



Agenda Item 2: Optimización del espacio aéreo SAM

PBN BRAZIL

(Presented by Brazil)

SUMMARY

This Working Paper aims to present the update of the projects and action plans for PBN implementation in Brazil, the situation and the progress of the TMA-SP Neo Project and other actions adopted by DECEA for the optimization of the Brazilian airspace (progress of PBN designs of the TMA).

References:

- SAM/IG/23
- GREPECAS/18
- DOC 9750 – GANP

1. Background

1.1 The conclusions obtained during GREPECAS/18 meeting, indicate the need for States to increase efforts for the publication and implementation of IFR routes and procedures for the Terminal Control Area (TMA) based on the PBN concept to increase or maintain safety efficiency of air navigation in the SAM Region.

1.2 This commitment assumed by the States is also a topic frequently addressed during the SAM/IG meetings, which also highlights that such initiatives must be implemented in close coordination between States, ANSPs, airlines and other airspace users.

1.3 In this regard, this working paper presents an update of the projects and action plans for PBN implementation in Brazil, the situation and progress of the TMA-SP Neo Project and other actions taken by DECEA for the optimization of Brazilian airspace (design of PBN procedures for TMA).

2. PBN projects and PBN procedures for the TMA of Brazil

2.1 The PBN projects and their respective dates for PBN implementation in the Brazilian TMAs are as follows:

| | | |
|--------|-----------------------------|---------------------------|
| Brazil | Brasília | 12 NOV 2015 (deployed) |
| | Belo Horizonte | 12 NOV 2015 (deployed) |
| | São Paulo (partial changes) | 12 NOV 2015 (deployed) |
| | Salvador | 27 ABR 2017 (deployed) |
| | Manaus | 17 AGO 2017 (deployed) |
| | (PBN SUL) | Curitiba Florianópolis |

| | | |
|--|---|----------|
| | Joinville | |
| | Navegantes | |
| | Porto Alegre | |
| | São Paulo (partial changes) | |
| | Rede de rota FIR CW | |
| | São Paulo (TMA-SP Neo) | SEP 2020 |
| | Fortaleza, Natal, João Pessoa, Recife | NOV 2021 |
| | Belém, Campo Grande e São Luís | OCT 2022 |
| | Cuiabá, Boa Vista, Porto Velho e Rio Branco | OCT 2023 |

2.2 Dates of PBN projects were updated by SAM/IG/23. Main reasons to change dates were:

- Increase in the number of IFR procedures required for the PBN TMA-SP Neo Project (there will be changes in the procedures of the TMA Curitiba, Florianopolis, Porto Alegre);
- Circular Implementation Plan 353 (316 letters);
- Procedural review work.

2.3 Another important information: Brazil has 1.524 IFR procedures (IAC, SID, STAR) published for 141 airports where IFR operations occurs:

| IAC | | SID | | STAR | |
|------|-----|------|-----|------|-----|
| CONV | PBN | CONV | PBN | CONV | PBN |
| 447 | 266 | 294 | 345 | 43 | 129 |
| 713 | | 639 | | 172 | |

2.4 Taking these procedures into account, it is possible to carry out the pertinent analyzes of the situation of implementation of the PBN concept and of the CDO and CCO techniques in Brazilian airports:

| APV / LNAV | | | STAR | SID | CDO TMA | CCO TMA |
|------------|---------|---------------|----------|---------|------------|------------|
| IAP APV | LNAV | IAP RNP AR | STAR PBN | SID PBN | | |
| 100,00% | 100,00% | 9,23% | 77,27% | 95,38% | 75,86% | 75,86% |

3. PBN TMA-SP Neo Project

3.1 As presented in SAM/IG/22, the Department of Airspace Control (DECEA) decided to establish a project with a view to implementing a new concept of airspace for the Terminal Control Area (TMA) of São Paulo. The project began in December 2017 and is expected to last three years.

3.2 The decision to implement a new PBN project was taken following the results of the analysis of the capacity indicators with respect to the predicted increase in demand. It also obeyed the request of users, pilots and air traffic controllers (ATCO), to introduce improvements in said concept of airspace.

3.3 In the PBN TMA-SP Neo project the concepts of continuous improvement, performance-based approach (PBA) and collaborative decision-making (CDM) are applied, and relevant analyzes are considered to endorse ICAO documentation as a strategic planning tool.

3.4 The most important strategic objectives to be achieved with the project are the following:

- a) Guarantee capacity at least 10% higher than the expected demand in the next 10 years, from the implementation of the project;
- b) Reduce the workload of ATCOs by at least 10%;
- c) Reduce waiting times due to airspace capacity;
- d) Reduce delays related to airspace capacity;
- e) Reduce flight distances, flight time and fuel consumption;
- f) Reduce or maintain safety indicators:
 - Air Safety Reports number;
 - Number of air traffic incidents;
 - Number of TCAS / RA.

