



International Civil Aviation Organization

CAR/SAM REGIONAL PLANNING IMPLEMENTATION GROUP (GREPECAS)

**Fifth Meeting of the CNS Committee of the GREPECAS ATM/CNS Subgroup
(CNS/COMM/5)**

Lima, Peru, 13 to 17 November 2006

CNS/COMM/5-WP/12

27/10/06

Agenda Item 3: Surveillance systems developments
3.2 Study of the regional ADS systems implementation.

**FOLLOW-UP TO THE STUDIES ON THE
ADS-C AND ADS-B IMPLEMENTATION IN THE CAR/SAM REGIONS**

(Presented by the Secretariat)

SUMMARY

This working paper presents the follow-up results to the study of the ADS-C and ADS-B systems regional implementation.

References:

- CAR/SAM Regional Air Navigation Plan, Doc 8733
- GREPECAS/12 Meeting Report, Havana, Cuba, June 2004
- Report of the Fourth Meeting of the CNS Committee, Mexico City, August 2005
- GREPECAS/13 Meeting Report, Santiago, Chile, November 2005
- Amendment 2 to the Global Air Navigation Plan (Doc 9750 – AN/963)

1. Introduction

1.1 The GREPECAS/12 Meeting reviewed and updated the surveillance systems plan contained in Table CNS 4A of the FASID and consequently drafted Conclusion 12/50 – *Amendment to FASID Table CNS 4A (Surveillance Regional Plan) – Surveillance Systems*. The Meeting also noted that Table CNS 4A did not contain the requirements for the ADS-C and ADS-B surveillance functions.

1.2 The Fourth Meeting of the CNS Committee developed studies on the implementation of ADS-C and ADS-B in the CAR/SAM Regions. These studies took into account the status of SARPs and ICAO guidance materials; the Administration initiatives on planning and implementation of these systems; the declarations and goals of the industry's surveillance roadmap; the identification of potential airspaces for the ADS-B implementation; the analysis of information on the current planning and aircraft fleet capacity operating in the CAR/SAM Regions; and, started the development of a strategy for the ADS-C and ADS-B implementation.

1.3 The GREPECAS/13 Meeting, held in Santiago, Chile from 14 to 18 November 2005, took note of the results of the ADS-C and ADS-B implementation study made by the Fourth Meeting of the CNS Committee of the ATM/CNS Subgroup. Likewise, it noted that the ATM Committee, as the CNS Committee, proposed to request information on aircraft equipped with Mode S improved transponders with the capability of ADS-B broadcast, that are operating in the CAR/SAM Regions. Therefore, the Meeting drafted Conclusion 13/53 – *Information request on aircraft capability to operate SSR in Mode S, ADS and ADS-B*, through which requested the aforementioned information to IATA and collected information from Aeronautical Administrations regarding the needs of the ATC automation systems to support ADS-B.

1.4 Furthermore, the GREPECAS agreed on Decision 13/54 – *Target dates, updated strategy and plan for ADS and ADS-B implementation*, orienting both ATM and CNS Committees that considering the implementation dates and the ADS-C and ADS-B implementation strategy developed by the CNS Committee, as well as the studies started by the ATM Committee, review and compile the work already done in order to obtain a harmonised strategy. Likewise, it requested to have initiatives to develop the initial regional plan of the ADS-C and ADS-B implementation; indicating that the results of these tasks should be presented to the Fifth Meeting of the ATM/CNS Subgroup.

1.5 Additionally, the GREPECAS drafted Conclusion 13/87 – *ADS-B Trials Programme in the CAR/SAM Regions*, through which Aeronautical Administrations are urged to collaborate with airspace users to establish and implement ADS-B trial programmes in order to improve the knowledge on ADS-B and evaluate benefits for air traffic management in the CAR/SAM Regions.

1.6 In those issues related to ADS-C and ADS-B, the Second Amendment to the Global Air Navigation Plan (Doc 9750 – AN/963), established Global Efficiency Initiative (GEI) 09, which is presented in **Appendix A** to this working paper.

2. Discussion

Revised strategy for the ADS-C and ADS-B deployment

2.1 As a follow-up to the work performed by the CNS Committee on this issue, and considering GREPECAS Decision 13/54, as well as based on the guidelines set in the Global Air Navigation Plan, specifically GEI 09, **Appendix B** to this working paper presents for the consideration of the Meeting, the CAR/SAM Regional Strategy for the ADS-C and ADS-B Systems Implementation in the short, medium and long terms.

ADS-C and ADS-B Implementation Initiatives

2.2 Considering the potential airspaces for the ADS-C and ADS-B implementation already identified by the GREPECAS/13 Meeting, which are included in Appendix BI to the Report on Agenda Item 3 of the mentioned Meeting, as well as other recent initiatives by CAR/SAM States, Territories and International Organizations; and according to additional information in possession of the Secretariat, **Appendix C** to this working paper presents an updated table on the initiatives for the ADS-C and ADS-B deployment, which is presented for the review and adoption by the Meeting.

