

# **Application of RNP 1 for parallel domestic en-route**

Implementation Process, Operational  
Improvement and Lesson Learned

*By Maldives*

# Maldives PBN (RNP 1) DOMESTIC ROUTES

- Maldives PBN Domestic routes implemented on 13<sup>th</sup> November 2014
- Connect Male International Airport and 6 domestic airports, where there is limited or no surveillance coverage
- Major breakthrough to manage domestic IFR traffic safely and efficiently

# Implementation Process

## Planning

- Planning began in 2012
  
- Stakeholder:
  - Air Traffic Services (Maldives Airports Company)
  - Maldives Civil Aviation Authority (MCAA)
  - The two domestic operators (Island Aviation Services & Villa Air)

## Operational Requirement

To address the challenges faced by ATC and operators with the increasing domestic IFR traffic, associated with new domestic airports:

- ✓ Controllers facing increasing workload in separating aircraft using conventional methods;
- ✓ Aircraft facing restriction in descend, delays on the ground and longer routes

## Design Team

### Core Design Team:

- Lead by ATS (2 Senior ATS officers with procedure design and airspace planning experience)
- ANS officer from MCAA
- 2 Pilots (IAS and Villa Air)

## Concept

To establish parallel routes based on Performance Based Navigation (PBN) :

- optimum route;
- optimum cruising level;
- facilitate CCO;
- facilitate CDO;
- minimum ATC intervention;
- reduced controller and pilot workload

# Fleet Capability

## Villa Air (Flyme)



**ATR aircraft**

RNP1 and RNP APCH capable  
with Local Ops Approval

## Island Aviation Services (Maldivian)



**Dash 8 aircraft**

RNP1 and RNP APCH capable  
with Local Ops Approval

## Navigation Specification

### **RNP 1 was selected :**

- ✓ Geography of Maldives, stretching from north to south.
- ✓ any other navigation specification with wider lateral spacing requirement would not have served the purposed
- ✓ Easier to obtain Operational Approval for the ATR and Dhash 8 aircraft in the domestic fleet

*Note: The most basic qualifying system is a stand-alone GNSS receiver (TSO C129(a)) coupled to a CDI or HSI display providing course guidance and cross-track deviation indications.*

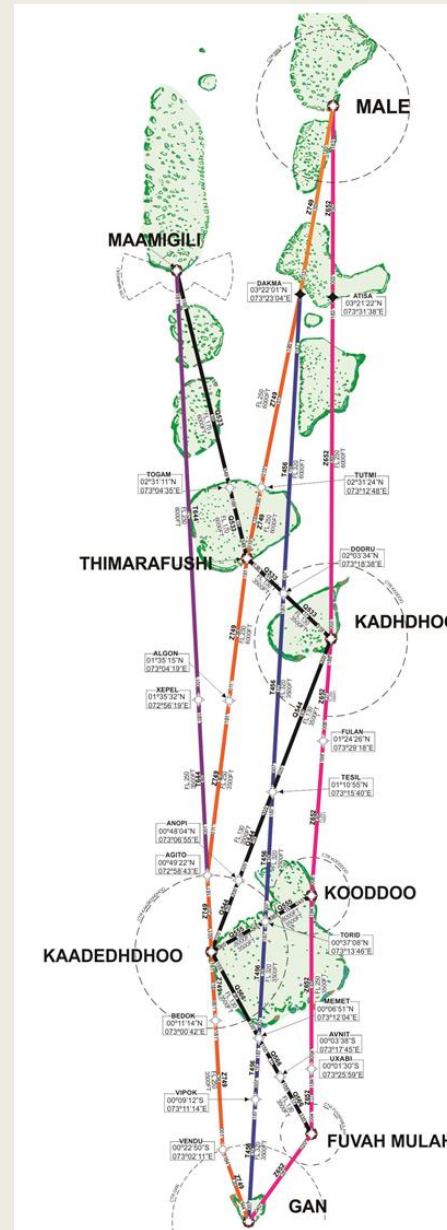


## Navigation Requirement

- RNP 1 based on GNSS positioning.
- Total System Error (TSE) must be within  $\pm 1$  NM for at least 95 per cent of the total flight time
- The 95 per cent Flight Technical Error (FTE) should not exceed 0.5 NM

## Final Airspace Design

- Minimum lateral separation 8 NM ( $\frac{1}{2}$  Area Width 3.5 NM between the routes and 1 NM separation buffer)
- Most way-points designed as on-request reporting points, to reduce R/T
- Upper limit FL250



## Risk Assessment

*Based on statistics from the operators and ATC :*

- ✓ 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

Doc 9906, Quality Assurance Manual for Flight Procedure Design, Volume 5, Validation of Instrument Flight Procedures

- ✓ Independent IFP Design review;
- ✓ Simulator Evaluation; and
- ✓ Flight Evaluation

*Note: 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.*

## Publication

- AIRAC AIP Supplement, published 56 days ahead (2 AIRAC cycle dates)
- include aeronautical Chart and the Operating Procedures
- published as an Area Chart

