



International Civil Aviation Organization

NORTH AMERICAN, CENTRAL AMERICAN AND CARIBBEAN OFFICE

Twenty-Eighth Eastern Caribbean Working Group Meeting (28 E/CAR WG)

Montserrat, 26 to 30 April 2004

28 E/CAR WG – WP/07

15/04/04

Agenda Item 3: Specific Air Navigation Activities and Developments
3.5 Air Traffic Management (ATM)

ATM PROGRESS IN THE E/CAR

(Presented by the Secretariat)

SUMMARY

This Working Paper presents action proposals to continue with ATM Developments in the E/CAR area, keeping in mind the relevant results of the GREPECAS/11, NACC/DCA/1 and AP/ATM/6 Meetings.

References:

- Report of the First North American, Central American and Caribbean Directors of Civil Aviation Meeting (Grand Cayman , Cayman Islands, 8 – 11 October 2002)
- Report of the Eleventh Meeting of the CAR/SAM Regional Planning and Implementation Group (GREPECAS/11) (Manaus, Brazil, 3 – 7 December 2002)
- Report of the Sixth Meeting/Workshop of Air Traffic Management Authorities and Planners for the transition to the CNS/ATM Systems in the CAR/SAM Regions (AP/ATM/4) (San Jose, Costa Rica, 29 September – 3 October 2003)

1. Introduction

1.1 The Eleventh Meeting of the CAR/SAM Regional Planning and Implementation Group (GREPECAS/11) held in Manaus, Brazil, from 3 to 7 December 2002 agreed, among others, agreed conclusions related to RNP, RNAV Routes and RVSM implementation.

1.2 The First North American, Central American and Caribbean Directors of Civil Aviation Meeting held in Grand Cayman, Cayman Islands from 8 to 11 October 2002, agreed the working guidelines for the main ATM issues in the CAR Region through the following conclusions:

- **Conclusion 1/10** – National RNAV/RNP Implementation Programmes for the CAR Region

- **Conclusion 1/11** – Development of a National RVSM Implementation Plan in the States/Territories/COCESNA in the CAR Region
- **Conclusion 1/15** – Support for the continuing development and implementation of CNS/ATM Systems in the CAR Region
- **Conclusion 1/23** – ICAO Educational Event using Internet Technology

2. Analysis

RVSM

2.1 In the framework of the Air Traffic Management Authorities and Planners Meetings for the transition to the CNS/ATM Systems in the CAR/SAM Regions (AP/ATM), States/International Organizations have completed different tasks within the RVSM implementation programme, such as ATC simulation in different RVSM scenarios, ATC Training, for RVSM and RVSM Operational Requirements for ATC automated system, among others. This programme is planned to be concluded by the end of 2004, and the foreseen RVSM implementation date in the CAR/SAM Regions is 20 January 2005, in harmony with RVSM implementation in the NAM Region.

2.2 The ICAO NACC Regional Office has followed-up on the RVSM works carried out by the States/Territories/International Organizations for RVSM implementation in January 2005 in their corresponding jurisdiction of the Flight Information Regions (FIRs).

RNAV Routes

2.1 The last ATM/CNS/SG meeting reviewed and discussed an RNAV implementation action plan for CAR/SAM Regions. The final result of discussions is attached as **Appendix A** to this working paper, in particular, the RNAV work done to be presented for consideration by GREPECAS/12 Meeting for its possible approval and/or introduction of changes deemed pertinent.

2.2 Appendix A shows a list of trajectories requested by users with detailed information as regards to weekly operations, distance savings, annual fuel savings and operational costs savings for each one of the trajectories involved in the mentioned list. In this regard, the meeting made a thorough and detailed analysis of each one of the 63 trajectories that permits the identification of some segments that may be joined by only one RNAV route in the same FIR, or adjacent FIRs which distance between them is not longer than 200 NM, taking into consideration the cities located in the vicinity of SIDs/STARs. This would help to simplify airspace by not unnecessarily increasing the number of RNAV regional routes.

RNP implementation

2.3 In addition, the ATM/CNS/SG meeting discussed an RNP implementation action plan for the CAR/SAM Regions attached as **Appendix B** to this Working Paper, to be presented for consideration by GREPECAS/12 Meeting for its possible approval and/or introduction of changes deemed pertinent.

2.4 The meeting took into consideration airspace characteristics of the CAR/SAM Regions. There was a consensus that the only types of RNP currently applicable in both regions would be RNP 10 or RNP 4 for the oceanic airspace and RNP 4 or RNP 5 for the continental airspace.