Updating of the Surveillance Regional Plan

2.3 Considering the implementation initiatives for ADS-C and ADS-B systems, as well as the results of the study on the Regional Implementation of SSR in Mode S and other surveillance systems, issue dealt under WP/11 of this Meeting, **Appendix D** to this working paper includes Table CNS 4A of the FASID, with updated information available to the Secretariat. The Meeting should review this Appendix to improve the update.

3. Suggested actions

3.1 The Meeting is invited to:

- a) take note of the information contained in this working paper;
- b) review and recommend the adoption of the revised strategy for the ADS-C and ADS-B deployment presented in Appendix B to this working paper;
- c) review and improve the ADS-C and ADS-B deployment initiatives table bearing in mind the considerations mentioned in paragraph 2.2 and in Appendix C to this working paper;
- d) review and updated the Surveillance Regional Plan, considering paragraph 2.3 and Appendix D to this working paper; and
- e) review and propose any other actions deemed appropriate.

APPENDIX A

(GEI-9) SITUATIONAL AWARENESS

Scope: Operational implementation of data link-based surveillance. The implementation of equipment to allow traffic information to be displayed in aircraft supporting implementation of conflict prediction and collaboration between flight crew and the ATM system. Improve situational awareness in the cockpit by making available electronic terrain and obstacle data of required quality.

Related ATM objectives: application of data link; Functional integration of ground systems with airborne; ADS; ADS-B; SSR Mode S

Description of strategy

1.49 The further implementation of enhanced surveillance techniques (ADS-C or ADS-B) will allow reductions in separation minima and an enhancement of safety, increase in capacity, improved flight efficiency, all on a cost-effective basis. These benefits may be achieved by bringing surveillance to areas where there is no primary or secondary radar, when cost-benefit models warrant it. In airspaces where radar is used, enhanced surveillance can bring a further reductions in aircraft separation minima and improve, in high traffic density areas, the quality of surveillance information both on the ground and in the air, thereby increasing safety levels. The implementation of sets of quality assured electronic terrain and obstacle data necessary to support the ground proximity warning systems with forward looking terrain avoidance function as well as minimum safe altitude warning (MSAW) system will benefit safety substantially.

1.50 Implementation of surveillance systems for surface movement at aerodromes where weather conditions and capacity warrant will also enhance safety and efficiency while implementation of cockpit display of traffic information and associated procedures will enable pilot participation in the ATM system and improve safety through greater situational awareness.

1.51 In remote and oceanic airspace where ADS-C is used, FANS capabilities exist on many air transport aircraft and could be added to business aircraft. ADS-B can be used to enhance traffic surveillance in domestic airspace. In this respect, it should be noted that 1090 extended squitter is both available and should be accepted as the global choice for the ADS-B data link.

1.52 At terminal areas and at aerodromes surrounded by significant terrain and obstacles, the availability of quality assured terrain and obstacle databases containing digital sets of data representing terrain surface in the form of continuous elevation values and digital sets of obstacle data of features, having vertical significance in relation to adjacent and surrounding features considered hazardous to air navigation, will improve situational awareness and contribute to the overall reduction of the number of controlled flight into terrain related accidents.

APPENDIX B

CAR/SAM Regional strategy for the ADS-C and ADS-B systems Implementation

Near-Term (until 2011)

1. The ADS-C surveillance implementation is used in oceanic and remote airspace associated with FANS capacities. The ADS-B surveillance implementation should be prioritize in the continental airspaces where there is no radar surveillance available, taking into consideration the density of traffic, the operational requirements and aircrafts capability. Also, consideration should be given to the potentialities to complement or replace the SSR in a scarcely to medium traffic density area, for route surveillance, in terminal areas, for surface movement control (ADS-B) and other applications.
2. Each State/Territory/International Organization needs to evaluate the: maximum density traffic nowadays and expected for the year 2015. The useful life of their radars and the potentiality for their replacement with ADS-B, the locations of potential ADS-C or ADS-B ground station sites, and the capabilities of existing and planned ATC automation systems to support the ADS-C or ADS-B.
3. The proportions of equipped aircrafts are also critical for the ADS-C and ADS-B deployment, for which it is required to periodically provide, al least, the following information: number of equipped aircrafts operating in the concern airspace, number and name of the airlines that have equipped aircrafts for ADS-C and ADS-B, type of equipped aircrafts, categorization of the accuracy/integrity data available in the aircrafts.
4. The ADS-B deployment should be associated at early stages in coordination with the States/Territory/International Organizations responsible for the control of adjacent areas, and the correspondent ICAO Regional Office, establishing a plan in the potential areas of ADS-B data sharing, aimed at a coordinated, harmonious and interoperable implementation.
5. Each State/Territory/Organization should investigate and report their own Administration's policy in respect to the ADS-B data sharing with their neighbours and from cooperative goals.
6. The ADS-B data sharing plan should be based selecting centres by pairs and analyzing the benefits and formulating proposals for the ADS-B use for each pair of centre/city with the purpose to improve the surveillance capacity.
7. Likewise, it is necessary to consider implementing surveillance solutions for surface movement control by the implementation of ADS-B.
8. To support the ADS-C and ADS-B regional plan, the States/Territories/International organizations, as well as the entity representing the airspace users, should organized and provide the following information; a focal point of contact, its respective implementation plan, including a time-table, and information on its air-ground communications and automation systems.
9. The ADS-B data links technology that will be use for the Mode S 1,090 MHz extended squitter to (1090 ES). Likewise, al the end of the medium term the introduction of ADS-B data sharing could be initiated and be approved by ICAO for its use in a long-term to satisfy the new requirements of the global ATM system.
10. The implementation would be in conformity with the SARPs, ICAO guidelines and the GREPECAS conclusions.