## ATC Procedures

- ❖ ATC Separation Standards
- ❖ Contingency procedures

## Training

PBN Implementation Course and PBN Operational Approval Course for major **stakeholders** conducted in association with COSCAP

In-house training for **ATCOs** organized by ATS

Trainings for pilots organized for **pilots** by respective operators

# Operational Improvement

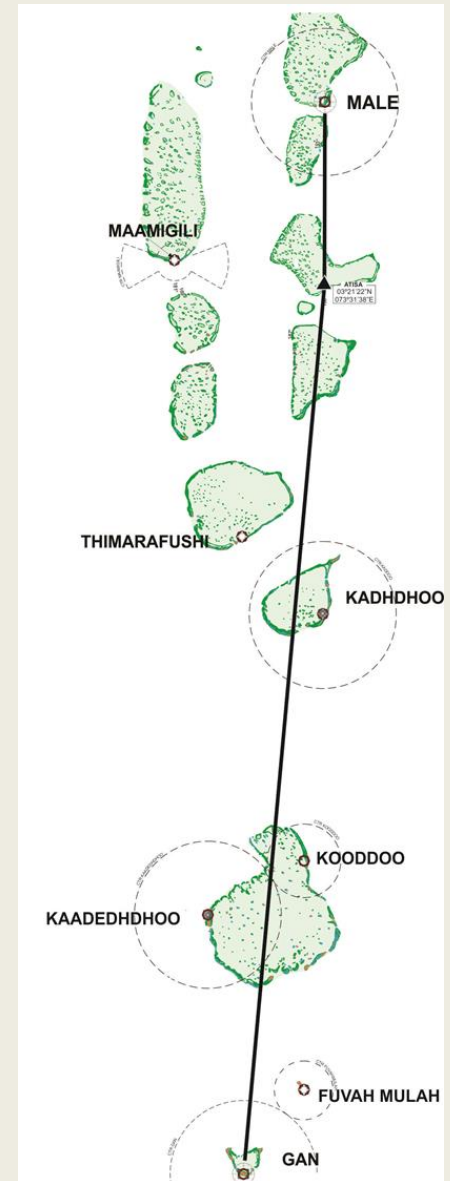
Previously :

Single conventional route;

Conventional separation standards  
(Such as time-based separation) ;

Restricted climb or descend;

Delay on ground





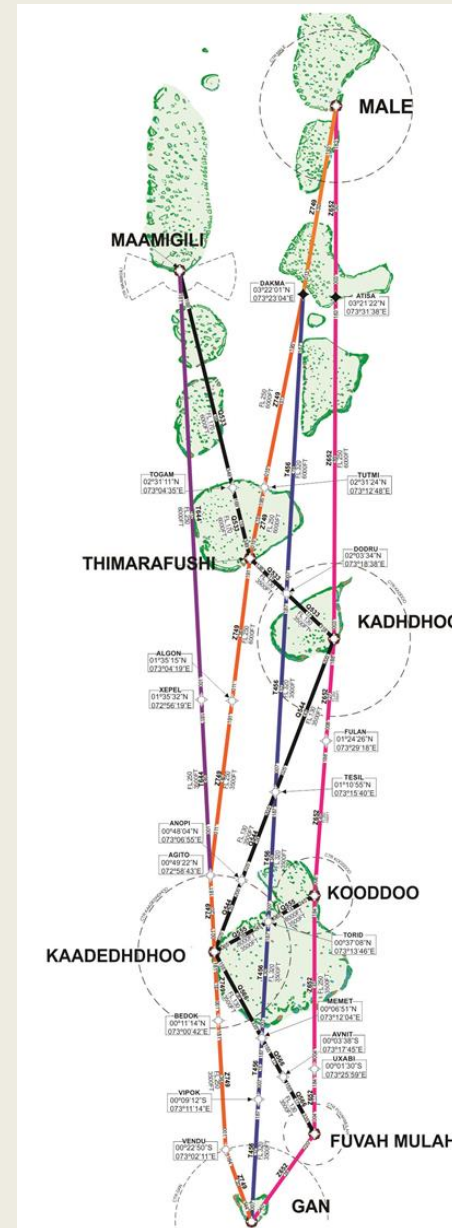
*Now :*

Parallel routes which are mostly laterally separated;

Almost no restriction for aircraft climb or descend;

No delay on ground;

Minimal workload for ATC in solving conflicts



# Lesson Learned

Although **RNP 1** is designated for SIDs and STARs, it can successfully be implemented on routes outside TMA without deviating from the regulations.

A Local OPS Approval, rather than going back to the original aircraft manufacture, alleviated operator's concern for additional cost and thereby received enormous support from them in the implementation.

A collaborative effort among the main stakeholders—CAA, ATS and airline operators, are key success.

Imparting knowledge and making operators and ATC aware of the benefit are crucial

If the initiation comes from ATC and Pilots there is less resistance

Someone or a group of dedicated people should be there to drive the process.

**Question ?**