INTERNATIONAL CIVIL AVIATION ORGANIZATION

Seventh Meeting of Civil Aviation Authorities of the SAM Region (RAAC/7)

(Salvador, Bahia, Brazil, 1-3 July 2002)

Agenda Item 4: **Transition to the ATM/CNS systems**

a) **Pre-operational trials**

(Presented by the Secretariat)

Summary

This working paper provides the civil aviation authorities of the South America Region with a summary of developments during the pre-operational trials and demonstrations and implementation of RNAV routes in the CAR/SAM Regions, for their consideration.

References:

- Report of the CAR/SAM/3 RAN meeting
- Report of the RAAC/6 meeting
- Reports of the AP/ATM/1 and AP/ATM/2 meetings

1. Introduction

1.1 In keeping with the planning by the CAR/SAM Regional Planning and Implementation Group (GREPECAS), subsequently endorsed by the Third CAR/SAM RAN (CAR/SAM/3 RAN) Meeting, the decision was made to carry out pre-operational trials and demonstrations for long-haul flights between city pairs, to enable the gradual introduction of CNS/ATM elements in the CAR/SAM Regions and the use of avionics already installed on aircraft, thus allowing users to obtain substantial flight time and fuel savings.

1.2 In keeping with the above, the Sixth Meeting of Civil Aviation Authorities of the SAM Region (RAAC/6), Panama, 18-20 August 1999, declared that it was fully satisfied with the work being done by GREPECAS toward implementing CNS/ATM, and with regional CNS/ATM transition activities being carried out by Regional Project RLA/98/003.

1.3 In this respect and as a reaffirmation of the above, the RAAC/6 formulated Conclusion 6/6 – Support to regional CNS/ATM activities, which, in items b) and c), urges SAM States to give their utmost support to RNAV route trials and demonstrations and to Regional Project RLA 98/003 - “Transition to the CNS/ATM Systems in the CAR and SAM Regions”.

1.4 It was precisely within the framework of Regional Project RLA/98/003 that the First Meeting of Air Traffic Management (ATM) Authorities and Planners was held in Lima, Peru, on 18-21 July 2000, which decided to conduct pre-operational trials and demonstrations on three RNAV routes selected for implementation (Santiago-Lima/Miami, which includes the Guayaquil, Bogotá and Panama FIRs, Sao Paulo/Miami and Rio de Janeiro/Miami).

1.5 Continuing with this task, the second meeting of Air Traffic Management Authorities and Planners (AP/ATM/2) implemented three more routes (Buenos Aires/Miami, Sao Paulo/Los Angeles and Sao Paulo-Rio de Janeiro/New York).

1.6 As stated above, the tasks carried out by the two meetings have resulted in the implementation of pre-operational trials and demonstrations on six (6) RNAV routes and the process for their incorporation into the ATS route network of the CAR/SAM ANP and their definitive implementation has been started.

1.7 Furthermore, and as a result of the discussions held at the GREPECAS 10 meeting, another six RNAV routes were presented to the AP ATM/3 Meeting (Lima, Peru, 20-24 May 2002) and a new implementation programme was approved for 5 of the 6 proposed routes.

1.8 This meeting also agreed to carry out pre-operational trials on RNP assignment on parallel routes UL 780 and UL 302 between Santiago and Peru, which will provide CAR/SAM Offices with the necessary experience for RNP implementation.

2. Analysis

2.1 The meetings of Air Traffic Management Authorities and Planners, in examining proposals to conduct trials and demonstrations on RNAV routes, through an ample discussion and exchange of opinions, analyse the operational aspects and the possible impact of these trials on the airspace structure of the States involved, as well as matters relating to communications between the ACCs involved and the aeronautical mobile service.

