ADS-B/ANP/1

INTERNATIONAL CIVIL AVIATION ORGANIZATION

RLA/06/901

First NAM/CAR/SAM Meeting/Workshop on Planning the Implementation of Automatic Dependent Surveillance - Broadcasting (ADS-B) (ADS-B ANP/1)

SUMMARY OF DISCUSSIONS

(Teleconferences, 02 to 04 March 2022)

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HISTORY OF THE WORKSHOP/MEETING

ii-1 WORKSHOP/MEETING DETAILS

The First NAM/CAR/SAM Meeting/Workshop on Planning the Implementation of Automatic Dependent Surveillance - Broadcasting (ADS-B/ANP/1), was held through teleconferences (Zoom), from 02 to 04 March 2022.

ii-2 OPENING

Mr. Fabio Rabbani, Regional Director of the ICAO South American Regional Office, welcomed the participants, highlighted the topics to be addressed and desired success in the deliberations. He then opened the workshop/meeting.

ii-3 LANGUAGES

The working languages of the workshop/meeting were Spanish and English (simultaneous interpretation). The documentation was presented in both languages.

ii-4 PARTICIPANTS AND ORGANIZATION

The Meeting was attended by representatives of the 22 States of the NAM/CAR/SAM Regions and COCESNA, 2 international organizations, 2 companies and ICAO Officers, totaling 107 people. The list of participants appears on page iii-1.

Mr. Francisco Almeida, CNS Regional Officer, acted as Secretary of the Meeting.

LIST OF PARTICIPANTS

ARGENTINA
1. Moira Callegare
2. Dario Ferrel
3. Adrian Capomasi
4. Daniel Lezcano
5. Andres Espina
6. Leonardo Gonzalez

ARUBA
7. Joselito Correa de Andrade

BARBADOS
8. Roderick Oliver
9. Gail Clarke
10. Tracia Smith

BERMUDA
11. Geoffrey Smith

BOLIVIA
12. Jaime Yuri Alvarez

BRAZIL
13. José Izidro Apolinario
14. Marcelo Melo Fagundes

CAYMAN ISLANDS
15. Wendell Prout
16. Sean Bridle
17. Cleavy scott

CHILE
18. Francisco Uzieda
19. Hector Ibarra
20. Francisco Gálvez
21. Christian Vergara
22. Alfonso de La Vega
23. Raúl Fernandez

COLOMBIA
24. Jaime Burbano
25. Jhon Sabogal
26. Harlen Mejia Oliveros
27. Carlos Alberto Gaitán Zárate
28. Breiner Medina
29. Xabier Beitia Rojas

COSTA RICA
30. Gabriel Qirós Pereira

CUBA
31. Lizet Toirac
32. Orlando Nevot

CURAÇAO
33. Jacques Lasten

ECUADOR
34. Luis Leon
35. Alba Cecilia Cifuentes Pinto
36. Jorge Zuñiga
37. Luis Tarira Veliz
38. Miguel Olmedo
39. Cesar Maldonado
40. Marcelo Valencia
41. Darwin Suarez
42. Manuel Santamaria

GUIANA
43. Rickford Samaroo

JAMAICA
44. Deano Ledford
45. Yannick Francis
46. Anphia Morgan

PANAMA
47. Daniel de Ávila
48. Cristino Vargas Racines
49. Hipólito Caballero

PARAGUAY
50. Vicente Martinez Carrera
51. David Torres
52. Emilio Molina

PERU
53. Giuliano Guzman
54. Sady Beaumont
55. Eloy Tafur
56. Guilermo Belevan

PERU
57. Maria Lopez
58. Paul Quintanilla
59. Mario Luis Matos Rivera
60. Rony Portilla Peña
61. Gloria Carbajal
62. Jonatan Portillo
63. Jián Mendoza Léon
64. Raúl Morón Zamorra
65. Johnny Avila
66. Ananias Gerardo Huaytalla Quiroz
67. Anibal Salazar
68. Manuel Cabredo Castro
69. Tomas Macedo
70. JoseEnver López Russac
71. Wilber Ruiz
72. Jorge Merino
73. Marco Vargas
74. Luis Perales

TRINIDAD & TOBAGO
75. Richard Haliday
76. Satnarine Maharaj
77. Adam Khan
78. Jason Small
79. Varun Sookra
80. Ann Edwards
81. Rupnarine Baboolal
82. Veronica Ramdath
83. Steve Saroop
84. Naresh Seeparsad
85. Ashley Lalman
86. Kent Ramnarace-Singh
87. Curtis Fraser

