



Agenda Item4: Air traffic management (ATM)

RNP 4 IN THE EUR/SAM CORRIDOR

(Presented by SATMA)

SUMMARY

The main aim of this working paper is to present a tentative roadmap to implement RNP 4 in the EUR/SAM corridor.

1. INTRODUCTION

The main aim of this working paper is to present a consolidated study on the implementation of RNP4 in the EUR/SAM corridor and to establish an implementation working plan.

Currently, RNP 10 supports 50NM lateral and 80NM (or 10 minutes) longitudinal separation and RNP 4 implementation would allow 30NM lateral and 30NM longitudinal separation.

2. BACKGROUND

It is well known that RNP 4 implementation is a target of the working programme of IAS/SG. In this line, during last SAT meetings there have been several working papers, references and decisions related to the implementation of RNP 4 in the EUR/SAM Corridor:

- SAT14/TF1/Decision 11 (2009-Cape Verde): That EUR/SAM Corridor States and ANSPs agree on the need of RNP 4 (30/30NM) implementation strategy;
- SAT15/FIT5/Decision 3 (2010-Lisbon): That IATA and ACC units encourage Airlines to increase their level of participation in ADS-C/CPDLC operations in order to enhance safety and efficiency of operations within the SAT and specially within the EUR/SAM corridor;
- Based on previous discussion, it was decided by SAT States to develop a task in accordance with the following terms (Decision SAT 16/06 -Brazil):
 - *It is agreed by all EUR SAM States that consolidation of FANS1/A aircraft facilities, prior to RNP 4 fleet certifications, should be a prerequisite for the implementation of RNP 4 in the area.*

- *SATMA will contact States and IATA to compile data and information required to achieve a cost/benefit study based on the following hypothesis:*
 - a) *Results in terms of time and average of FANS1/A equipped & RNP 4 certified aircraft on traffic growth expected;*
 - b) *Impact of "FL, Route or Airspace" restrictions for low average of FANS1/A equipped & RNP 4 certified aircraft:*
 - c) *Increase average of optimal levels per period /peak time set;*
 - d) *ATC/Pilots Work load impact;*

The cost/benefit analysis will be submitted to SAT Group for further actions".

- SAT17/Conclusion 11, in order to achieve the implementation of RNP 4, SAT States concluded that:
 - SATMA and SAT States initiate the study for a mandatory target date for aircraft FANS equipage on the routes in the corridor in close coordination with NAT region;
 - IATA will assist with the data.
- SAT18/Conclusion 14, in order to achieve the implementation of RNP 4, SAT States concluded that:
 1. SATMA consolidates the study on the implementation of RNP4 in the EUR/SAM corridor and establishes an implementation working plan describing:
 - a. The responsibilities and tasks of all stakeholders (ANSPs, States, Operators);
 - b. Milestones and corresponding timelines;
 - c. Ways and means to conduct the required pre-implementation safety assessment.
 2. SATMA will contact States, ANSPs and IATA to compile data and information required.

3. PROPOSED ROADMAP FOR EUR/SAM CORRIDOR (SAT18)

In order to accomplish with SAT17 decisions, SATMA recommended SAT members in SAT18 to follow these next steps:

3.1 EUR/SAM Corridor Data Link Mandate

This data link mandate would be implemented during **2015**, with all aircraft operating in corridor between FL330 to FL390 inclusive, being required to be fitted with and using CPDLC and ADS-C equipment. This measure would have the following effects:

- Optimum flight level assignment to equipped and connected aircrafts.
- Reduced minimum longitudinal and lateral separation of 50NM based on RNP 10 and use of ADS-C and CPDLC from FL330 to FL390.

This plan would require a previous analysis, including its respective CRM, trials and consolidation of operation.

3.2 EUR/SAM Corridor PBN implementation plan

This PBN implementation plan should consist of:

- RNP 10 and RNP 4 differentiated airspace structure:
 - RNP 4 airspace from FL360 to FL390 based on ADS-C and CPDLC compliance, reduced lateral and longitudinal separation to 30NM and an extended set of new RNP 4 airways;
 - RNP 10 airspace from FL330 to FL350 based on ADS-C and CPDLC compliance, reduced lateral and longitudinal separation to 50NM and the existing set of airways;
 - RNP 10 airspace bellow FL330 with no ADS-C and CPDLC compliance, lateral and longitudinal separation of 80NM and the existing set of airways.
- A full implementation of this plan would be accomplished during 2016.