2.2 Project RLA/98/003 has turned out to be an excellent tool for implementation and assistance to States/Organisations and at the same time has benefited users both technically and economically. The **Appendix** to this document shows the savings estimated by Project RLA 98/003 for RNAV routes implemented to date. According to information provided by IATA to the Third Meeting of ATM Authorities and Planners, savings in the Sao Paulo/Los Angeles route would be as estimated by the project. However, in the Buenos Aires/Miami route, savings reached approximately US$2’800,000, a figure greater than previously estimated.

2.3 The information supplied by IATA with regard to the benefits obtained by users shows that not only have the economic results been better than had been estimated earlier, but also, more important, improvements have been made which have a direct impact on safety. The main benefits obtained include the following:

a) Reduction of flight distances and times.
b) Significant savings of fuel and, consequently, of money.
c) Greater possibilities for attaining optimum flight levels.
d) Paths far from mountainous areas.
e) Flexible use of airspace by permitting the overflying of restricted areas and special use airspace.

f) Uniform application of longitudinal separation.
g) Improvement of some shortcomings and deficiencies in ground/air and ATS speech communications.

2.4 Insofar as the responsibility of civil aviation administrations is concerned, it should be recalled that it is not advisable to make isolated improvements in CNS/ATM systems, but rather they should be as co-ordinated as possible between adjacent administrations.

2.5 Despite successful RNAV route implementation, the co-ordination process has revealed that some factors are affecting it and should be corrected for a timely implementation of the RNAV routes proposed for the CAR/SAM Regions:

a) There is a tendency to assign the starting/end points of the proposed RNAV routes at a single point for all routes coming from the same sector, at already existing points and/or on FIR boundaries. This would make it impossible to implement parallel routes to relieve traffic congestion or to enable aircraft to fly at their optimum flight levels;
b) There are restricted and prohibited airspaces that affect some of the paths of the proposed RNAV routes and that significantly increase the distances to be flown; this requires close civil-military co-ordination; and
c) The preferred method is to incorporate the new RNAV routes into already existing arrival and departure paths, which suggests that the Administrations are not making a thorough analysis of the already existing conventional ATS routes that coincide with or are close to the proposed RNAV routes.

2.6 This situation is due mainly to the fact that some States do not have a national programme for the implementation of RNAV routes, as well as the relevant study on the impact of the implementation of these routes on the airspaces and the efficient supply of air traffic services.

3. Conclusions

3.1 The evaluation of pre-operational trials and demonstrations has shown that it is possible to include tests of CNS elements, assign RNP values, conduct airspace safety assessments, update operational arrangements, carry out civil-military co-ordination, make arrangements for restricted and dangerous areas, draw up training programmes and make improvements in the provision of air traffic control services and in communication.

3.2 The meetings of CAR/SAM ATM authorities and planners would be the most appropriate mechanism for implementing regional RNAV route implementation programmes.

3.3 The implementation of new RNAV routes has had good economic results and has brought about improvements that have a direct impact on safety.

3.4 With the support of States and under the support of Project RLA/98/003, implementation of the different elements and functions included in the CAR/SAM air navigation plan and that will improve ATM in the Regions will continue.

3.5 It would be advisable for civil aviation administrations to develop national RNAV route implementation programmes that are consistent with the regional RNAV implementation programme and in which the scope of implementation and the possibility of assigning RNP values to the routes in question would be examined, the impact of implementation on air traffic management would be assessed and the relevant co-ordination would be established to ensure successful implementation.

4. Suggested action

4.1 The meeting is invited to take note of the information provided, examine the aspects presented in this working paper and, if applicable, agree upon the need to establish national RNAV route implementation programmes, so that the implementation of routes already started at regional level may be carried to its conclusion in an integrated, harmonious and timely fashion.

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APPENDIX A

ANNUAL SAVINGS ASSOCIATED WITH THE INTRODUCTION OF RNAV ROUTES AS ESTIMATED BY PROJECT RLA/98/003

Route	Conventional route distance	RNAV route distance	Difference	Time saved	Number of Aircraft	Total annual savings in U$S
Santiago Miami	**3653**	**3581**	**72**	**9 min**	**156**	**1,954,124**

Note 1: Total annual savings include aircraft operating cost and fuel savings.