UNITED STATES
88. Rudolph Lawrence
89. Alejandro Rodriguez

URUGUAY
90. Marcos Vignolo

VENEZUELA
91. Jarumy Castillo
92. Kender Ferrer
93. Maribel Mayora

COCESNA
94. Roger Perez
95. Yeltsin Mejía
96. Cesar Augusto Nunez Aguilar
97. Ernest Arzu
98. Victor Andrade
99. Jose Manuel Flores
100. Pablo Luna

IATA
101. Kieran O'Carroll

IFALPA
102. Marcelo Ceriotti

AIREON LLC
103. Athayde Frauche

COLLINS AEROSPACE
104. Manny Gongora

OACI
105. Mayda Avila
106. Francisco Almeida
107. Javier Vittor

Agenda Item 1: Guides and documents published on ADS-B implementation

1.1 First, in this item of the Agenda, the participants took note of the events held in the last five years on the implementation of Automatic Dependent Surveillance – Broadcasting (ADS-B), which bring together various material on the subject.

1.2 The following events were indicated with their respective links to access the information provided:

- 2017: Workshop/Seminar on ADS-B implementation (Lima, 13-16 November). https://www.icao.int/SAM/Documents/2017-ADSB/Sumario%20de%20discusion%20ADS%20B.pdf

- 2018: ADS-B Implementation and Regulation Meeting for the NAM/CAR/SAM Regions (Mexico City, 26-30 November) https://www.icao.int/NACC/Pages/meetings-2018-adsb.aspx

- 2019: Automatic Dependent Surveillance – Broadcast OUT Implementation Meeting (ADS-B/OUT/M) (Ottawa, 21-23 August) https://www.icao.int/NACC/Pages/meetings-2018-adsbout.aspx

- 2021: Automatic Dependent Surveillance – Broadcast OUT Technical On-Line Workshop for the NAM/CAR Regions (ADS-B/OUT/W) (26-29 January) https://www.icao.int/NACC/Pages/meetings-2021-adsb.aspx

- 2021: ICAO/Industry Workshop: ADS-B & WAM/MLAT Technologies (10 February) https://www.icao.int/NACC/Pages/meetings-2021-adsb1.aspx

- 2021: ICAO/Industry Workshop: Surveillance Technologies (17 February) https://www.icao.int/NACC/Pages/meetings-2021-adsb2.aspx

1.3 The participants of the Meeting/Workshop were informed that, during the event held in Ottawa (2019), the document (CONOPS) of the Automatic Dependent Surveillance – Broadcasting (ADS-B) Concept of Operations (CONOPS), was revised and adopted as a reference for the NAM/CAR Regions.

1.4 During the ADS-B/ANP/1 Meeting/Workshop, a working paper (ADS-B/ANP/1 – WP/1) was presented, highlighting that the purpose of the document is to facilitate coordination among stakeholders who will be involved or affected by the implementation of services using ADS-B. Likewise, as a suggested action, it proposes the acceptance of the document, by the SAM States, as a reference guide for the implementation of the ADS-B.

1.5 The participants of the SAM States, reviewed the document, proposing some changes of form, and agreed on it as a reference guide for the implementation of the Automatic Dependent Surveillance – Broadcasting (ADS-B). The NAM/CAR/SAM Automatic Dependent Surveillance – Broadcasting (ADS-B) Concept of Operations (CONOPS) document can be accessed by the following link:

https://www.icao.int/SAM/Pages/MeetingsDocumentation.aspx?m=2022-RLA06901-ADSBYADSBANP1

1.6 The Secretariat stressed that the objective of this first Meeting/Workshop is to review and discuss the concepts recommended in the GANP Version 6 planning framework, adopted by the Regional Planning and Execution Group CAR/SAM (GREPECAS), for application in the preparation of the new

Volume III of the Regional Air Navigation Plan CAR/SAM, according to the GREPECAS Conclusion 19/05.

1.7 The participants were informed that, in the future, the regional air navigation plans should have an electronic version (eANP), enabling a more dynamic way of managing the proposed amendments, reviewing the plans and access it for consultation.

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Agenda Item 2: Instructions for use of the Template of Volume III of the Regional Air Navigation Plan - CAR/SAM ANP

2.1 On this topic of the agenda, a presentation was made regarding the "Instructions for the use of the Template of Volume III of the Regional Air Navigation Plan – ANP CAR/SAM". The said document was approved and validated at the Meetings e-PPRC/3 (August 2021) and GREPECAS/19 (October 2021) to support the activities of elaboration of Volume III of the Regional Air Navigation Plan - ANP CAR/SAM.

2.2 A brief review of the content of the ICAO GANP Portal was carried out, highlighting the new organization of four layers, as well as the conformation of the modules and elements of the ASBU framework and the tools offered by the portal to facilitate planning. It was remarked that the Portal will progressively include more digital facilities for Layer 3 - Regional and Layer 4 - National, and additional key performance indicators (KPIs) are also under development.