3.5 The challenge is significant, as the TMA Sao Paulo comprises three of Brazil's largest airports, which are Guarulhos-SBGR, Congonhas-SBSP and Campinas-SBKP, which respectively rank the country's first, second and sixth place in terms of transit volume Air.

3.6 In addition, the TMA Sao Paulo comprises several airports for general aviation, a complex network of visual routes that allows flight between them and a flow of operations generated by the largest urban fleet of helicopters in the world.

3.7 Another important aspect is the airport configuration, which does not favor the implementation of a simple airspace concept, taking into account, for example, that a final approach with an angle of almost 90 degrees to the main slopes of Guarulhos and Congonhas, considering that the distance between the midpoints of these airports is 15 NM.

3.8 After almost 2 years of work, many activities were already developed during the implementation of the project:

- a) Implementation process based on the CDM concept: holding a practical seminar (two weeks) to address the concept of airspace, with the participation of more than 130 participants from the Brazilian aeronautical community (safety, civil aviation authority, General aviation, airlines and air navigation service providers (ANSP)). This seminar had two main objectives:
 - ✓ Inform the aeronautical community about the complexity and general schedule of the project;
 - ✓ Collect experiences and expectations of the Aeronautical Community, with a view to establishing the objectives and expected results.
- b) Establishment of ATM indicators to verify whether operational gains in the areas of Operational Safety, Capacity and Efficiency, in accordance with the strategic objectives of the project, will be effectively achieved. The Aeronautical Community will participate in the process of data collection and calculation of the key performance indicators;
Note: Draft Performance Measurement Plan presented in SAM/IG/22.
- c) Development of the Project Analytical Structure (EAP), and Action Plan, and the team of project specialists;
- d) Design of 2 (two) scenarios for the Airspace Concept, developed in close coordination with stakeholders (ATCO, airlines, ATFM, ANSP, AOM, etc.);
- e) Validation of the scenarios in Accelerated Time Simulator (STA) for the decision making of the best Airspace Concept.

3.9 The last activities carried out were the choice of the best Airspace Concept scenario for the TMA SP and the evaluation of that scenario in Real Time Simulation (STR).

3.10 The scenario decision took place in MAY 2019 during a meeting with the Head of the Operations Subdepartment of DECEA to present the progress made so far. The chosen scenario has been the one that will produce the most changes in air traffic in the TMA SP, but the same as expected will bring more operational advantages. Basically, the characteristics of the chosen scenario were:

- a) Arrival by the western sector (W) of the TMA SP for Guarulhos airport (SBGR);
- b) Improve the balance of the arrival flow in the TMA SP;
- c) Increase airspace capacity;
- d) Use of a Point Merge in the food sector (more time and more space to fix air traffic);
- e) Freer departures for the use of the CDO concept of constant ascent, which will increase navigation efficiency and decrease fuel consumption.

3.11 With respect to Real Time Simulation (STR), the results obtained during the STR were very promising. At that time, it was possible to evaluate the Airspace Concept in more detail and obtain the opinion of the Air Traffic Controllers (ATCO) on air traffic in the TMA SP.

3.12 It has been possible to verify the new airspace capacity values and validate the new sectorization of the TMA SP and the ACCs affected by the project.

3.13 The general opinion of the ATCOs was that the changes that will be implemented will improve air traffic in the TMA and that the service will be less complex than the current scenario. This very important information, since the resistance of the ATCOs to change for a new air circulation is one of the factors that most harm the implementation of PBN projects.

3.14 Now the most important work is to design all the IAC, SID and STAR procedures of the project. There are 194 letters (85 IAC, 69 SID and 40 STAR) for 11 airports in Brazil and that work will consume almost all the procedure design capacity of the Institute of Aeronautical Cartography (ICA).

3.15 Finally, it is important to highlight that the PBN approach procedures of the TMA SP Neo Project will be the first in Brazil to have the new identification recommended by ICAO. The IACs will be named according to the criteria of Circular 353 and the SAM AIC on the new identification. The change will be RNAV (GNSS) for RNP for PBN approach procedures.

3.16 That information is already coordinated with the Lima Office, to develop the Implementation Plan for Circular 353 in the SAM Region.

4. Suggested actions

4.1 The Meeting is invited to:

- a) Analyze the information provided in this Working Paper; and
- b) make comments and suggestions that can help in the development of the PBN TMA-SP Neo project.