2.5 Keeping in mind that there are still controversies that are being defined in the Air Navigation Commission Experts Groups on the application of RNP 4 and RNP 5, it was considered that the available RNP 5 could be applied within the CAR/SAM continental airspace. This would enable the use of the current infrastructure, in both ground and on-board, as applied in the EUR and MID Regions.

2.6 In this regard, it was also considered that the Caribbean airspace, due to its CNS infrastructure, has characteristics of a continental airspace and therefore RNP 5 could be applied in such an airspace. Current air traffic movement available at the CARSAMMA, as well as air traffic forecasts anticipate that RNP implementation would be necessary around year 2008.

2.7 Additionally, the Havana FIR is considered as transition airspace between CAR/SAM and NAM Regions that today justifies RNP implementation, but this implementation would originate a *domino effect* which might force to implement RNP in all the CAR Region, therefore it is convenient to continue the analysis to implement RNP in such an airspace.

3. Conclusion

3.1 Is recommended that the ECAR/IWG continue working towards ATM developments considering the background mentioned in paragraphs 1.1 to 2.7, to develop an appropriate action plan for implementation of RNAV Routes, RNP and RVSM in the E/CAR.

3.2 To this end, among other aspects, the Meeting should take note of the information on the development of ATM issues contained in this Working Paper.

4. Suggested action

4.1 Is suggested that the Meeting adopt the following Draft Conclusion:

DRAFT

CONCLUSION 4/XX RVSM IMPLEMENTATION IN THE EASTERN CARIBBEAN

That E/CAR States/Territories/International Organizations,

- a) develop of action plan, in coordination with ICAO NACC Regional Office, to be carried out by the ECAR/IWG with a view to implementing RVSM, RNAV and RNP in the ECAR; and,
- b) present the Action Plan in the next ECAR/IWG/29 meeting.

APPENDIX A

CAR/SAM RNAV ROUTE PROGRAM - PROGRAMA DE RUTAS RNAV CAR/SAM (Summary - Listado General)								
N° Summary / N° Listado Gral	N°	Trajectory between/ Trayectoria entre		Total weekly operations/ Total operaciones semanal	Distance saved in N.M./ Dist. Ahorro en NM	Operational annual savings / Ahorro operacional anual	Annual fuel savings in us gallons Ahorro anual comb en Galon US	Notes / Notas
1	Antigua	Miami	34	17.5	\$274,174	78,375	78,375	
2	Aruba	San Juan	14	8.3	\$37,684	10,549	10,549	
3	Asuncion	Buenos Aires	42	3.9	\$54,952	14,686	14,686	
4	Balmaceda	Buenos Aires	0	0	\$0	0	0	Route requested for operations from Buenos Aires to Australia/Ruta solicitada para operaciones de Buenos Aires a Australia
5	Barbados	Miami	39	23.7	\$394,608	107,656	107,656	
6	Belize	Miami	16	18.2	\$99,368	27,415	27,415	
7	Bonaire	Guayaquil	7	6	\$34,028	11,297	11,297	
8	Bonaire	Lima	7	50	\$283,567	94,144	94,144	
9	Bonaire	Quito	7	5.7	\$32,327	10,732	10,732	
10	Buenos Aires	Lima	48	7.7	\$164,300	44,271	44,271	
11	Buenos Aires	Santiago	107	3.6	\$163,926	48,205	48,205	Westbound only/En dirección oeste
12	Buenos Aires	Puerto Montt	0	2.4	\$0	0	0	Route requested for operations from Buenos Aires to Australia/Ruta solicitada para operaciones de Buenos Aires a Australia
13	Cancun	Havana	40	29.9	\$355,765	101,538	101,538	
14	Cancun	Houston	112	9	\$351,155	94,958	94,958	
15	Cancun	New York	42	176.8	\$2,899,397	798,946	798,946	