2.3 The importance of the preparation of Volume III of the ANP and the fundamentals of Volumes I and II were analyzed. Through the ANP CAR/SAM approved by GREPECAS, the consensus of the two Regions and the Industry is obtained on the priorities to achieve a safe, efficient and interoperable air navigation system, leading to the selection and implementation of operational or technical solutions of the ASBU (or non-ASBU initiatives) in a cost-efficient scheme and a continuous process of evaluation of the improvement of the performance of the aforementioned system.

2.4 Regarding the instructions, it was stressed that it is not intended to replace the GANP portal but to support the drafting of Volume III, which will be carried out by the members of GREPECAS. It points to the homogeneous understanding of the "six-step" planning method stipulated in ICAO Document 9883, applied to the templates provided by the ICAO Council for the aforementioned Volume. Personnel requirements are presented, based on multi-disciplinary teams, as well as data management that is relevant for the generation of key performance indicators (KPIs).

2.5 The instructions are aimed to facilitate the orderly transition from the planning documents currently supporting GREPECAS programs and projects, allowing the implementations that are in progress not to be affected (e.g. implementation of the PBN, transition AIS to AIM, etc.).

2.6 The instructions submit four appendices. These include an example for SWOT analysis and a synthesis of the GANP portal's performance framework, the ASBU threads and their interrelation with the nineteen KPI indicators developed to date. In addition, it includes an attachment containing the basic template for Volume III (English only).

2.7 It was noted that the material presented had been made available on the website of the Meeting/Workshop, and participants were encouraged to familiarize themselves with the Instructions, available in a bilingual version, and to integrate and strengthen the activities of elaboration of Volume III in their States.

2.8 Finally, the Meeting was invited to enter to the GANP portal site (only in Spanish), registering through the available login, which will give access to the AN-SPA tool designed to facilitate exercises for performance-based planning analysis for selected airspaces and airport scenarios. The link for access in the GANP portal is indicated below:

https://www4.icao.int/ganpportal/

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Agenda Item 3: ASBU Threads and Elements/Modules of CNS Technology and Services

3.1 Under this Agenda item, participants received information on the planning tools available on the GANP Portal (https://www4.icao.int/ganpportal).

3.2 The Secretariat encouraged participants to access and familiarize themselves with the functionalities provided in the GANP Portal, as an instrument for planning with a focus on the performance. This concept is employed in the new Regional Air Navigation Plan CAR/SAM (ANP CAR/SAM), with three volumes.

3.3 Meeting/Workshop participants noted the existence of a material (tutorial) on the GANP Portal website (https://www4.icao.int/ganpportal/Tutorial), which describes the Global Technical Level of the GANP multilayer structure. The objective of Level 2 is to support technical managers in planning the implementation of basic air navigation services and new operational improvements in a cost-effective manner.

3.4 The GANP Global Technical Level Tutorial is structured in 4 parts:

- Part I – El Marco BBB (Base Building Blocks)
  - Introduction
  - BBBs Verification

- Part II – The ASBU (Aviation Systems Block Upagrade) Framework
  - Introduction
  - Main concepts and updates (of Version 6)

- Part III – A globally harmonized performance management process
  - Introduction
  - Outile of the six step method & AN-SPA

- Part IV – The GANP Performance Framework
  - Introduction
  - Performance Objectives
  - KPIs
  - ASBU performance assessment

3.5 Participants received a brief explanation of the concepts of the GANP planning framework. It has been indicated that in Version 6 of the GANP there are 3 Threads:

- Information: consisting of 4 groups of Elements;
- Operational: consisting of 14 groups of Elements; and
- CNS Technology and Services: made up of 4 groups of Elements.

3.6 An ASBU element is a specific change in operations designed to improve the performance of the air navigation system under specific operational conditions. In short, the ASBU Elements are specific operational improvements. To ensure the complete realization of the development of operational improvements, different enabling components necessary for the implementation of the Elements were identified.

3.7 ASBU Enablers are components (standards, procedures, training, technology, etc.) required for the implementation of the Elements.

3.8 The objective of the ASBU Enablers is to identify the stakeholders involved in the implementation of the ASBU Elements, as well as the necessary requirements, in order to ensure an effective implementation. Some of the enablers can be elements in other Threads, for instance: avionics and ground systems of the Technology Thread.

3.9 ASBU Block is a key concept in the updated framework. An ASBU block is the end date of a six years timeframe that defines a deadline for a Element to be available for implementation. This implies, that the element and all enablers associated to it, need to be available for implementation by the ASBU block year.

3.10 The last concept in the updated framework is ASBU Module. An ASBU Module is the group of Elements from a thread that, according to the enabler's roadmap, will be available for implementation within the defined deadline stablished by the ASBU Block.