The aim of this plan would be to implement reduced separation and optimum performance for better equipped aircrafts, while still compatible with the operation in the EUR/SAM corridor for worse equipped aircraft. Thus, there would be three different degrees of performance according to the “best equipped best served” statement.

4. CURRENT STATUS IN EUR/SAM CORRIDOR (2013)

Before developing any implementation plan, it is necessary to know the current status and possible issues that could limit the implementation.

As it has been described in previous SAT meetings, the main aspects which limit the implementation of RNP4 are described in next sections.

4.1 FLEET CAPABILITIES IN EUR/SAM CORRIDOR

There is a lack of a global database of aircraft capabilities, both FANS 1/A and RNP4, in EUR/SAM Corridor. The unique existing data is collected by SATMA and reported by ENAIRE that shows data relative to the performance and use of FANS services since 2010. This data concerns only aircraft flying in the UIR Canarias from/to the EUR/SAM Corridor.

An abstract of the reported data in SAT/FIT/9 by ENAIRE is shown herein:

Traffic Data	2013			2012	2011	2010
	Maximum	Minimum	Mean	Mean	Mean	Mean
Number of connected flights	1518	1271	1400	1651	1601	1601
Percentage referred to total number of flights in the EUR/SAM Corridor ¹	57,66%	52,80%	55,13%	59,97%	61,37%	61,37%
Percentage referred to flights in the EUR/SAM Corridor indicating data link and ADS capacity in the Flight Plan	97,80%	93,42%	95,36%	95,44%	97,99%	97,99%
Number of flights with CPDLC connection (Monthly average)	1460	1204	1335	1526	1525	1525

Table 1: Traffic data summary

The main conclusions obtained from this study are the following:

- Approximately **60%** out of the total flights within EUR/SAM Corridor are FANS equipped flights.
- Almost every equipped flight connected to SACCAN² (**95%**).
- The majority of logged-on flights exchanged CPDLC information (**95%**).
- **Trend of figures is kept since 2010.**

The previous data considers only traffic over flying the UIR Canarias from/to EUR/SAM Corridor. Therefore the traffic flows which fly SANTA MARIA OCEANIC directly Cape Verde/Dakar or

¹ Traffic over flying the UIR Canarias from/to EUR/SAM Corridor

² SACCAN: ADS/CPDLC System in the Canarias FIR.

UR976/UA602 have been not considered (approximately 600 flights per months). Thus, there is not a global figure concerning fleet capabilities in the EUR/SAM Corridor.

Additional data sources could be used by SATMA in order to complete the previous study, for instance, the equipment and capabilities (item 10/18) of each presented flight plan. However, this data source has also some limitations:

- This data is received by ATFN. Normally, a unique flight has several messages and then it needs to be validated by the ATC System or similar. Besides, Spain only has the flight plans crossing its airspace jurisdiction. Likewise, EUROCONTROL could provide similar information but only for traffic from/to the ECAC area.
- This data only contains the presence of relevant serviceable equipment on board the aircraft which are commensurate with flight crew qualifications and where applicable. Nowadays it is exclusively required RNP10. Therefore others capabilities, like RNP4, could not be reflected in the flight plan.

On the other hand, there is also a lack of Acceptable Means of Compliance (**AMC**) to certificated RNP4. Most of CAAs require an AMC to provide the certification. Hence, Air Europa and Iberia, that mean the 12% of total traffic, are not certificated.

In addition, the **uselessness** for EUR/SAM Corridor (currently there are not operational benefits) and other areas (e.g. nowadays in North Atlantic it is not required) confirm that **the evolution of this certification will be slow and progressive during several years**.