CAR/SAM RNAV ROUTE PROGRAM - PROGRAMA DE RUTAS RNAV CAR/SAM (Summary - Listado General)								
N° Summary / N° Listado Gral	N°	Trajectory between/ Trayectoria entre		Total weekly operations/ Total operaciones semanal	Distance saved in N.M./ Dist. Ahorro en NM	Operational annual savings / Ahorro operacional anual	Annual fuel savings in us gallons Ahorro anual comb en Galon US	Notes / Notas
16	Cancun	Panama	10	8.6	\$37,315	8,906	8,906	
17	Cap Haitien	Puerto Plata	0	0	\$0	0	0	Route requested by Cuba and Haiti, unknown traffic/Ruta solicitada por Cuba y Haití, tráfico desconocido
18	Cap Haitien	Santiago de Cuba	0	0	\$0	0	0	Route requested by Cuba and Haiti, unknown traffic/Ruta solicitada por Cuba y Haití, tráfico desconocido
19	Caracas	Havana	0	21.6	\$0	0	0	At this moment there is not traffic, but in near future traffic will increase/Al momento no hay tráfico pero en un futuro próximo el tráfico aumentará
20	Caracas	Lima	20	24.2	\$137,348	40,684	40,684	
21	Caracas	Mexico	14	81.1	\$402,420	95,439	95,439	
22	Caracas	Miami	112	20.3	\$1,039,353	285,168	285,168	
23	Caracas	San Jose	16	22.7	\$133,512	32,056	32,056	
24	Cucuta VOR	Villavicencio VOR	10	49.2	\$386,157	128,204	128,204	Domestic route in Colombia/Ruta doméstica en Colombia
25	Elorza	San Gabriel	0	19.5	\$0	0	0	Requested by Colombia, unknown traffic/Solicitada por Colombia, tráfico desconocido
26	Great Inagua	Kingston	0	0	\$0	0	0	Traffic unknown, exit route to Europe, requested by Jamaica/Tráfico desconocido, ruta hacia Europa solicitada por Jamaica
27	Great Inagua	Montego Bay	0	0	\$0	0	0	Traffic unknown, exit route to Europe, requested by Jamaica/Tráfico desconocido, ruta hacia Europa solicitada por Jamaica
28	Guadalajara	Houston/Dallas	98	6.4	\$195,318	55,733	55,733	

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CAR/SAM RNAV ROUTE PROGRAM - PROGRAMA DE RUTAS RNAV CAR/SAM (Summary - Listado General)								
N° Summary / N° Listado Gral	N°	Trajectory between/ Trayectoria entre		Total weekly operations/ Total operaciones semanal	Distance saved in N.M./ Dist. Ahorro en NM	Operational annual savings / Ahorro operacional anual	Annual fuel savings in us gallons Ahorro anual comb en Galon US	Notes / Notas
29	Guatemala	Houston/Dallas	44	36	\$599,856	163,650	163,650	
30	Guatemala	Miami	82	12.3	\$407,571	115,301	115,301	
31	Guayaquil	Lima	42	5.5	\$98,821	26,333	26,333	
32	Guayaquil	San Jose	39	24.2	\$333,505	93,084	93,084	
33	Havana	Panama	48	5.7	\$88,346	24,761	24,761	
34	La Paz	Lima	22	3.4	\$29,605	7,888	7,888	
35	Lima	Houston/Dallas	28	23.7	\$296,978	87,018	87,018	
36	Lima	New York	16	77.3	\$646,759	179,335	179,335	
37	Lima	San Jose	22	34.3	\$248,066	63,430	63,430	Segment route/Segmento ruta Lima - Houston/Dallas
38	Lima	Sao Paulo	30	10.6	\$158,395	42,733	42,733	Continuation of UM415 to be implemented in Jun04/Continuación de UM415 a ser implantada en Jun 04
39	Managua	Miami	62	7.2	\$234,129	67,687	67,687	
40	Merida	Houston	8	46.7	\$158,760	37,685	37,685	
41	Mexico	Houston/Dallas	177	11.7	\$791,931	205,899	205,899	
42	Mexico	Miami	76	24.4	\$897,641	260,559	260,559	
43	Mexico	Salvador	22	14.3	\$103,421	26,444	26,444	Segment of route Mexico-San Jose/Segmento de ruta México-San José
44	Mexico	San Jose	48	9.7	\$185,841	48,139	48,139	