3.11 Waze's brilliant co-founder and serial entrepreneur, Uri Levine, is credited with the phrase, "Fall in love with the problem, not the solution," enunciated at the Techcrunch Disrupt conference in London in 2014. This sentence is perfectly applicable in the performance-based planning framework of the GANP, and planners must know in depth the current context, the needs and what is missing, and then carry out a process within an adopted methodology (six-step method), identifying all the enabling components, to successfully conclude the implementation of the planned improvement.

3.12 It should be noted that this planning process must be carried out by a multidisciplinary team of professionals from the aeronautical context, with the effective participation of representatives of the aeronautical authority, regulator, air navigation service providers, aircraft operators and the Industry.

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Agenda Item 4: Information required for the ADS-B implementation planning

4.1 Under this Agenda Item, a Brazilian representative from DECEA presented the initiatives in Brazil for implementation of ADS-B OUT. The presentation is available at the following link:

https://www.icao.int/SAM/Documents/2022-RLA06901-ADSBYADSBANP1/5.%20ADS-B%20OUT%20Implementation%20in%20Brazil.pdf

ADS-B implementation in Campos Basin (TMA Macaé)

4.2 Initially, the Brazilian representative explained that the efforts to make the ADS-B operational are part of a strategic program developed by DECEA for the evolution of the national ATM, called SIRIUS BRAZIL.

4.3 The full deployment of ADS-B OUT 1090ES in TMA Macaé was explained, highlighting the operational demand, the technical solution, the main challenges for the implementation and some lessons learned.

4.4 The region, relevant for its oil concentration, corresponds to a remote area of approximately 100 thousand km^2, subordinate to Macaé Terminal Control Area (TMA-ME), extending beyond 120 NM from the coast. The air operations are performed by helicopters flying from 500ft to 4500ft between the continent and the prospection platforms for the transportation of loads and people.

4.5 The main purpose was to provide a better provision of air navigation service to aircrafts (helicopters) operating in the Campos Basin (oceanic part of TMA Macaé), allowing a better occupation of the airspace, reducing separations and fuel consume, resulting in a remarkable improvement of safety in the operations.

4.6 Six ADS-B stations and one central processor were installed, in order to provide complete coverage from 500 ft MSL to FL145. The ADS-B system implanted in the TMA has the capacity to receive information according to Extended Squitter Message Version 0, Version 1 and Version 2, considered in DO 260, DO260A and DO260B, respectively.

4.7 ADS-B, along with other automation, meteorology and communication capabilities, integrated to APP Macaé, allowed the use of minimum separations of 5 NM.

4.8 An exclusive ADS-B airspace was created to ensure ATM homogeneity. This is the portion belonging to the Macaé TMA and its projections, whose the use of the mode S transponder with ADS-B 1090 ES is mandatory for the receipt of the ATS Surveillance Service by APP-Macaé.

4.9 Currently, 100% of the helicopters flying in that region are already equipped with the avionics ADS-B 1090 ES. State aircrafts, not equipped with ADS-B 1090 ES, may be allowed to enter such airspace, for specific missions, prior coordination with APP. Likewise, aircraft not equipped with ADS-B involved in SAR missions, transport of patients or serious injuries will also be assisted, through prior coordination with APP Macaé.

4.10 The project was challenging because of its unprecedented nature, besides requiring coordination for embarkation in maritime units, raising awareness of users, developing new regulations, equipping more than 120 aircraft of different 7 operators, ATC system adequacy, ATCO and maintenance personnel training, continuous security risk management and post-implementation strategy.

4.11 The successful result was achieved thanks to synergy among representatives of the aeronautical community, consolidating a legitimate work of collaborative decision-making (CDM) among stakeholders, such as DECEA, Brazilian Navy, PETROBRAS, INFRAERO (Brazilian Airport Infrastructure Company), all the offshore region helicopter operators, ANAC (National Civil Aviation Agency) and industry, with a common purpose: ensuring safety and efficiency of air operations.

4.12 Since November 2018 the TMA-Macaé operates with surveillance information supported by ADS-B and RADAR. From that date, there is an ADS-B mandate to the oceanic airspace of the TMA-ME between 500ft and FL 145.

4.13 Following, the Brazilian representative provided information about the project to implement ADS-B OUT stations in the continental area of Brazil.

Continental ADS-B implementation Planning

4.14 The Brazilian administration began negotiations to establish 66 terrestrial ADS-B stations in its territory, with the objective of providing better and more accurate surveillance data, which potentially include, for example: accuracy and integrity indicators of navigation data, aircraft selected altitude and heading - supporting the use of the 4D path and the reduction of the time needed for ATM decision making.