Note 2: The number of aircraft represents the small, medium and heavy types of aircraft that operated on the route in question during the evaluation period.

Note 3: The period used in the example (two weeks) was **19 June to 2 July 2000.**

Note 4: The rated speed used was 480 knots.

Route	Conventional route distance	RNAV route distance	Difference	Time saved	Number of Aircraft	Total annual savings in U$S
Lima Miami	**2310**	**2266**	**54**	**6 min**	**91**	**854,042**

Note 1: Total annual savings include aircraft operating cost and fuel savings.

Note 2: The number of aircraft represents the small, medium and heavy types of aircraft that operated on the route in question during the evaluation period.

Note 3: The period used in the example (two weeks) was **19 June to 2 July 2000.**

Note 4: The rated speed used was 480 knots.

Route	Conventional route distance	RNAV route distance	Difference	Time saved	Number of Aircraft	Total annual savings in U$S
Guayaquil Miami	**1696**	**1689**	**27**	**3 min**	**30**	**142,717**

Note 1: Total annual savings include aircraft operating cost and fuel savings.

Note 2: The number of aircraft represents the small, medium and heavy types of aircraft that operated on the route in question during the evaluation period.

Note 3: The period used in the example (two weeks) was **19 June to 2 July 2000.**

Note 4: The rated speed used was 480 knots.

Route	Conventional route distance	RNAV route distance	Differ-ence	Time saved	Number of Aircraft	Total annual savings in U$S
Sao Paulo/ New York	**4168**	**4106**	**62**	**8 min.**	**98**	**1,712,826**

Note 1: Total annual savings include aircraft operating cost and fuel savings.

Note 2: The number of aircraft represents the small, medium and heavy types of aircraft that operated on the route in question during the evaluation period.

Note 3: The period used in the example (two weeks) was **19 July to 1 August 1999.**

Note 4: The rated speed used was 480 knots.

Route	Conventional route distance	RNAV route distance	Difference	Time saved	Number of Aircraft	Total annual savings in U$S
Sao Paulo/ Los Angeles	**5484**	**5350**	**134**	**17 min.**	**60**	**2,937,134**

Note 1: Total annual savings include aircraft operating cost and fuel savings.

Note 2: The number of aircraft represents the small, medium and heavy types of aircraft that operated on the route in question during the evaluation period.

Note 3: The period used in the example (two weeks) was **19 June to 2 July 2000.**

Note 4: The rated speed used was 480 knots.

Route	Conventional route distance	RNAV route distance	Difference	Time saved	Number of Aircraft	Total annual savings in U$S
Rio de Janeiro/ New York	**4239**	**4174**	**65**	**8 min.**	**24**	**519,957**

Note 1: Total annual savings include aircraft operating cost and fuel savings.

Note 2: The number of aircraft represents the small, medium and heavy types of aircraft that operated on the route in question during the evaluation period.

Note 3: The period used in the example (two weeks) was **19 July to 1 August 1999.**

Note 4: The rated speed used was 480 knots**.**

Route	Conventional route distance	RNAV route distance	Difference	Time saved	Number of Aircraft	Total annual savings in U$S
Buenos Aires/ Miami	**3926**	**3830**	**96**	**12 min.**	**123**	**1,541,942**

Note 1: Total annual savings include aircraft operating cost and fuel savings.

Note 2: The number of aircraft represents the small, medium and heavy types of aircraft that operated on the route in question during the evaluation period.

Note 3: The period used in the example (two weeks) was **19 June to 2 July 2000.**

Note 4: The rated speed used was 480 knots.

Operating cost per flight hour used to estimate savings in US$, according to the type of aircraft

Small aircraft:	2,100.00	(B 737-MD80)
Medium-size aircraft:	3,200.00	(A 320- B 757 - B 767)
Heavy aircraft:	6,600.00	(MD11 - B 747)

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