CAR/SAM RNAV ROUTE PROGRAM - PROGRAMA DE RUTAS RNAV CAR/SAM (Summary - Listado General)								
N° Summary / N° Listado Gral	N°	Trajectory between/ Trayectoria entre		Total weekly operations/ Total operaciones semanal	Distance saved in N.M./ Dist. Ahorro en NM	Operational annual savings / Ahorro operacional anual	Annual fuel savings in us gallons Ahorro anual comb en Galon US	Notes / Notas
45	Mexico	San Pedro	7	62.3	\$195,166	57,186	57,186	
46	Montego Bay	Miami	60	0.9	\$24,685	6,736	6,736	
47	Panama	Houston	14	9.7	\$44,040	12,328	12,328	
48	Panama	New York	14	30.1	\$136,660	38,256	38,256	
49	Panama	Port au Prince	4	21.5	\$37,507	8,964	8,964	
50	Port au Prince	Miami	77	4.9	\$177,460	50,431	50,431	
51	Salvador	Houston/Dallas	36	67	\$798,364	215,362	215,362	
52	Salvador	San Francisco	14	42.7	\$211,878	50,249	50,249	
53	Salvador	San Jose	42	7.2	\$107,180	25,419	25,419	Domestic route within Cenamer, segment route Mexico-San Jose/Ruta doméstica dentro de Cenamer, tramo ruta México-San José
54	San Jose	Houston	28	24.7	\$309,509	90,689	90,689	Segment route Lima-Houston/Dallas/Segmento ruta Lima-Houston/Dallas
55	San Jose	New York	24	71.8	\$580,468	151,607	151,607	
56	San Pedro	New Orleans	8	7.5	\$17,027	5,043	5,043	
57	Santa Cruz	Santiago	10	24.6	\$113,108	28,949	28,949	
58	Santiago	Buenos Aires	107	14.2	\$646,599	190,143	190,143	Eastbound only/En dirección este solamente
59	Sao Paulo	Houston\Dallas	28	36.5	\$662,871	187,276	187,276	

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CAR/SAM RNAV ROUTE PROGRAM - PROGRAMA DE RUTAS RNAV CAR/SAM (Summary - Listado General)								
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60	Sao Paulo	Memphis	14	39	\$517,711	165,223	165,223	
61	Tegucigalpa	Miami	29	21.1	\$246,100	65,765	65,765	
62	Havana	Santo Domingo	4	92.3	\$169,754	\$43,448	\$43,448	
63	Cancun	Miami	42	7.7	\$113,794	32,983	32,983	Southbound operations only, northbound no need improvement/Operaciones en dirección al sur solamente, en dirección al norte no necesitan mejorar

44	Mexico	San Jose	48	9.7	\$185,841	48,139	48,139	
45	Mexico	San Pedro	7	62.3	\$195,166	57,186	57,186	
46	Montego Bay	Miami	60	0.9	\$24,685	6,736	6,736	
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60	Sao Paulo	Memphis	14	39	\$517,711	165,223	165,223	
61	Tegucigalpa	Miami	29	21.1	\$246,100	65,765	65,765	
62	Havana	Santo Domingo	4	92.3	\$169,754	\$43,448	\$43,448	
63	Cancun	Miami	42	7.7	\$113,794	32,983	32,983	Southbound operations only, northbound no need improvement/Operaciones en dirección al sur solamente, en dirección al norte no necesitan mejorar

SCHEDULE FOR THE RNAV ROUTES IMPLEMENTATION PROGRAMME IN THE CAR/SAM REGIONS (Phase II-a)
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EXPLANATION OF THE TABLE

Column 1	Describes the activities to be carried out by the States/Organizations involved
Column 2	Shows the target dates for completion of the activities described in column 1
Column 3	Contains additional information

Activities under the responsibility of the States and International Organizations, which FIR/s are involved		
ACTIVITY	COMPLETION DATE	REMARKS
1	2	3
In accordance with phase 2 implementation priorities	12/06/04	GREPECAS/12 should approve the RNAV list to be implemented in phase 2 of the RNAV Routes Implementation Programme of the CAR/SAM/Regions.
States' preliminary analysis	09/07/04	CAR/SAM States should analyze RNAV Routes proposals under their responsibility and send the results to the ICAO NACC and SAM Offices, keeping in mind the planning principles and issues to be considered in the planning process appearing in this Guidance Material.
CAR/SAM analysis regarding the routes implementation impact in the CAR/SAM RVSM implementation programme.	30/11/04	The CARSAMMA shall evaluate the implementation impact of phase 2 of the CAR/SAM RVSM implementation programme in the CAR/SAM RVSM Implementation Programme Safety Assessment
Agreement on the RNAV routes to be implemented	09/07/04	Route paths, reporting points, agreements, etc., to be defined at the Third Meeting/Workshop of ATM Authorities and Planners.
Review of bilateral/multilateral agreements between service suppliers and/or identification of cases requiring their execution	09/07/04	According to the route paths, reporting points (including the geographical coordinates), agreements, etc., established during the Third Meeting/Workshop of ATM Authorities and Planners.
Verification and approval of geographical coordinates	09/08/04	The geographical coordinates should be established in the course of the meeting. Otherwise, the necessary coordination will be made for that purpose through the respective ICAO NACC and SAM Regional Offices.