4.15 For the operationalization of ADS-B in continental Brazilian airspace, four priorities were established based on two main parameters: homogeneous ATM areas and main air traffic flows.

4.16 The project is structured in four phases of implementation, which meet the operational needs:

- Phase 1: Routes above FL245 and major TMA (SP, RJ, BS, SV, RF, PA, CT, FL) - (2023) - extension of the EURO-AM Corridor (between Europe and South America), for surveillance coverage, along the entire length of the UM654, UN741, UN8857, UN866, UN873 and UZ18 airways.
- Phase 2: Central and North area above FL245 - (2023) - surveillance coverage along the entire length of the UA312, UA317, UB680, UL201, UL304, UL795 and UZ13 airways, taken as a reference for this implementation phase;
- Phase 3: Complementary routes above FL245 - (2024) - surveillance coverage along the entire length of the UL306, UL540, UM799, UW33, UZ2, UZ4, UZ7, UB554, UL309, UL655, UL793, UM402 and UM415 airways, which will be the references for the last phases of implementation.
- Phase 4: Complementary routes above FL245 (remotes sites) - (2025) - the terrestrial infrastructure to service the ADS-B OUT surveillance will be fully implemented, providing coverage above FL245 and the main TMA.

4.17 DECEA initiated studies to identify the need for a future mandate in the Brazilian airspace. To date, there is no provision for a mandate in the next five years. If the need to establish a mandate in the future is identified, the aviation community will be invited to participate in the implementation plan from the beginning, establishing the timing of regulations, allowing sufficient time for operators to equip.

4.18 Even with the introduction of ADS-B, DECEA will keep its non-dependent surveillance layer since these radars would be immune to failures or abnormalities that may occur in positioning systems based on satellites. In addition, RADAR systems will be maintained, in order to guarantee an additional means for aeronautical surveillance as well as to support the transition phase, providing surveillance services to unequipped users.

4.19 The Brazilian representative recognized that the operationalization of ADS-B in continental airspace will be much more complex and should have a much more comprehensive approach than the work that was carried out for the implementation of ADS-B in the Campos Basin.

4.20 Finally, the Brazilian representative presented a list (not exhaustive) of important aspects to be considered in the planning process of ADS-B implementation:

4.21 **Operational Aspects**:

a) Detail the objectives/actual benefits for the ATM and for aviation;
b) Define the airspace for operationalization and its complexity – phased operationalization? Best Equipped Best Served?;
c) Define the minimum separation between aircrafts to be applied;
d) Evaluate the standards in force, identify those that will be impacted, edit new publications (AIP, AIC, etc.);
e) Evaluate the impact of the use of ADS-B on the Operational Doctrine for the ATC;
f) Assess the need for an Operational Training for ATCO and Simulations;
g) Define the version of ADS-B to be adopted – the version to be adopted must be aligned with the desired operation and with regional/global interoperability strategies;
h) Assess of which RNP and ADS-B requirements with GNSS will enable the required operations;
i) Develop ATC doctrine for handling GNSS unavailability occurrences (NOTAM?);
j) Assess how will the GNSS availability prediction information be presented and handled by ATCO;
k) Define the airspace access strategy: Mandate x airspace access priority for aircraft with operational ADS-B equipment?;
l) If there is ADS-B-OUT Mandate: delimit the Airspace, define the start date, inform what requirements for ADS-B avionics are necessary to fly in the designated airspace; and
m) ADS-B Risk Assessment.

4.22 **Technical Aspects**:

a) Defines the technical and logistical requirements for the infrastructure that meet the operational demand;
b) Recognize the standards to be adopted: ref. MOPS, TSO, AC, RTCA, Doc;
c) Define acceptable NIC, NACp, NuC, SiL requirements – in line with desired operation;
d) Define the required RNP (NACp, NiC, SiL values for GNSS support the definition of RNP);
e) Define how monitoring requirements will take place;
f) Definition of valid thresholds (to be accepted) for the airspace of interest (in Route and/or in Terminal;
g) ADS-B Spectrum security – assessment of spectrum security and congestion in the medium and long term;
h) Develop cybersecurity actions for the ADS-B network;
i) Integration - How will be the ADS-B position validation?;
j) Define how GNSS availability monitoring will occur;
k) GNSS Navigation System Requirements - (ADS-B relies on data obtained from a navigation system (typically GNSS) to enable its functions and performance). Therefore, the navigation infrastructure must meet the corresponding requirements of

the ADS-B application, in terms of: a) Data items; and b) Performance (eg accuracy, completeness, availability, etc.). - but does not preclude the use of another navigation source method;

l) Recognize the quality of ADS-B performance systems vs MSSR system;
m) Integrate ADS-B surveillance data into the ATFM center;
n) Define training for technical maintenance teams;
o) Define routine for recording, maintenance and local analysis of ADS-B data;
p) Define the correlations accepted by the ATC System (Flight ID and/or ICAO Address of the aircraft) – to support correct orientation of filling in the ACFT/ID and Item 18 fields of the flight plan);
q) ATC System: Identify the necessary improvements (new requirements) to the ATC system in consideration of the expected ATM operation;
r) Define the ASTERIX Cat.21 protocol version to be used; and
s) Define which groups (group 1 - mandatory, group 2-desirable, group 3-optional) of the ASTERIX protocol will be available (depending on operational demands/ATM objectives).

