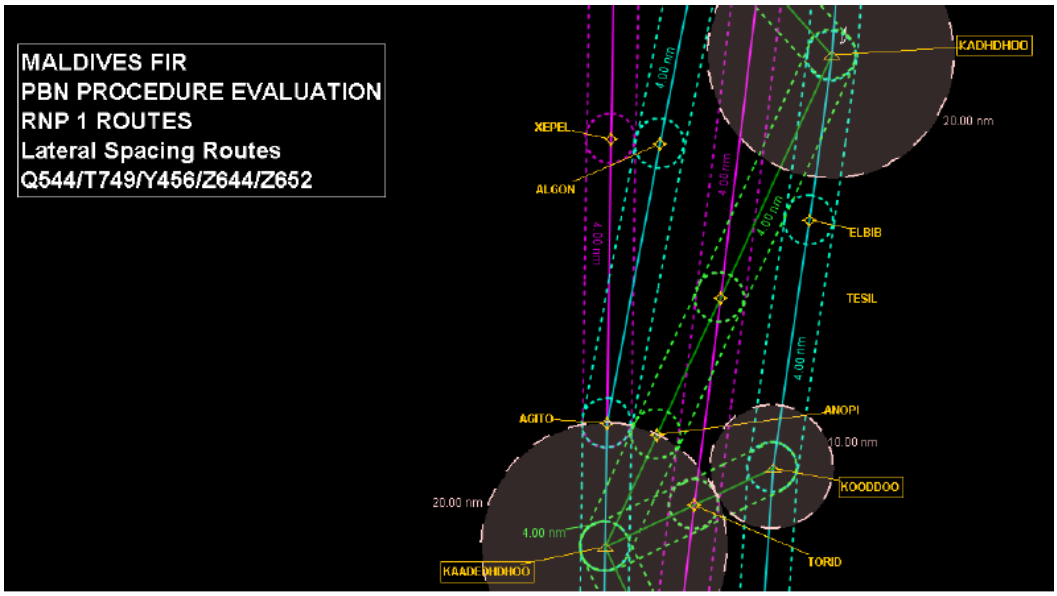
Validation

- ground validation;
- Fast-time simulation;
- Flight validation

2.1 Fast-time simulation carried out with assistance from Airports Authority of India using the Terminal Area Route Generator Evaluation, Traffic Simulation (TARGETS) tool developed by MITRE INC, USA.







2.2 Flight validation is being conducted by local carriers and expected to be complete by the 3rd week of this August. Flight validations are conducted during daylight hours, in Visual Meteorological Condition

Publication

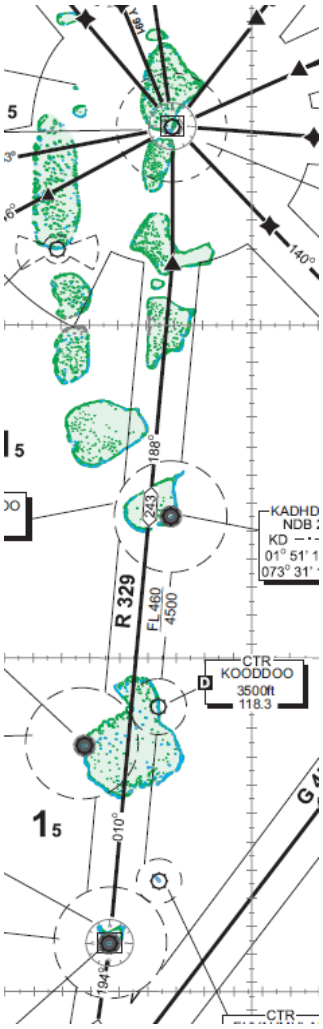
- PBN (RNP1) routes will be published as an Area Chart;
- Operating Procedures will be included in the AIP

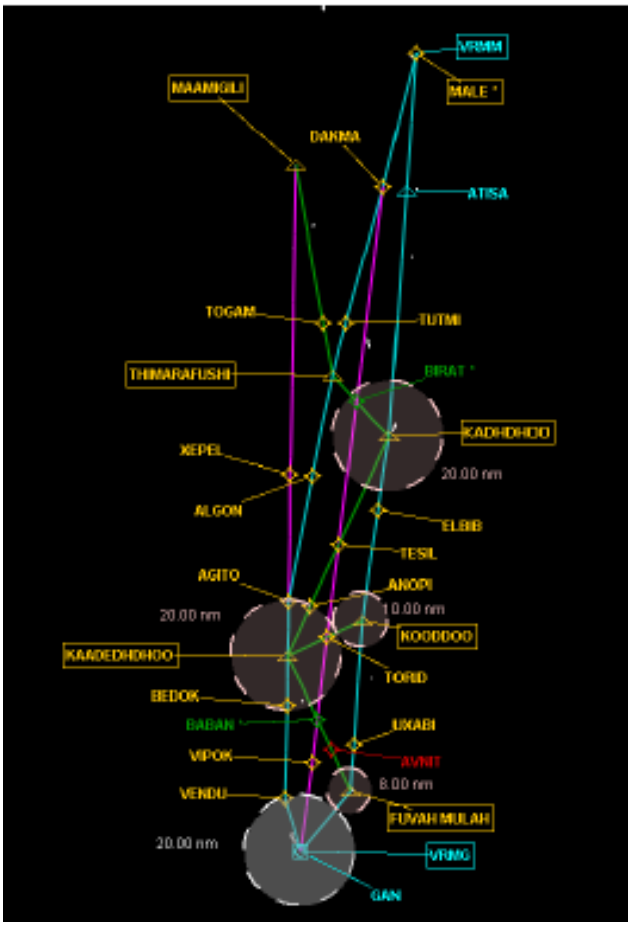
ATC Procedures

- Separation minima; and
- ATC contingency procedures.

Benefits of PBN (RNP1) Domestic routes

- 3 parallel routes which are laterally separated for most part compared to a single conventional route defined by VOR or NDB;
- Less restriction for climb and descend; and
- Reduced workload for ATC in solving conflicts.





3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper; and

b) discuss any relevant matters as appropriate.

…….