Medium-Term (2011 – 2015)

11. Continuation of the ADS-B use with the 1090 ES technique and the planning initiation for the ADS-B implementation by new data links to satisfy the ATM global system requirements.

Longer-Term (From 2015 to 2025)

12. The planning and implementation would be carried out according to the ADS and ADS-B evolution, with the associated technology developments, in conformity with the global ATM systems, with the new SARPs and ICAO guidance.

APPENDIX C

POTENTIAL AIR SPACE TO IMPLEMENT ADS-C AND ADS-B CONSIDERED BY CAR/SAM STATES, TERRITORIES, AND INTL. ORGANIZATIONS / ESPACIOS AÉREOS POTENCIALES PARA IMPLANTAR ADS Y ADS-D CONSIDERADOS POR LOS ESTADOS/ TERRITORIOS/ORGANIZACIONES DE LAS REGIONES CAR/SAM

No.	State or Organization/ Estado u Organización/ Center/Centro	Air Space/ Espacio aéreo	ADS Type/ Tipo	Status/ Estado	ADS-B data sharing with/ Intercambio de datos ADS-B con	Impl. Date Fecha de Impl.	Remark/ Observaciones
1	2	3	4	5	6	7	8
	CAR						
1.	Bahamas/ Nassau ACC	Nassau FIR	ADS-B	S			There are being carried out studies./Se están realizando estudios.
2	Cuba/ Habana ACC	Havana FIR (South East Zone)					
2.	Haiti/ Port au Prince ACC	Port au Prince FIR	ADS-B	S			There are being carried out studies./Se están realizando estudios.
3.	Mexico/ Mérida ACC Monterrey ACC	Golf of Mexico (Central zone between Houston Oceanic and Mexico FIRs / Zona central entre las FIRS Houston Oceanic y México)	ADS-B	P	Houston ARTCC		Based on an agreement Mexico - USA/ Basado en acuerdo México - Estados Unidos.
4.	Trinidad and Tobago/ Piarco ACC	Piarco FIR (Oceanic East Sector/Sector Este oceánico)	ADS-B	P			There are being carried out more studies./Se están realizando más estudios.
5.	United States/ Houston ARTCC Miami ARTCC	Golf of Mexico (Central zone between Houston Oceanic and Mexico FIRs / Zona central entre las FIRS Houston Oceanic y México) Miami Oceanic FIR (Domestic zone)	ADS-B ADS-B	P P			Based on an agreement Mexico - USA/ Basado en acuerdo México - Estados Unidos.

No.	State or Organization/ Estado u Organización/ Center/Centro	Air Space/ Espacio aéreo	ADS Type/ Tipo	Status/ Estado	ADS-B data sharing with/ Intercambio de datos ADS-B con	Impl. Date Fecha de Impl.	Remark/ Observaciones
1	2	3	4	5	6	7	8
6.	COCESNA/ Cenamer ACC	Cenamer FIR (Caribbean and Pacific Oceanic sectors / Sectores oceánicos Caribe y Pacífico)	ADS-B	S			There are being carried out studies./ Se están realizando estudios.
7.		Other air spaces./ Otros espacios aéreos					Pending of the studies/ Pendiente de estudios.
<u>SAM</u>							
8.	Argentina	Ezeiza FIR Oceanic Zone / Zona Oceánica	ADS-C	P			Planned to be implemented at the end of the first trimester of 2007 / Planificado para ser instalado a finales del primer trimestre de 2007
9.	Brasil/ Atlántico ACC	Atlántico FIR	ADS-C	P			Trials have been carried out and It has an installation plan in the EUR/SAM corridor / Se han realizado ensayos y existe un plan de implantación en el corredor EUR/SAM.
10.	Chile/ Chile's ACC/ ACCs de Chile	Chile FIRs (Continental and Oceanic air space./ Espacios aéreos continental y oceánicos)	ADS-C	S			In the 2005 tests will be begun to implement ADS./ En el 2005 se comenzarán pruebas para implementar ADS.
11.		Other air spaces./ Otros espacios aéreos					Pending of the studies/ Pendiente de estudios.