This data is the key one to determine the milestones of the RNP4 implementation plan. Taking into account that the unique source shows that the approximately **60%** out of the total flights within EUR/SAM Corridor are FANS equipped flights, SATMA proposes:

- Each ASNP, if needed, will contact with its CAA in order to establish the needed mechanisms related to RNP4 certifications.
- SATMA will perform, from flight plans provided for each ASNP, a deep and global study of fleet capabilities in the EUR/SAM Corridor.
- IATA/SATMA will contact with the airlines in order to complete the previous document (fleet capabilities).
- To review the date for EUR/SAM Corridor Data Link Mandate (see the suggested new road map).

4.2 GROUND SYSTEMS UPGRADING

Next table summaries the requirements for RNP4 related to the Air Navigation Service Provider (ANSP):

NAV	COM	SUR
Based on GNSS .	Direct controller-pilot voice communications or CPDLC	ADS C in accordance with determinate specifications

Table 2: Requirements for ANSP

In this regard, the status of implementation of ADS-C/CPDLC ground systems in the EUR/SAM corridor is fully operational.

However, in accordance with the report provided by CFRA in the period 2010-2013, there are several operational issues, such as the following ones, that should be addressed:

- Problems with A/C Log-On due to different causes;
- Flight Plans with incorrect aircraft registration;
- Reception of Not Current Data Authority.

These operational issues could mean the loose of direct controller pilot communications with any aircraft, and therefore a contingency situation for the ATCs in a RNP4 environment. Likewise, there has not been ADS/CPDLC issues registered nor harmonization of ADS/CPDLC procedures between states, etc., which denotes that CFRA is not in full operation yet.

SAMTA/CFRA proposes to collect the needed data of each member of EUR/SAM corridor to establish a roadmap for the improvement of ATC System (improvements already done, planned and ongoing).

5. PROPOSAL OF ROADMAP FOR EUR/SAM CORRIDOR

In order to accomplish with the SAT decisions mentioned above and taking into account the current status of EUR/SAM Corridor as well as the defined dates/targets in NAT Region, SATMA recommends SAT members to follow these next steps:

5.1 EUR/SAM Corridor Data Link Mandate

This data link mandate will be implemented at the beginning of **2017**, with all aircraft operating in corridor between FL330 to FL390 inclusive, being required to be fitted with and using CPDLC and ADS-C equipment. This measure would have the following effects:

- Optimum flight level assignment to equipped and connected aircrafts.
- Reduced minimum longitudinal and lateral separation of 50NM based on RNP 10 and use of ADS-C and CPDLC from FL330 to FL390.

In order to achieve this plan, several activities must be accomplished:

- 1 Determine that the proposed flight levels are aligned with the operation. Global study of fleet capabilities in the EUR/SAM Corridor, to be performed by SATMA, will include this requirement;
- 2 The respective Collision Risk Model analysis for 2014, based on the traffic of the six first months of 2014, will include an estimation of risk for this mandate. In other words, SATMA will perform a CRM analysis considering that all aircraft, operating in corridor between FL330 to FL390, will be fitted with and using CPDLC and ADS-C equipment;
- 3 Before the implementation, a period of trials could be established to apply the reduced separation, if needed;
- 4 During 2016, LoA between SAT involved members must be updated. Likewise CFRA must coordinate the implementation of ADS/CPDLC procedures and configurations: e.g. LoA between states, the indicated periodic reporting intervals (27 minutes as maximum), etc. CFRA would present all these procedures, configurations during SAT/FIT11 (2016);
- 5 To publish an AIC at the end of 2016. SATMA will present the AIC during SAT 21 (2016) where the implementation date shall be agreed.

IATA, SATMA, CAAs and ASNPs will disseminate all information about this mandate as far as possible.

5.2 EUR/SAM Corridor PBN implementation plan

The PBN implementation plan should consist of:

- RNP 10 and RNP 4 differentiated airspace structure:
 - RNP 4 airspace from FL360 to FL390 based on ADS-C and CPDLC compliance, reduced lateral and longitudinal separation to 30NM and an extended set of new RNP 4 airways;
 - RNP 10 airspace from FL330 to FL350 based on ADS-C and CPDLC compliance, reduced lateral and longitudinal separation to 50NM and the existing set of airways;
 - RNP 10 airspace bellow FL330 with no ADS-C and CPDLC compliance, lateral and longitudinal separation of 80NM and the existing set of airways.
- A full implementation of this plan would be accomplished during **2018-2020**. Obviously, the timelines for EUR/SAM Corridor PBN implementation plan will depend directly on the previous step.