4.23 **Management Aspects**:

a) Develop a Project Implementation Plan;
b) Structure a Project Team/Implementation Team;
c) Encourage a collaborative decision-making process with all stakeholders;
d) Monitor the fleet ADS-B qualification status (survey/follow-up);
e) Encourage the disclosure of the project status and its benefits (management expectations);
f) Guide/Support the aeronautical community;
g) Coordinate reviews (as necessary) of avionics certification processes and crew operational approval;
h) Planning for a technical-operational TRIAL under appropriate conditions;
i) Develop appropriate post-implementation monitoring and review processes; and
j) Establish a methodology for continuous reporting, monitoring events, results of incidents, and observations on ADS-B operations.

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Agenda Item 5: Specific Concept of Operations (CONOPS) to each State for the implementation of ADS-B

5.1 Under this agenda item, participants received a presentation from a representative of COCESNA on the Concept of Operations of Space-based ADS-B Surveillance (SB ADS-B) for remote (oceanic) areas of FIR CENAMER.

CONOPS of Space-based ADS-B Surveillance

5.2 The objective of the presentation was to provide participants with an example of structuring a CONOPS, as an important instrument to recognize the operational problems of the current context, identify the gaps and glimpse the future context, pointing out all the components that need to be implemented, to achieve the required improvement.

5.3 The CONOPS document prepared by COCENA has the following structure:

1. **Objective**
2. **Purpose and Scope**
   - Introduction to Space-based ADS-B
   - Current equipment
   - Reason for Change
3. **Current Operational Environment**
   - Airspace Structure
   - CNS Systems
   - Operating Procedures
   - Minimum Separation
   - Flight Planning and Coordination
4. **Proposed Operational Environment**
   - Pre-Implementation Assumptions
   - Changes Introduced by this CONOPS
     a) ADS-B Satellite Surveillance
     b) Flight Conformity Monitoring
     c) Speed control
     d) Human Factors
     e) Interaction with Adjacent Ocean Airspaces
     f) Reduction of Minimum Separation
5. **Contingency**
   - Operations in Contingency Mode: unplanned
   - Operations in Contingency Mode: planned

5.4 The full document is available at the following link (only in Spanish):

https://www.icao.int/SAM/Documents/2022-RLA06901-ADSBYADSBANP1/3b.%20CONOPS%20ADS-B%20Espacio%20Aereo%20Oceanico%20COCESNA.pdf

5.5 It is important to highlight what is expressed, concisely and directly, in item 2 - Purpose and Scope: "The purpose of this CONOPS is to describe the **operational need** and **expectation** of COCESNA when implementing Space-based ADS-B surveillance in the upper oceanic airspace of the Central American FIR".

5.6 In the ASBU planning framework of the Global Air Navigation Plan (GANP) Version 6, it is essential to identify the Elements of improvement existing in the three Threads (Operational, Information and CNS Technology/Services) of the methodology; being necessary, before any implementation initiative, to know the problem and have a clear notion of what results are expected.

Safety Case for Space-based ADS.B Implementation

5.7 In addition to the CONOPS presentation, the COCESNA representative has provided the participants of the Meeting/Workshop with a presentation of the work done for the preparation of the Safety Case for the implementation of Space-based ADS-B Surveillance.

5.8 The Safety Case is the assurance in documented form (argument and supporting evidence) of the achievement and sustenance of operational safety, constituting the main means by which those responsible for changes in the ATM system or the continuous provision of ATM services, ensure that those services or changes achieve and will continue to achieve an acceptable level of security.

5.9 Additionally, the Safety Case must provide the relevant regulatory authorities with the guarantee of compliance with the requirements and regulations established, in order to obtain regulatory approval or corresponding acceptance.

5.10 The Safety Case is a means of compliance within the framework of the SMS for the documentation and registration of operational safety aspects as part of the management of change in an ATM system.

5.11 The Safety Case for the implementation of Space-based ADS-B Surveillance was the first work of its kind developed internally by COCESNA, being led by the SMS coordinator of the Corporation, with the involvement of a multidisciplinary team of experts.