P – Planned/Planificado S – Study/Estudio

APPENDIX/APENDICE D

Table CNS 4A - SURVEILLANCE SYSTEMS (Updated)
Tabla CNS 4A - SISTEMAS DE VIGILANCIA (Actualizada)

State(Territory)/Location Estado(Territorio)/Ubicación	ATS Unite Served Unidad ATS Servida	PSR			SSR				ADS		Remarks Observaciones
		Funtion Función	Coverage Cobertura (NM)	Status Impl. Estado	Funtion Función	Modes Modos (A,C& S)	Coverage Cobertura (NM)	Status Impl. Estado	Type Tipo	Status Impl. Estado	
1	3	4	5	6	7	8	9	10	11	12	13
ANGUILA (UK)								NP			
ANTIGUA & BARBUDA											
Airport (4 NM North)	V.C. Bird APP				T	A/C	180	I*			* MSSR
ARGENTINA											
Aeroparque Jorge Newbery	Ezeiza ACC Aeroparque APP	T	60	P	E	A/C	220	P*			* MSSR
Bahía Blanca, Airport	Ezeiza ACC Bahía Blanca APP	T	60	P	E	A/C	220	P*			* MSSR
Bolívar, Airport	Ezeiza ACC				E	A/C/S	220	P*			* MSSR
Colonia Gatriel, Airport	Ezeiza ACC				E	A/C	220	P*			* MSSR
Córdoba, Airport	Córdoba ACC	T	60	I	E/T	A/C	180	I/P*	C y B	P	* MSSR
	Ezeiza ACC										
Ezeiza, Airport	Ezeiza ACC	T	90	I	E	A/C	220	I*	C y B	P	* MSSR
	Buenos Aires APP										
Jujuy, Airport	Córdoba ACC				E	A/C/S	220	p*			* MSSR
La Rioja, Airport	Córdoba ACC				E	A/C	220	p*			* MSSR
Las Lomitas, Airport	Ezeiza ACC				E	A/C	220	p*			* MSSR
	Córdoba ACC										
Mar de Plata, Airport	Ezeiza ACC	T	60	I	E	A/C	220	I*			* MSSR
	Mar del Plata APP										
Monte Quemado ,Santiago del Estero	Ezeiza ACC				E	A/C/S	220	P*			* MSSR
	Cordoba ACC										
Mendoza, Airport	Cordoba ACC	T	60	I	E	A/C	180	I*			* MSSR
	Mendoza APP										
Merlo (Buenos Aires)	Ezeiza ACC	T	220	P	E	A/C/S	220	P*			* MSSR
Paraná, Airport	Ezeiza ACC				E	A/C	220	I*			* MSSR
	Córdoba ACC										
Posadas Airport	Ezeiza ACC				E	A/C	220	P*			* MSSR
Reconquista Airport	Ezeiza ACC				E	A/C	220	P*			* MSSR
	Córdoba ACC										
Resistencia, Airport	Ezeiza ACC	T	60	P	E	A/C	220	P*			* MSSR
	Córdoba APP										
	Resistencia APP										
Neuquen Airport	Ezeiza ACC				E	A/C/S	220	P*			* MSSR
	Neuquen TMA APP										
Las Lomitas Airport	Ezeiza ACC	E	220	P	E	A/C/S	220	P*			* MSSR
	Cordoba ACC										
La Boulaye Airport	Ezeiza ACC				E	A/C/S	220	P*			* MSSR
	Cordoba ACC										
San Carlos de Bariloche,	Ezeiza ACC	T	60	P	E/T	A/C	220	P*			* MSSR