Activities under the responsibility of the States and International Organizations, which FIR/s are involved		
ACTIVITY	COMPLETION DATE	REMARKS
1	2	3
Distribution of the proposal for amendment to the ANP CAR/SAM – Basic Vol. by the ICAO NACC and SAM Regional Offices.	10/04	The distribution of the proposal for amendment will enable parties involved expressing their comments or observations.
Remittance of comments or remarks on the proposal for amendment to the ANP CAR/SAM – Basic Vol. to the corresponding ICAO NACC and SAM Regional Offices.	11/04	The timely response to the proposal for amendment will enable a quick processing of the comments or remarks for submission to the ICAO Council and further approval.
Inclusion of agreements and procedures in national operating manuals	03/05	If necessary, States shall include the agreements and procedures in their operating manuals
Publication of AIC and AIP Supplement	03/05	States affected by RNAV routes should publish a common AIC and AIP Supplement with three AIRAC cycles in advance.
Entry into effect of the Implementation	06/05	

CAR/SAM RNAV ROUTE PROGRAM - PROGRAMA DE RUTAS RNAV CAR/SAM (FASE II-a - PHASE II-a)								
N° Summary / N° Listado Gral	N°	Trajectory between/ Trayectoria entre		Total weekly operations/ Total operaciones semanal	Distance saved in N.M./ Dist. Ahorro en NM	Operational annual savings / Ahorro operacional anual	Annual fuel savings in us gallons / Ahorro anual comb en Galon US	Notes / Notas
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20	2	Caracas	Lima	20	24.2	\$137,348	40,684	
26	3	Great Inagua	Kingston	0	0	\$0	0	Traffic unknown, exit route to Europe, requested by Jamaica/Tráfico desconocido, ruta hacia Europa, solicitada por Jamaica
27	4	Great Inagua	Montego Bay	0	0	\$0	0	Traffic unknown, exit route to Europe, requested by Jamaica/Tráfico desconocido, ruta hacia Europa, solicitada por Jamaica
32	5	Guayaquil	San Jose	39	24.2	\$333,505	93,084	
38	6	Lima	Sao Paulo	30	10.6	\$158,395	42,733	Continuation of UM415 to be implemented in Jun 04/Continuación de UM415 a ser implantada en Jun 04
43	7	Mexico	Salvador	22	14.3	\$103,421	26,444	Segment of route Mexico-San Jose/Segmento de ruta México-San José
44	8	Mexico	San Jose	48	9.7	\$185,841	48,139	
53	9	Salvador	San Jose	42	7.2	\$107,180	25,419	Domestic route within Cenamer, route segment Mexico-San Jose/Ruta doméstica dentro de Cenamer, tramo ruta México-San José
57	10	Santa Cruz	Santiago	10	24.6	\$113,108	28,949	
58	11	Santiago	Buenos Aires	107	14.2	\$646,599	190,143	Eastbound only/Solamente en dirección este
62	12	Havana	Santo Domingo	4	92.3	\$169,754	\$43,448	