5.12 COCESNA employed the GSN methodology – Goal Structured Notation, developed at the University of York (UK) in the nineties, being the main methodology for the elaboration of the safety assurance structure and the graphical visualization of the Safety Case.

5.13 GSN is a graphical argument notation used to document and explicitly display the elements and structure of an argument and the relationship of the argument and its sub-arguments to evidences.

5.14 The presentation on the Safety Case carried out by COCESNA can be accessed through the link below (only in Spanish):

https://www.icao.int/SAM/Documents/2022-RLA06901-ADSBYADSBANP1/Agenda%20Item%205%20-%20Presentaci%C3%B3n%20Safety%20Case%20SB%20ADS-B%20COCESNA-EA%20FINAL.pdf

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Agenda Item 6: Review of the information regarding the aeronautical surveillance planning of Volume II of the CAR/SAM ANP

6.1 Under this item on the Agenda, the Secretary stressed that in addition to the preparation of Volume III, the work assigned by GREPECAS includes the review and updating of Volumes I and II of the Regional Air Navigation Plan CAR/SAM (ANP CAR/SAM).

6.2 In this regard, it is appropriate that the NAM/CAR Region Surveillance Task Force and the CNS/SUR Subgroup of the Interop TF of the SAM Region Implementation Group (SAM/IG) review the **Table CNS II-CARSAM-5 – Surveillance Systems Plan**. The **Appendix** of this part of the Summary of Discussions presents an excerpt (first 2 pages) from Table CNS II-CARSAM-5.

6.3 With the review work, the two groups should consider implementing changes in the format of the table and in the type of information to be presented, taking into account the methodology used in the ASBU planning framework of the Global Air Navigation Plan (GANP) Version 6.

6.4 The NACC and SAM Offices will be supporting the work carried out by the groups for the updating of Table CNS II-CARSAM-5 and providing for the processing of the Proposal for Amendments (PfA) to the CAR/SAM Regional Air Navigation Plan, for approval of the changes.

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Appendix

TABLE CNS II-CARSAM-5- SURVEILLANCE SYSTEMS PLAN

EXPLANATION OF THE TABLE

Column	
1	Name of State/Territory and location of the radar station
2	Air traffic services unit served by the facility
3	PSR/Function - Primary surveillance radar/Function E - En-route area control centres T - Terminal
4	Coverage of primary surveillance radar in nautical miles
5	SSR/MSSR/Function - Secondary surveillance radar/ Monopulse secondary surveillance radar/Function E - En-route area control centres T - Terminal
6	SSR/MSSR/Modes - Modes A, C or S
7	Coverage of secondary surveillance radar in nautical miles
8	ADS-B/Function — Automatic dependent surveillance-Broadcast/ Function E — En-route area control centres T — Terminal
9	ADS-C/Function — Automatic dependent surveillance-Contract/ Function C — Continental Airspace O — Oceanic Airspace
10	MLAT/Function — Multilateration /Function E — En-route area control centres T — Terminal
11	Remarks

State(Territory)/Location Estado(Territorio)/Ubicación	ATS Unit Served Unidad ATS Servida	PSR		SSR			ADS-B	ADS-C	MLAT	Remarks Observaciones
		Function Función	Coverage Cobertura (NM)	Function Función	Modes Modos (A,C& S)	Coverage Cobertura (NM)	Function	Function	Function	
1	2	3	4	5	6	7	8	9	10	11
ANGUILLA (UK)										
ANTIGUA & BARBUDA										
	V.C. Bird APP			T	A/C	180				*MSSR
ARGENTINA										
Bahia Blanca, Airport	Ezeiza ACC			E/T	A/C	200				*MSSR
	Bahia Blanca TMA/APP									
Ceres	Cordoba ACC						E/T			
Córdoba, Airport	Córdoba ACC			E/T	A/C	200				
	Córdoba TMA/APP									
Corriente Airport	Resistencia ACC			E/T	A/C	200				*MSSR
	Resistencia TMA/APP									
Comodoro Rivadavia Airport	Com. Rivadav. ACC			E/T	A/C	200				*MSSR
	Com.Rivad. ACC									
Esquel Airport	Com. Rivad.ACC			E/T	A/C	200				*MSSR
	Esquel TMA									
Ezeiza, Airport	Ezeiza ACC	T	90	E	A/C	220				
	Buenos Aires TMA/APP									
	Ezeiza ACC			E/T	A/C	200				*MSSR
	Buenos Aires TMA/APP									

Agenda Item 7: Status of implementation in the States of the CAR/SAM Region

7.1 Under this item of the Agenda, participants were invited to express the initiatives and status of the ADS-B implementation in their States/Organizations.