State(Territory)/Location Estado(Territorio)/Ubicación	ATS Unite Served Unidad ATS Servida	PSR			SSR				ADS		Remarks Observaciones
		Funtion Función	Coverage Cobertura (NM)	Status Impl. Estado	Funtion Función	Modes Modos (A,C& S)	Coverage Cobertura (NM)	Status Impl. Estado	Type Tipo	Status Impl. Estado	
1	3	4	5	6	7	8	9	10	11	12	13
Airport San Luis, Airport Santa Rosa, Airport Tartagal, Airport Tucumán, Airport Comodoro Rivadavia	Bariloche APP Córdoba APP Ezeiza ACC Ezeiza ACC Ezeiza AGG Córdoba APP Córdoba APP Ezeiza ACC Ezeiza ACC				E E E E	A/G A/G A/G A/C	220 220 220 220	P* P* P* P*			*MSSR *MSSR *MSSR *MSSR *MSSR
ARUBA (Kingdom of the Netherlands)	Reina Beatrix APP	T	80	I	T	A/C	256	I*		P	*MSSR
BAHAMAS Nassau	Miami ACC Nassau APP	E/T		I	E/T	A/C		I			
BARBADOS Airport	Adams APP				T	A/C	250	I*			*MSSR
BELIZE	Belize APP							NP			
BOLIVIA La Paz La Paz	La Paz ACC La Paz APP				E T	A/C A/C		I/P* I/P**			*It is recommended to widen coverage and replacem to MSSR/ Se *Recommended/ Recomendado **Replacem ent recommended to MSSR / Recomendado reemplazo por MSSR
Cochabamba	Cochabamba APP				E/T	A/C		I			MSSR
BRASIL Barra do Carcas Belém Belém Boa Vista Bom Jesus da Lapa Brasilia (Gama) Brasilia Cachimbo Campinas Cangucu Catanduvas Chapada Dos Guimaraes	Brasilia ACC Belem ACC Belem APP Manaus ACC Recife ACC Brasilia ACC Brasilia APP Campinas APP Curitiba ACC Curitiba ACC Brasilia ACC	E E T E E E T T E E E E		I I I I I I I P I I I I	E E T E E E T T E E E E	A/C A/C A/C A/C A/C A/C A/C A/C A/C A/C A/C A/C		I I I I I I I I I I I I			*MSSR <-2000 *MSSR *MSSR

State(Territory)/Location Estado(Territorio)/Ubicación	ATS Unite Served Unidad ATS Servida	PSR			SSR				ADS		Remarks Observaciones	
		Functio	Coverage	Status	Functio	Modes	Coverage	Status	Type	Status		
		Función	Cobertura (NM)	Impl. Estado	Función	Modos (A,C&S)	Cobertura (NM)	Impl. Estado	Tipo	Impl. Estado		
1	3	4	5	6	7	8	9	10	11	12	13	
Confins	Belo Horizonte APP	T		I	T	A/C			I			
Conceicao do Araguaia		E		P	E	A/C			I			*MSSR
Cruzeiro do Sul		E		P	E	A/C			I			*MSSR
Curitiba (Morro da Igreja)	Curitiba ACC	E		I	E	A/C			I			
Curitiba	Curitiba APP	T		I	T	A/C			I			
Dianopolis					E	A/C			P*			*MSSR
Eirunepe		E		P	E	A/C			P*			*MSSR
Fernando Noronha	Recife ACC				E	A/C			I			
Fortaleza	Recife ACC	E		I	E	A/C			I			
Fortaleza	Fotaleza APP	T		I	T	A/C			I			
Foz do Iguazu	Foz do Iguacu APP	T		I	T	A/C			I			
Guajara - Mirim		E		P	E	A/C			P*			*MSSR
Guarulhos	Sao Paulo APP	T		I	T	A/C			I			
Imperatriz					E	A/C			I			*MSSR
Jacarcacanga					E	A/C			I			*MSSR
Jaraguari	Curitiba ACC	E		I	E	A/C			I			
Macapa		E		P	E	A/C			I			*MSSR
Maceió	Recife ACC	E		I	E	A/C			I			
Manaus (E. Gomes)	Manaus ACC	E		I	E	A/C			I			
Manaus (E. Gomes)	Manaus APP	T		I	T	A/C			I			
Natal	Recife ACC	E		I	E	A/C			I			
Natal	Natal APP	T		I	T	A/C			I			
Petrolina	Recife ACC				E	A/C			I			*MSSR <-1999
Pico do Couto	Brasilia ACC	E		I	E	A/C			I			
Porto Alegre	Porto Alegre APP	T		I	T	A/C			I			
Porto Espiridiao		E		P	E	A/C			I			*MSSR
Porto Seguro	Recife ACC	E		P	E	A/C			I			*MSSR <-2000
Porto Velho		E		P	E	A/C			I			*MSSR
Recife	Recife ACC	E		I	E	A/C			I			
Recife	Recife APP	T		I	T	A/C			I	ADS-C		
Río Branco		E		P	E	A/C			I			*MSSR
Río de Janeiro (Galeao)	Río APP	T		I	T	A/C			I			*MSSR
Salvador	Recife ACC	E		I	E	A/C			I			
Salvador	Salvador APP	T		I	T	A/C			I			
Sabtarém		E		P	E	A/C			I			*MSSR
Santiago	Curitiba ACC	E		I	E	A/C			I			
Sao Felix do Aragonia					E	A/C			I			*MSSR
S.Feliz do Xingu					E	A/C			I			*MSSR
Sao Gabriel Cachoeira	Manaus ACC	E		I	E	A/C			I			
Sao Luis		E		P	E	A/C			I			*MSSR
Sao Paulo	Sao Paulo APP	T		I	T	A/C			I			
Sao Roque	Brasilia ACC	E		I	E	A/C			I			
Sinop	Brasilia ACC	E		P	E	A/C			I			*MSSR
Tabatinga	Manaus ACC	E		I	E	A/C			I			
Tanabi	Brasilia ACC	E		I	E	A/C			I			
Tefé		E		P	E	A/C			I			*MSSR
Tirios					E	A/C			P*			*MSSR
Tres Marias	Brasilia ACC	E		I	E	A/C			I			
Vilhena		E		P	E	A/C			I			*MSSR

