



ICAO

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(SAT/23)**

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**Agenda Item 2.2: EUR SAM Airspace Corridor**

**PBCS IMPLEMENTATION IN THE EUR-SAM CORRIDOR AIRSPACE**

*(Presented by ENAIRE)*

SUMMARY
This working paper offers initial steps to introduce PBCS concept in EUR SAM Corridor, as main issue to achieve objectives agreed for EUR/SAM CORRIDOR AIRSPACE PROJECT, regarding time based longitudinal separation minima.
REFERENCE(S):
Related ICAO Strategic Objective(s):

**1. INTRODUCTION:**

During SAT 21 a group was tasked to update the actual “EUR/SAM Corridor Airspace Concept”. This group, or task force, was composed by focal points from EUR/SAM corridor members States/ANSPs (Brazil, Cape Verde, Senegal, Spain), SATMA, ICAO (WACAF & SAM) and IATA.

This responsible team, called ESCIT (EUR-SAM Corridor Implementation Team), with Portugal leading, met in several videoconferences in order to define milestones and establish a main schedule for the project, so it could be coordinated and forwarded in a proper time scale.

In between SAT21 and the second ESCIT videoconference, some ICAO relevant information regarding PANS-ATM doc.4444 approvals appeared, so, during SAT22 (Paris, 7-9 June, 2017), ENAIRE proposed that, perhaps, some intermediate objectives should be reanalyzed and, in case, reformulated.

Consequently, the EUR/ SAM Corridor Airspace Concept Action Plan was amended to be in line with a new PANS-ATM doc.4444, and the concept of PBCS with time-based longitudinal separation minima was introduced.

Based in new ICAO documentation, a five (5) minutes longitudinal separation may be applied, under certain conditions.

- RNP: Required Navigation Performance
- RCP: Required Communication Performance
- RSP: Required Surveillance Performance

<i>Mínimas de separación</i>	<i>RNP</i>	<i>RCP</i>	<i>RSP</i>	<i>Máximo intervalo de notificación periódica de ADS-C</i>
93 km (50 NM)	10	240	180	27 minutos
	4	240	180	32 minutos
55,5 km (30 NM)	2 o 4	240	180	12 minutos
5 minutos	2 o 4 o 10	240	180	14 minutos

## 2. DISCUSSION:

2.1 RNP10 is a prerequisite already met in EUR/SAM Corridor, implemented at the same time of RVSM. As a new time-based criteria was adopted by SAT member, it should be a matter for ESCIT (EUR-SAM Corridor Implementation Team) to define what RCP and RSP requisites implies for operators in the corridor (apart of fulfilling flight plan codes), and how ANSPs Systems should be updated or configured.

2.2 RCP240 assumes that the communication system bound to enable the application of the 5 minutes separation minima shall allow a controller, within 4 minutes, to intervene and resolve a potential conflict by contacting an aircraft using an alternative communication. An alternative means shall be available to allow the controller to intervene and resolve the conflict within a total time of 10.5 minutes, should the normal means of communication fail.

2.3 In that sense, EUR/SAM States should verify that any ATC-Pilot communication based in DataLINK (CPDLC) has always a backup to a Direct Voice Communication (VHF or HF), so an immediate alternative communication is available at any time. Obviously, this communication aim backup has been a prerequisite long time before this project.

2.4 RSP180. When a ADS-C periodic or waypoint change event report is not received within 3 minutes of the time it should have been sent, the report is considered overdue and the controller shall take action to obtain the report as quickly as possible, normally by ADS-C or CPDLC. If a report is not received within 6 minutes of the time the original report should have been sent, and there is a possibility of loss of separation

with other aircraft, the controller shall take action to resolve any potential conflict(s) as soon as possible. 2.5 The communication means provided shall be such that the conflict is resolved within a further 7.5 minutes. The ANPs system should guarantee that ATCs are aware about delayed reports. If a report exceeds three minutes over the normal time, the ATC should be aware, so any action (report demand) may be initiated. If the report exceeds six minutes, ATC should be notified in order to apply separation security actions. A color or size code could be used so signal changes appearance when the plot has not been refreshed in the agreed time (3 m or 6 min).