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CAR/SAM RNAV ROUTE PROGRAM - PROGRAMA DE RUTAS RNAV CAR/SAM (FASE II-b / PHASE II-b)								
N° Summary / N° Listado Gral	N°	Trajectory between/ Trayectoria entre		Total weekly operations/ Total operaciones semanal	Distance saved in N.M./ Dist. Ahorro en NM	Operational annual savings / Ahorro operacional anual	Annual fuel savings in us gallons / Ahorro anual comb en Galon US	Notes / Notas
2	1	Aruba	San Juan	14	8.3	\$37,684	10,549	
3	2	Asuncion	Buenos Aires	42	3.9	\$54,952	14,686	
4	3	Balmaceda	Buenos Aires	0	0	\$0	0	Route requested for operations from Buenos Aires to Australia/Ruta solicitada para operaciones de Buenos Aires a Australia
7	4	Bonaire	Guayaquil	7	6	\$34,028	11,297	
8	5	Bonaire	Lima	7	50	\$283,567	94,144	
9	6	Bonaire	Quito	7	5.7	\$32,327	10,732	
10	7	Buenos Aires	Lima	48	7.7	\$164,300	44,271	
12	8	Buenos Aires	Puerto Montt	0	2.4	\$0	0	Route requested for operations from Buenos Aires to Australia/Ruta solicitada para operaciones de Buenos Aires a Australia
16	9	Cancun	Panama	10	8.6	\$37,315	8,906	
17	10	Cap Haitien	Puerto Plata	0	0	\$0	0	Route requested by Cuba and Haiti, unknown traffic/Ruta solicitada por Cuba y Haití, tráfico desconocido
18	11	Cap Haitien	Santiago de Cuba	0	0	\$0	0	Route requested by Cuba and Haiti, unknown traffic/Ruta solicitada por Cuba y Haití, tráfico desconocido
19	12	Caracas	Havana	0	21.6	\$0	0	At this moment there is not traffic, but in near future traffic will increase/AI momento no hay trafico pero muy pronto el tráfico aumentará
21	13	Caracas	Mexico	14	81.1	\$402,420	95,439	
23	14	Caracas	San Jose	16	22.7	\$133,512	32,056	
24	15	Cucuta VOR	Villavicencio VOR	10	49.2	\$386,157	128,204	Domestic route in Colombia/Ruta doméstica en Colombia
25	16	Elorza	San Gabriel	0	19.5	\$0	0	Requested by Colombia, unknown traffic/Solicitada por Colombia, tráfico desconocido
33	17	Havana	Panama	48	5.7	\$88,346	24,761	
34	18	La Paz	Lima	22	3.4	\$29,605	7,888	
37	19	Lima	San Jose	22	34.3	\$248,066	63,430	Segment route Lima-Houston/Dallas/Segmento ruta Lima-Houston/Dallas
45	20	Mexico	San Pedro	7	62.3	\$195,166	57,186	
49	21	Panama	Port au Prince	4	21.5	\$37,507	8,964	
11	22	Buenos Aires	Santiago	107	3.6	\$163,926	48,205	Westbound only/En dirección oeste, solamente
31	23	Guayaquil	Lima	42	5.5	\$98,821	26,333	UL 780 segment Guayaquil/Trujillo to Lima/UL 780 segment Guayaquil/Trujillo, then UG436 to Lima/UL 780 Tramo Guayaquil/Trujillo a Lima/UL780 segmento Guayaquil/Trujillo, luego UG436 hasta Lima

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CAR/SAM RNAV ROUTES PROGRAM FROM/TO NAM REGION - PROGRAMA DE RUTAS RNAV CAR/SAM DESDE/HACIA REGION NAM								
N° Summary / N° Listado Gral	N°	Trajectory between/ Trayectoria entre		Total weekly operations/ Total operaciones semanal	Distance saved in N.M./ Dist Ahorro en NM	Operational annual savings / Ahorro operacional anual	Annual fuel savings in us gallons / Ahorro anual comb en Galon US	Notes / Notas
1	1	Antigua	Miami	34	17.5	\$274,174	78,375	
5	2	Barbados	Miami	39	23.7	\$394,608	107,656	
6	3	Belize	Miami	16	18.2	\$99,368	27,415	
14	4	Cancun	Houston	112	9	\$351,155	94,958	
15	5	Cancun	New York	42	176.8	\$2,899,397	798,946	
22	6	Caracas	Miami	112	20.3	\$1,039,353	285,168	IATA requests to be implemented during the year 2004/IATA solicita se implemente durante el año 2004
28	7	Guadalajara	Houston/Dallas	98	6.4	\$195,318	55,733	
29	8	Guatemala	Houston/Dallas	44	36	\$599,856	163,650	
30	9	Guatemala	Miami	82	12.3	\$407,571	115,301	IATA requests to be implemented during the year 2004/IATA solicita se implemente durante el año 2004
35	10	Lima	Houston/Dallas	28	23.7	\$296,978	87,018	
36	11	Lima	New York	16	77.3	\$646,759	179,335	
39	12	Managua	Miami	62	7.2	\$234,129	67,687	
40	13	Merida	Houston	8	46.7	\$158,760	37,685	
41	14	Mexico	Houston/Dallas	177	11.7	\$791,931	205,899	
42	15	Mexico	Miami	76	24.4	\$897,641	260,559	
46	16	Montego Bay	Miami	60	0.9	\$24,685	6,736	
47	17	Panama	Houston	14	9.7	\$44,040	12,328	
48	18	Panama	New York	14	30.1	\$136,660	38,256	
50	19	Port au Prince	Miami	77	4.9	\$177,460	50,431	
51	20	Salvador	Houston/Dallas	36	67	\$798,364	215,362	
52	21	Salvador	San Francisco	14	42.7	\$211,878	50,249	
54	22	San Jose	Houston	28	24.7	\$309,509	90,689	Segment route Lima-Houston/Dallas/Segmento ruta Lima-Houston/Dallas (IATA comment - Comentario de IATA)
55	23	San Jose	New York	24	71.8	\$580,468	151,607	
56	24	San Pedro	New Orleans	8	7.5	\$17,027	5,043	
59	25	Sao Paulo	Houston/Dallas	28	36.5	\$662,871	187,276	
60	26	Sao Paulo	Memphis	14	39	\$517,711	165,223	
61	27	Tegucigalpa	Miami	29	21.1	\$246,100	65,765	
62	28	Cancun	Miami	42	7.7	\$113,794	32,983	Southbound operations only, northbound no need improvement /Operaciones en dirección norte solamente, no necesitan mejora (IATA comment - Comentario de IATA)