State(Territory)/Location Estado(Territorio)/Ubicación	ATS Unite Served Unidad ATS Servida	PSR			SSR				ADS		Remarks Observaciones
		Funtion Función	Coverage Cobertura (NM)	Status Impl. Estado	Funtion Función	Modes Modos (A,C& S)	Coverage Cobertura (NM)	Status Impl. Estado	Type Tipo	Status Impl. Estado	
1	3	4	5	6	7	8	9	10	11	12	13
CHILE											
Antofagasta	Santiago ACC Antofagasta APP	T		I	E/T	A/C		I*			*MSSR
Cerrillos	Santiago ACC				T	A/C		I*			*MSSR
Iquique	Santiago ACC Iquique APP	T		I	T	A/C		I			
Los Angeles	Santiago APP				E	A/C		I*			*MSSR
Puerto Montt	Puerto Montt APP	T		I	T	A/C		I			
Punta Arena	Punta Arena ACC Punta Arena APP	E/T		I	E/T	A/C		I			
Santiago	Santiago ACC Santiago APP	T		I	T	A/C		I*	ADS-C	P	*MSSR
Vallenar					E	A/C		I*			*MSSR
COLOMBIA											
Araraguara	Bogotá ACC Villavicencio APP				E/T	A/C	250	I*			*MSSR
Bucaramanga	Barranquilla ACC Bogotá ACC Bucaramanga APP Cúcuta APP				E/T	A/C	250	P			<2005
Cali	Bogotá ACC Cali APP	T	80	P	T	A/C	250	I*			*MSSR
Carepa	Barranquilla ACC Bogotá ACC Rio Negro APP	E/T	80	I	E/T	A/C/S	250	I*			*MSSR, <2004 Used SAC- ASTERIX Code
Carimagua	Bogotá ACC Villavicencio APP	E/T	200	I	E/T	A/C	200	I			
Cerro Maco	Barranquilla ACC Bogotá ACC Barranquilla APP Cartagena TWR Rio Negro APP	E/T	165	I	E/T	A/C	250	I*			*MSSR
Cerro Verde	Barranquilla ACC Bogotá ACC Barranquilla APP Cali APP Pereira APP Rio Negro APP	E/T	60	I	E	A/C	200	I*			*MSSR
El Dorado	Bogotá ACC Bogotá APP Villacencio APP	E/T	60	I	E/T	A/C	200	I*			*MSSR
Espinal	Bogotá ACC Bogotá APP				E/T	A/C	250	P			<2005
Leticia	Bogotá ACC Leticia APP Villavicencio APP	E/T	200	I	E/T	A/C	250	I			*MSSR <2004
Leticia (MIL)	Villavicencio APP	T	240	P	T	A/C	240	P			
Marandúa	Bogotá ACC	E/T	240	I	E/T	A/C	240	I			

State(Territory)/Location Estado(Territorio)/Ubicación	ATS Unite Served Unidad ATS Servida	PSR			SSR				ADS		Remarks Observaciones
		Funtion Función	Coverage Cobertura (NM)	Status Impl. Estado	Funtion Función	Modes Modos (A,C& S)	Coverage Cobertura (NM)	Status Impl. Estado	Type Tipo	Status Impl. Estado	
1	3	4	5	6	7	8	9	10	11	12	13
Pereira	Villavicencio APP Bogotá ACC Bogotá APP Cali APP Pereira APP Rio Negro APP				E/T	A/C	250	P			<2005
Ríoacha	Barranquilla ACC	E	240	I	E	A/C	240	I			
S. J. Guaviare	Bogotá ACC	E/T	240	I	E/T	A/C	240	I			
San Andrés (MIL)	Villavicencio APP Barranquilla ACC	E/T	240	I	E/T	A/C	240	I			
San Andrés	San Andrés APP Barranquilla ACC				E/T	A/C	250	I*			*MSSR, <2007
Santa Ana	San Andrés APP Bogotá ACC	E/T	165	I	E/T	A/C	250	I*			*MSSR
Tablazo	Cali ACC/APP Pereira APP Bogotá ACC Bogotá APP Cali APP Pereira APP Rio Negro APP	E/T	80	P	E/T	A/C	250	I/P*			*MSSR, <2004
Tubará (Barranquilla)	Villavicencio APP Barranquilla ACC Barranquilla APP San Andrés APP	E/T	80	I	E/T	A/C	250	I*			*MSSR
Villavicencio	Villavicencio APP	T	80	I	E	A/C	150	I			
COSTA RICA											
El Coco	El Coco APP	E/T		I	E/T	A/C	245	I*			*MSSR
CUBA											
Camagüey	Habana ACC Camagüey APP				E/T	A/C	200	I/P*			*MSSR
Habana	Habana TMA Habana APP	T		P	T	A/C	200	I/P*			*MSSR
Holguín	Habana ACC Santiago de Cuba TMA				E/T	A/C	200	I/P*			*MSSR
Menocal	Holguín APP Habana ACC Habana TMA Habana APP				E/T	A/C	200	I*			*MSSR
San Julián	Varadero APP Habana ACC				E	A/C	200	I/P*			*MSSR
Sta. Clara	Habana ACC				E	A/C	200	I/P*			*MSSR
DOMINICA											