2.6 When information is received indicating ground or aircraft equipment failure or deterioration below the communication, navigation and surveillance performance requirements, ATC shall then, as required, apply alternative separation minima.

2.7 The first three steps of PROJECT: EUR/SAM CORRIDOR AIRSPACE CONCEPT, regarding “5 minutes LSM based on RSP/RCP/RNP10” are:

- EUR/SAM\_1.1: Doc4444 5.4.2.9 “Longitudinal separation minima” in National Regulations
- EUR/SAM\_1.2: RNP10/RSP180/RCP240 (ANSP Requirements - Operators Requirements)
- EUR/SAM\_1.3: Evaluation of ADS-C/CPDLC Ground Systems (RCP/RSP) for DLink Mandate feasibility

2.8 Both EUR/SAM\_1.1 and EUR/SAM\_1.2 are out of ANSPs scope and responsibility. Nevertheless, ICAO sent a letter to States urging to include Doc4444 amendments and publication of procedures for Aircraft to certificate PBCS, as matters to be addressed by national regulators. So, meanwhile, in this administrative parenthesis, what SAT group should be meant to do is focus on EUR/SAM\_1.3 (in order to evaluate existing ADS-C/CPDLC Ground Systems (RCP/RSP) in EURSAM Corridor) and anticipate issues related to operational procedures and safety requisites. That should be traduced in a shortage of time to start with implementation as soon as possible. Move forward with actions no dependent of certification procedures.

#### *ICAO Circular 343*

2.9 ICAO Circular 343 contains detailed information on the analysis used to determine these separation minima and monitoring procedures. Guidelines for the Implementation of Performance-based Longitudinal Separation Minima (Circular 343). As main principles, without going deeper at that stage of the project, we will juts refer to point 3.21- CONCLUSIONS of the circular.

2.10 There is a requirement for a region or State to undertake an implementation safety assessment. In principle, this comprises two parts, namely, a safety assessment for navigation performance and a hazard assessment. In practice, only a hazard assessment needs to be performed for any local implementation since the safety assessment for the navigation performance under the various navigation specifications is valid for any implementation. The hazard analysis is to identify hazards and related mitigation measures that are specific to the local situation.

2.11 SATMA, as Monitoring Agency will deal with the Regional EUR/SAM Safety Assessment for the implementation of 5 minutes Longitudinal Separation Minima, based on CRM (ICAO model), with data and information to be provided by States when demanded.

2.12 As no data related to 5 Separation minima in the corridor will be available, SATMA will work dealing with proper similar scenarios and estimating the more conservative hypothesis for a suitable implementation. At that time, States collaboration providing FANS data and equipment performance in a periodical base will be a requisite.

2.13 On the other hand, if analyzed deeply, all hazards established in Circular 343 (Annex 1) are no more than items to verify in an area with ADS/CPDLC in use. As FANS and DLink has been used in EUR/SAM corridor for years, after trials and tests, FANS operations has reached implementation maturity in all States. So, RSP180 and RCP240 flexible configuration should be already mostly implemented in their systems.

2.14 Actions regarding FPL filling and activation and correct use of onboard equipment remains on pilots and air companies. Only the interchange of correct data between ATCs regarding FANS capabilities (when error detected in FPL) seems to be a real responsibility for ANPs.

#### *RSP180 –Canarias ACC*

2.15 Canarias SACTA System for Traffic control is nowadays configured to accept ADS-C plots with a maximum delay of 180 seconds. If an ADS-C report is delayed in more than 180 seconds is not accepted, and the plot on screen would be maintained, but changed to a presentation of “low quality” (bigger size of blue square). If a second delay or lost occurs the ADS plot would be cancelled and ATC must demand a new report from the aircraft.

2.16 On the other hand, at least at initial implementation, it should be determined a more accurate periodic contract, (15 minutes up today), as the system allows a configuration of 2 minutes between periodic reports.