APPENDIX B

BRIEF SUMMARY OF THE CONCLUSIONS REACHED DURING THE SEPARATION AND SAFETY AIRSPACE PANEL (SASP) REGARDING TO THE DIFFERENCES ON RNP BETWEEN ICAO AND INDUSTRY DOCUMENTATION (RTCA DO-236A Y EUROCAE ED-75A)

1. Introduction

1.1 During successive meetings, the SASP discussed the differences found on RNP between the ICAO and Industry, and proposed solutions to the current general confusion about the terminology and requirements for RNP, RNAV, RNP RNAV and other related acronyms. These differences are detailed in the following paragraphs.

1.2 In ICAO's Manual on Required Navigation Performance (RNP), Doc. 9613, RNP concept is only established in terms of accuracy, which is specified as a limit, which Total System Error (TSE) must not exceed for 95% of flight time.

1.3 The Minimum Aviation System Performance Standard (MASPS) established by the Industry (RTCA DO-236A y EUROCAE ED-75A) introduced, in addition to the navigation accuracy as established by ICAO, the concept of containment integrity limit at a distance equal to twice the RNP value, as well a containment continuity for the containment limit.

1.4 To distinguish the two concepts, the MASPS introduced the term RNP RNAV to describe systems which compliant with all the requirements of the MASPS, in addition to the accuracy requirements.

1.5 Doc. 9613 establishes that a navigation data base is optional for RNP 4 to RNP 20, whereas MASPS indicates specifically such requirement because certain required functions could not be implemented without a data base. The MASPS required that the data base compliant with DO-200A/ED-76 and DO-201A/ED-77.

1.6 The MASPS requires parallel off set capability for all RNP 4 RNAV or less, and for systems operating to RNP 12.6 and RNP 20 if an offset capability is provided. In Doc. 9613, offset capability is only desirable for RNP 4 to RNP 20.

1.7 The MASPS required RNAV holding capability for all RNP RNAV types, whereas in Doc. 9613 this capability is only desirable for RNP 4 al RNP 20.

2. Discussion

2.1 Speciation of navigation accuracy only not necessarily fulfil all the navigation requirements, and as such some indication of the other navigation performance parameters would be required.

2.2 If terms RNP and RNP RNAV would be applicable in the context of global navigation requirements, this could itself create confusion and the difference could easily be misunderstood to be direct related only to the availability of an RNAV capability.

2.3 The current implementation developments and those foreseen in the near future would not need the full performance and functionality requirements as expressed in the RNP RNAV MASPS.

2.4 TMA operations would require more stringent navigation performance and functionality requirements that en-route.

2.5 The current plans for en-route all considered RNP 4 and higher. The application of RNP 4 for the 30/30 separation minima as expressed in the Annex 11, Air Traffic Services, Attachment B, and PANS/ATM Air Traffic Management, Doc. 4444, no requires the full MASPS.

2.6 There are currently no aircraft that are fully RNP RNAV MASPS compliant.

2.7 Taking the above into account, it was considered the merits of linking only the more stringent RNP types with RNP RNAV MASPS (i.e. RNP types lower than 4).

2.8 This still left potential problem areas in the context of the global applicability/consistency of RNP requirements and RNP approvals for the RNP types 4 and higher.

2.9 The discussions included the applicability of RNP approval regarding continental versus oceanic applications, the navigation systems on which RNP approval would be based and the potentially different needs region by region regarding functional requirements.