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1	3	4	5	6	7	8	9	10	11	12	13
				NP				NP			
DOMINICAN REPUBLIC											
Barahona	Barahona APP	T	70	I							
Puerto Plata	Puerto Plata APP	T	70	I							
Punta Cana	Santo Domingo ACC Punta Cana APP	T	70	P	E/T	A/C	250	P*			*MSSR
Santo Domingo	Santo Domingo ACC Santo Domingo APP	E/T	70	I	E/T	A/C	250	I*			*MSSR
ECUADOR											
Guayaquil	Guayaquil ACC Guayaquil APP	E/T			E	A/C	200	I*			
Quito APP	Quito APP	T		I	T	A/C		I/P*			* 2000
EL SALVADOR											
El Salvador	El Salvador APP	T		I	T	A/C	200	I*			*MSSR
FRENCH ANTILLES											
Fort-de-France	Fort-de-France APP				T	A/C	250	I*			*MSSR
Point-à-Pitre	Point-à-Pitre APP				T	A/C	250	I*			*MSSR
GRENADA											
	Point Salines APP							N/P			
GUATEMALA											
C. Guatemala	La Aurora APP	T		I	T	A/C	250	I*			*MSSR
GUYANA											
	Georgetown ACC							N/P			
HAITI											
	Port-au-Prince ACC Port-au-Prince APP				E/T T	A/C A/C		P* P*			*MSSR *MSSR
HONDURAS											
San Pedro Sula	La Mesa APP	T		I	T	A/C	250	I*			*MSSR
JAMAICA											
Kingston	Kingston APP	T	60	I	E/T	A/C	250	I*			*MSSR
Montego Bay	Montego Bay APP	T	60	I	T	A/C	250	I*			*MSSR
Mount Denham	Kingston ACC	E	120	I	E	A/C	250	I*			*MSSR
MEXICO											
Acapulco	Acapulco APP	T		I	T	A/C	240	I*			*MSSR
Bajío Gto	México ACC Bajío APP				E/T	A/C, S	240	I*			*MSSR
Cancún	Mérida ACC Cancún APP	E/T	60	I	E/T	A/C	240	I*			*MSSR
Cerro Potosi	Monterrey ACC México ACC				E	A/C	240	I*			*MSSR

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		4	5	6	7	8	9	10	11	12	
1	3	4	5	6	7	8	9	10	11	12	13
Cerro Rusias	Mazatlán ACC México ACC Monterrey ACC				E	A/C	240	I*			*MSSR
Cerro Los Gallos	Mazatlán ACC México ACC Monterrey ACC				E	A/C	240	I*			*MSSR
Cerro Santa Eulalia	Monterrey ACC Chihuahua APP				E/T	A/C	240	I*			*MSSR
Guadalajara	Guadalajara APP	T	80	I	T	A/C	240	I*			*MSSR
Hermosillo	Mazatlán ACC Hermosillo APP Tijuana APP				E/T	A/C	240	I*			*MSSR
Los Mochis	Mazatlán ACC				E	A/C	240	I*			*MSSR
Mazatlán	Mazatlán ACC				E	A/C	240	I*			*MSSR
Mérida	Mérida ACC Mérida APP	E/T		I	E/T	A/C	240	I*			*MSSR
Cerro Sordo	México ACC Monterrey ACC				E	A/C	240	I*			*MSSR
Monterrey	Monterrey ACC Monterrey APP	E/T	80	I	E/T	A/C	240	I*			*MSSR
Peñón	México APP				E	A/C	240	I*			*MSSR
Puerto Peñasco	Mazatlán ACC				E	A/C	240	I*			*MSSR
Puerto Vallarta	Puerto Vallarta APP				T	A/C	240	I*			*MSSR
San José del Cabo	Mazatlán ACC				E	A/C, S	240	I*			*MSSR
Tampico	México ACC Mérida ACC Monterrey ACC				E	A/C, S	240	I*			*MSSR
Tijuana	Tijuana APP				T	A/C	240	I*			*MSSR
Toluca	México ACC Toluca APP	E/T	80	I	E/T	A/C	240	I*			*MSSR
Veracruz	México ACC Mérida ACC				E	A/C	240	I*			*MSSR
Villahermosa	México ACC Mérida ACC				E	A/C, S	240	I*			*MSSR
MONSERRAT (United Kingdom)								N/P			
NETHERLANDS ANTILLES (Netherlands)											
Willemstad	Curaçao ACC Curaçao APP	E/T	120	I	E/T	A/C	256	I*			*MSSR
Saint Maarten	Juliana APP	T	60	I	T	A/C	256	I*			*MSSR
NICARAGUA											
Managua	Managua APP	T		P	T	A/C	250	P*			*MSSR
Bluefields	Bluefields TWR				T	A/C	250	N/I			
PANAMA											
Panamá	Panamá ACC	T	60	I	E/T	A/C		I*			*MSSR