This plan allows to have reduced separation and optimum performance for better equipped aircrafts, while still compatible with the operation in the EUR/SAM corridor for worse equipped aircraft. Thus, there would be three different degrees of performance according to the “best equipped best served” statement.

As it has been mentioned before, the first step of this phase is to define and approve the new airways structure. SATMA will present in 2016 a detailed RNP 4 airspace structure which must be analyzed and approved in 2017, by the SAT members. This RNP 4 airspace structure will consider both, the new structure inside the corridor and the interface with the adjacent airspace (SBAO ATS routes network and GCCC/GMMM interface).

6. COMMON TASKS

The previous plan must be completed with:

- a. The promotion of real implementation of Central FANS 1/A Reporting Agency (CFRA). Note that nowadays there are many technical and operative issues related to FANS 1/A and a lack of global data: aircraft capabilities, incidents, etc;
- b. To provide the required operational information: flight plans and LHD's in time and format;
- c. To encourage operators to take the necessary steps to obtain RNP 4/ FAN 1A approvals for suitably equipped aircrafts in their fleets;
- d. Monitoring and reviewing the agreed and consolidated roadmap of the improvements for EUR/SAM Corridor.

7. SUMMARY OF MILESTONES AND TIMELINES

In accordance with the previous roadmap, the main milestones, timelines and tasks are summarized below:

- Preliminary but essential activities:
 - a. Delivery of Flight Plans (6 first months of 2014). October 2014 – All SAT involved members. **Activity already done by all states.**
 - b. Delivery of LHD's for 2014. January 2015 – All SAT involved members.
 - c. SATMA will analyze and process both data: CRM analysis for Data Link Mandate. **SATMA.**
- During SAT 20/2015:
 - a. CRM Analysis – Current Situation. **SATMA.**
 - b. CRM Analysis based on FANS 1/A mandate. **SATMA.**
 - c. Global study of fleet capabilities in the EUR/SAM Corridor. **SATMA/IATA.**
 - d. Review and monitoring of the RNP4 roadmap. **SATMA**

During SAT20/FIT10 2015:

- e. Analysis of FANS services in the EUR/SAM Corridor. **CFRA.**
 - f. Harmonization of procedures to avoid technical and operational issues. **CFRA.**
 - g. Roadmap of improvements for ATC Systems. **CFRA.**
- During SAT 21/2016
 - a. Harmonization of changes on LoA in accordance with new separation values. **SATMA.**
 - b. AIC - EUR/SAM Corridor Data Link Mandate. **SATMA.**
 - c. "Go" establishing the Implementation Date or "No Go". SAT Members.
 - d. Detailed new RNP 4 airways structure. **SATMA**
 - e. Review and monitoring of the RNP4 roadmap. **SATMA.**

During SAT21/FIT11 2016:

- a. Analysis of FANS services in the EUR/SAM Corridor. **CFRA.**
 - b. Harmonization of changes on ATC systems in accordance with new separation values. **CFRA.**
- During SAT 22/2017:
 - a. Review and monitoring of the RNP4 roadmap. **SATMA**
 - b. Approval of new RNP 4 airways structure. SAT Members.
 - c. Preliminary operational assessment of the new structure in service in the EUR/SAM Corridor during 2017. **SATMA.**
- During SAT/FIT12 2017:
 - a. Preliminary analysis of FANS services in the EUR/SAM Corridor during 2017. **CFRA.**

8. ACTIONS BY THE MEETING

The SAT19 Meeting is invited to:

- a) Take note of the information provided in this working paper.
- b) To approve the proposed plan. In order to plan and achieve the previous roadmap, SATMA requires:

1. "SAT19/x Decision, where this implementation plan and roadmap is approved."
2. **Before November 2014**, each SAT member shall send to ICAO and SATMA an official approval of this roadmap and a commitment for the data link mandate implementation at the beginning of 2017, with all aircraft operating in corridor between FL330 to FL390 inclusive, being required to be fitted with and using CPDLC and ADS-C equipment.

If this approval is not received on time, SATMA shall understand that both, roadmap and all associated tasks are cancelled.