



Agenda Item 2: Implementation of the Air Traffic Flow Management (ATFM) and Collaborative Decision-Making (CDM)

Interrelation between ATFM and PBN

(Presented by the Secretariat)

SUMMARY	
This working paper is intended to present information regarding the interrelation between ATFM and PBN and urge States to consider such interrelation in the implementation projects of both concepts	
REFERENCES:	
- SAM/IG meetings	
ICAO strategic objectives:	<i>A - Safety</i> <i>B - Air navigation capacity and efficiency</i>

1. Background

1.1 The SAM PBN Implementation Group (SAM/PBN/IG) was created by SAM/IG/1 (Lima, Peru, 21 to 25 April 2008), in order to develop guidelines for RNAV and RNP implementation processes in en-route, terminal area and approach phases, considering the performance based navigation (PBN) concept, in accordance with ICAO strategic objectives, Global Plan Initiatives (GPI) and the CAR/SAM PBN route map.

1.2 Likewise, the SAM ATFM Implementation Group (SAM/ATFM/IG), was created by SAM/IG/1 in order to develop specific studies and guidelines for the implementation of a SAM system of Air Traffic Flow Management, according with ICAO strategic objectives and the Global Plan Initiatives in this matter (GPI 1, 6 and 7).

1.3 After about 6 years since the First SAM/IG Meeting, both groups have already made progress in their work programme, supporting the implementation of PBN and ATFM in the SAM Region. The current status of these groups indicates that the conditions are already given to provide States guidelines to favor the capacity, efficiency and safety of air navigation by the adequate interrelation between the PBN and ATFM concepts.

2. Analysis

2.1 The Airspace Concept provides an operational scheme in an airspace developed to satisfy explicit strategic objectives such as the improvement of safety, the increase of air traffic and the environment impact mitigation capacity, etc. The airspace concept should include details of airspace practical organization, based on user characteristics as well as on CNS/ATM infrastructure available or to be implemented.

2.2 For TMA operations, the airspace concept involves implementation of SID and STAR, trying to avoid conflicts between arrivals and departures, favoring aircraft flying at optimum profiles with the application of Continuous Descent Operations (CDO) and Continuous Climb Operations (CCO). Moreover, STARs should be connected to APV procedures as far as possible.

2.3 The PBN application for the development of airspace concepts will provide the necessary tools for the reduction of flown distances, for the implementation of CDO and CCO concepts, as well as for the link between STAR RNAV/RNP and APV procedures.

2.4 The PBN trajectory predictability permits the use of more departure and arrival points in a TMA, reducing the flown distance and consequently, lowering the fuel consumption and gas emissions damaging the environment. Nevertheless, the increase of trajectories demands the use of “altitude windows for crossings”, establishing adequate specific altitudes for aircraft arriving and departing from TMA.

2.5 Nevertheless, the PBN based airspace concepts as mentioned before, depend mostly on an adequate air traffic flow management, with the corresponding strategic, pre-tactic and tactic ATFM measures. The interaction between RNAV/RNP arrivals and departures, with CDO/CCO and an adequate link between STAR and approach, depends on a sequence of optimized departures and arrivals for which the air traffic controller should use radar vectors only on punctual situations.

2.6 Besides not permitting flights on their optimum profiles, another damaging consequence of using radar vectors in a “PBN environment” with a major number of trajectories, is the work overload faced by air traffic controller in order to guarantee the separation between aircraft, taking into consideration that the new trajectories used with radar vectors are not “guaranteed” by the “altitude windows for crossings”.

2.7 The strategic ATFM measures should provide an optimum air traffic flow, avoiding TMA overload, as well as enabling the application of pre-tactic and mainly tactic ATFM measures that guarantee an optimum sequence of arrivals and departures. Thus avoiding the application of radar vectors and holdings, among other measures, leading aircraft not to comply with their optimum flight profiles.

2.8 A simple example (only for illustration, without precise calculation) would be the case of a TMA covering only one airport, with only one runway. Supposing that the separation between successive approaches is 5 NM and that there are 4 entry points in a TMA with constant flow, the FMP/FMU should coordinate with the ATC dependencies in order to apply further measures to permit an adequate air traffic sequence, thus allowing that the air traffic concept operates adequately:

- “Miles-in-trail (MIT) not less than 20 NM in each entry point; or
- “Minutes-in-trail (MINIT)” not less than 2.5 minutes in each entry point. The application of MINIT should consider the use of “Required Time of Arrival” of FMS in aircrafts, aiming to an adequate sequence of air traffic for TMA.

3. Suggested action:

3.1 The meeting is invited to:

- a) Discuss strategic, pre-tactic and tactic ATFM measures which could facilitate the application of PBN airspace concepts;
- b) Update ATFM action plan in order to include activities that facilitate the integration between PBN and ATFM.