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		4	5	6	7	8	9	10	11	12	
1	3	4	5	6	7	8	9	10	11	12	13
PARAGUAY Asunción Ciudad del Este	Panamá APP Asunción ACC Ciudad del Este APP	T T	60 60	I I	E/T E/T	A/C A/C		I I			Sistema PSR y SSR necesita remplazo
PERU Arequipa Cusco Iquitos Lima	Arequipa APP Cusco APP Iquitos APP Lima ACC Lima APP	T T T T		P P P I	E E	A/C A/C		R R R I* I*			*MSSR, Se recomienda ampliar la cobertura de la FIR
PUERTO RICO (United States) Pico del Este San Juan	San Juan ACC San Juan APP	E/T		I	E T	A/C A/C		I I			
SAINT KITTS AND NEVIS									NP		
SAINT LUCIA	Santa Lucia APP							NP*			* Radar data sharing with Martinica planned/ Proyecto compartir datos radar con Martinica.
SAINT VINCENT & THE GRENADINES	E.T.Joshua APP							NP			
SURINAME								NP			
TRINIDAD & TOBAGO Piarco (15 NM north)	Piarco ACC Piarco APP	E/T		I	E/T	A/C	230	I*			*MSSR
TURKS & CAICOS IS. (United Kingdom) Grand Turks	Miami ACC				E	A/C		I			
URUGUAY Carrasco Durazno	Montevideo ACC Carrasco APP Montevideo ACC Carrasco APP	E/T	80	I	E/T E/T	A/C A/C	180 256	I* P			MSSR MSSR

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1	3	4	5	6	7	8	9	10	11	12	13
VENEZUELA											
Barquisimeto	Baruisimeto APP	T	60	I	T	A/C	200	I/P*			*MSSR
Isla Margarita	Margarita APP	T	60	I	T	A/C	200	I/P*			*MSSR
Maiquetía	Maiquetía ACC	E/T	60	I	E/T	A/C	200	I*			*MSSR
	Maiquetía APP										
Maracaibo	Maracaibo APP	T	60	I	T	A/C	200	I*/P*			*MSSR
Pto Ayacucho	Maiquetía ACC	E/T	60	P	E/T	A/C	200	P*			*MSSR
Cerro San Jacinto Puerto Ordaz	Maiquetía ACC	E/T	60	P	E/T	A/C	200	P*			*MSSR
Paramo La Negra , Edo Merida	Maiquetía ACC				E	A/C	200	P*			*MSSR
San Carlos de Rio Negro	Maiquetía ACC				E	A/C	200	P*			*MSSR
Santa Elena de Uairen	Maiquetía ACC				E	A/C	200	P*			*MSSR
VIRGIN IS. (United Kingdom)								NP			
VIRGIN IS. (United States)											
Saint Thomas	San Juan ACC San Juan APP	E/T		I	E/T	A/C		I			
COCESNA											
Cerro Santiago, Guatemala	CENAMER ACC				E	A/C*	245	I*			*MSSR-Modo S
Costa Rica	CENAMER ACC				E	A/C*	245	I*			*MSSR-Modo S
Grand Cayman, Cayman I.	CENAMER ACC				E	A/C*	245	I*			*MSSR-Modo S
Guatemala	CENAMER ACC				E	A/C*	245	I*			*MSSR-Modo S
Mata de Caña, Costa Rica	CENAMER ACC				E	A/C*	245	I*			*MSSR-Modo S
Puerto Cabezas, Nicaragua	CENAMER ACC				E	A/C*	245	I*			*MSSR-Modo S
Dixon Hill, Honduras	CENAMER ACC				E	A/C*	245	I*			*MSSR-Modo S
Monte Crudo, Honduras	CENAMER ACC				E	A/C*	245	I*			*MSSR-Modo S