#### *Operational Procedures*

2.17 The implementation of 5 LSM in the corridor will bring a new scenario for ATCs. The main aspect to consider is that the same flight level will be shared by PBCS certificated and PBCS non-certificated aircraft, and, consequently, both with different separation minima, so a proper use of levels will rely mainly on procedures. A main list of issues to be addressed by Sates involved from an operational point of view could be:

- AIC models
- Letters of agreements
- Traffic transfer between collaterals
- Flight level occupancy considerations
- ADS Contracts

2.18 The creation of a “Operational Procedures Task Force” (See Annex) to work in parallel to other project issues would be the optimal way to face procedure aspects.

#### *Implementation considerations*

2.19 When undertaking a regional, State or local safety assessment, the following process is provided as guidance (ICAO Circular 343):

- Step 1: Undertake widespread regional consultation with all possible stakeholders and other interested parties.

- Step 2: Develop an airspace design concept or ensure that the proposed separation minima being implemented will fit the current airspace system and regional or state airspace planning strategy.
- Step 3: Review this circular noting specific assumptions, constraints, enablers and system performance requirements.
- Step 4: Compare assumptions, enablers, and system performance requirements in this circular with the regional or State's operational environment, infrastructure and capability.
- Step 5: If a region, State or ANSP has determined that the change proposal for that region or State is equal to or better than the reference, requirements and system performance in this circular, then the region or State must undertake safety management activities including:
  - a) formal hazard and consequence(s) identification, and safety risk analysis activities including identification of controls and mitigations;
  - b) implementation plan;
  - c) techniques for hazard identification/safety risk assessment which may include:
    - i. the use of data or experience with similar services/changes;
    - ii. quantitative modeling based on sufficient data, a validated model of the change, and analyzed assumptions;
    - iii. the application and documentation of expert knowledge, experience and objective judgment by specialist staff; and
    - iv. a formal analysis in accordance with appropriate safety risk management techniques as set out in the Safety Management Manual (Doc 9859).
  - d) identification and analysis of human factors issues identified with the implementation including those associated with Human Machine Interface matters; e) simulation where appropriate; f) operational training; and g) regulatory approvals.
- Step 7: Develop suitable safety assessment documentation including a safety plan and associated safety cases.
- Step 8: Implementation activities should include:
  - a) trial under appropriate conditions;
  - b) expert panel to undertake scrutiny of proposals and development of identified improvements to the implementation plan;
  - c) develop an appropriate backup plan to enable reversion if necessary; and
  - d) continuous reporting and monitoring results of incidents, events and observations.
- Step 9: Develop suitable post-implementation monitoring and review processes.

### *SATMA Monitoring*

2.20 Regional PBCS monitoring responsibility has been arised in ICAO RMAs meetings. In fact, a task was commanded to NAARMO in order to “Coordinate with the ICAO CP-OPDLWG on potential updates to the ICAO Doc 9896 and ICAO Doc 9937 to reflect expanded role of RMAs in support of regional PBCS monitoring programs (Target Date: December 2017).

On the other hand, point 2.1.6 of ICAO Doc 10063 (2017 Edition) remarks that “At Regional level, those functions (a, b) could be assumed by States and Regional RMAs, already established for evaluation and supervision of operational safety.

- a) Operational safety supervision related to Longitudinal Separation minima performance required in the responsibility area

- b) Adopt necessary options, in case of minima application, when operational performance doesn't comply with the reference level established in the system design

2.21 During next RMACG 13 (Brazil 11-15 June) this and other items regarding RMAs responsibilities will be discussed and (perhaps) concluded. SATMA will inform SAT group properly.

### **3. ACTION BY THE MEETING:**

3.1. The meeting is invited to:

- a) Create the “5 minutes Operational Procedures” task force;
- b) Provide Data for 2018 SATMA Safety Assessment (to include 5 minutes LSM); and
- c) States to verify ATC awareness and RSP180 availability on ADS-C Systems report delays.

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