2.10 In this context, it was considered that in the longer term certain additional functionalities may be required in airspace where, from an accuracy requirement point of view, RNP 4 or higher would be sufficient.

2.11 Given the availability capabilities of the aircraft operating in the airspace by the time that MASPS compliance is a reality, a requirement for RNP 1 may be an option, which would include the functionalities as specified in the MASPS.

3. Conclusions

3.1 Taking into account that still some issues need to be clarified, the meeting developed the following revised approach regarding to the terminology, requirements and applicability in the context of RNP, RNAV, RNP RNAV:

Where RNP is specified:

P1. Navigation Aids/Systems (applicable for all RNP types):

Approval Authority to determine which systems are appropriate for intended operation, and indicate limitations which apply given the navigation systems on which the RNP approval is based.

The aircraft operator is responsible for ensuring that the operation complies with the RNP approval and indicated limitations. (e.g. max x hrs outside range ground navaids, or only within range of an appropriate DME-DME ground infrastructure (see also Doc 9613, §6.1.1.8)).

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- P2. RNP accuracy (95%) is globally applicable
- P3. RNP functionality:
- a) For RNP < 4: The required functionalities as indicated in the RNP RNAV MASPS apply globally.
 - b) For RNP 4 – RNP 10: A subset of the RNP RNAV MASPS functionalities applies globally. This subset is still to be defined, and should be such that it caters for global requirements to the extent possible (i.e. to prevent the requirement for regional deviations).
- P4. RNP performance parameters other than accuracy:
- a) For RNP < 4: The required performance as indicated in the RNP RNAV MASPS applies globally.
 - b) For RNP 4 – RNP 10: A set of parameters less stringent than the RNP RNAV MASPS applies globally. This set was still to be defined, and should be such that it caters for global requirements to the extent possible (i.e. to prevent the requirement for regional deviations).
- P5. The requirements referred to in items P3.b) and P4.b) above are to be specified in the RNP Manual (or alternatively, will be basis for changes to the RNP RNAV MASPS; this would simplify the required text in the RNP Manual)
- P6. If regional needs in the context of a specific RNP Type require a deviation from the above RNP requirements (e.g. in terms of functionality or navigation performance), then the authorities have two options:
- a) if a higher functionality and/or more stringent performance is required than defined under respectively P3.b and P4.b above, the applicability of a more stringent RNP (<4) may be considered;
 - b) if P6. a) is not feasible, the requirement should not be specified as an “RNP”, but as an alternative requirement using terminology clearly different from “RNP”. The need for this option should be limited to the extent possible through an appropriate definition of the global requirements referred to in P3.b and P4.b above.

3.2 This approach is a reasonable compromise between the need for a common basis for long term RNP requirements (RNP RNAV MASPS) and also for shorter term applications of RNP not required to meet the RNP RNAV MASPS. The approach did not particularly distinguish between “RNP” and “RNP RNAV” as terms describing different navigational requirements or concepts as this was agreed to cause more confusion in the aviation world.

3.3 The above approach had been described as accepting the RNP RNAV MASPS as the RNP requirement, but allowing the less accurate RNP types to be implemented without requiring the MASPS. This would permit early introduction of RNP given that very few aircraft are currently compliant with the RNP RNAV MASPS, which would not change in the short term.

3.4 Regarding short-term requirements for the availability of RNP 4 approval requirements (in support of 30/30 NM minimum separations), according to this point of view, some reference would have to be included on the required performance, besides precision. One option would be, as a temporary solution, to refer to the performance currently reached by aircraft navigation systems expected to operate in the routes system proposed.

3.5 The three main issues that seemed still to require further discussion were considered to be:

- a) which of the RNP types would need to comply with the RNP RNAV MASPS;
- b) the terminology applied for the navigation performance requirements, e.g. whether or not compliance with the MASPS would need to be expressed in the name of the RNP type; and
- c) the performance and functional requirements for those RNP types that are not compliant with the RNP RNAV MASPS.

3.6 One issue that need to be resolved in the short term is the set of navigation performance and functional requirements for RNP 4 as required to support the 30/30 separation minima. In the current approach, an RNP 4 requirement would not need to comply with the RNP RNAV MASPS. However, the approach also required that any (non-MASPS) RNP requirement would, to the extent possible, need to be globally applicable. In this context, the RNP 4 requirements as detailed in the RNP Manual (Doc 9613) were consulted, with the aim to achieve a globally applicable RNP 4 requirement based on the Doc 9613 requirements.