7.2 Following are the initiatives of the States that submitted their comments:

Argentina

7.3 In February 2022, ANAC approved the preliminary draft for the Modernization of the Air Traffic Surveillance System presented by the air navigation service provider EANA S.E. This preliminary project consists of the technological update of the 22 secondary radars, manufactured INVAP, currently operational incorporating Mode S and ADS-B; the replacement of primary and secondary radars Modes A/C/S with ADS-B and meteorological channel for Terminal Baires, Córdoba and Mendoza; 2 new secondary radars Mode A/C/S and ADS-B to be installed in FIR Comodoro Rivadavia and 5 ADS-B stations to expand aeronautical surveillance coverage. The planning contemplates that the implementations of the sensors will begin in 2023 and will be developed progressively until 2025.
Also began
7.4 The operational approval process of the new radar sensor developed by INVAP that integrates mode S and ADS-B technology to be installed at Paraná Airport is currently underway. This sensor is the first of the upgrade stage of the remaining 21 radars manufactured by INVAP and also began the project of updating the Indra Secondary Radar of Ezeiza to Mode S integrating ADS-B.

7.5 The planned improvement of the existing radars incorporating the S mode and ADS-B technology and the addition of new ADS-B systems and stations, will allow to progressively incorporate experience in the use of ADS-B. Although the planning does not contemplate in the short term the use of the Space-base ADS-B system in Argentina, it is of interest to know the evolution, costs and operational use of the SB ADS-B.

Barbados

7.6 Barbados has set a deadline of 1 January 2023 for the transition to a fully ADS-B compliant environment within the Adams TMA.

Stakholders Meeting

7.7 During December 2021, a meeting was held with all stakeholders. This meeting was convened to inform stakeholders of the transition and to determine any challenges they may face that may prevent them from meeting the planned date. Comments expressed during the meeting supported the transition to the ADS-B environment and highlighted many of the benefits that will be achieved.

Regulations

7.8 The updating of the Regulations is at an advanced stage.

Activities scheduled for 2022 (Operational Requirements)

7.9 Completing the required objectives where applicable in the Design Phase of the implementation inclusive of the following:

- Development of ADS-B procedures; and

- Training for Staff & technical support personnel.

Ongoing Collaboration with Stakeholders

7.10 It is expected that the next meeting will be held with the stakeholders during the month of May 2022 to inform them of the progress that has been made and to ascertain if there are any challenges and how they can be resolved.

Status of the Infrastructure

7.11 The current status of the infrastructure is as follows:

- **Automatic Dependent Surveillance – Broadcasting (ADS-B)**:
  - Ground system infrastructure: surveillance ADS-B ground stations (completed);
  - Ground system infrastructure: Technical systems HMI that supports controller awareness. (completed);
  - Airborne system capability Surveillance SSR Mode S transponder with extended squitter version 0, version 1 and 2. (Further Development required).
    Note: Currently over 80% of traffic activity within the Adams TMA is ADS-B equipped.

- **Multilateration surveillance Systems (MLAT)**:
  - Ground system infrastructure Surveillance MLAT ground stations (completed);
  - Airborne system capability surveillance SSR Mode A, C and s transponders (completed);
  - Ground system infrastructure surveillance service delivery point(s) for MLAT information.

Bolivia

7.12 In Bolivia there is a new ANSP (formerly AASANA now NAABOL), with just three months of life and new staff.

7.13 The planning is not yet known and there are several gaps in the implementation of the SSR, already installed and not yet "operational", directing efforts for the implementation of ADS-B would further complicate the current situation.

7.14 The DGAC is planning to hold an induction seminar oriented to the use of the GANP (Version 6) and the evolution/update of the ANP to the eANP, surely documentation and support will be requested from the Regional Office for this purpose.

Brazil

7.15 Considering the vastness of the flight information regions under its responsibility, Brazil has a great challenge, which is to provide surveillance, to comply with existing ATS precepts, in accordance with ICAO guidelines.

7.16 The strategic program of DECEA (Department of Brazilian Airspace Control) for the evolution of Brazilian air traffic management, SIRIUS-Brazil, aligned with the recommendations contained in Doc. 9750 and with ASBU, considers the implementation of several surveillance systems to meet the identified operational demands, contributing to the evolution of future ATM concepts.

7.17 Current surveillance is mainly based on primary and secondary radars. Brazil also has an ADS-C system for application in the EUR/SAM corridor (FIR-AO), since 2009, with CPDLC capabilities, and a small ADS-B network installed in an offshore region, near Rio de Janeiro.

7.18 The ATC and APP Centers in Brazil are equipped with SAGITTARIUS software, which is already prepared to integrate ADS-B signals (because it already has ADS-C incorporated) in addition to the previously established radar links. This system has already undergone major updates and aims to automate the procedures for visualizing and integrating data from the various existing surveillance sensors.

7.19 The first deployment of ADS-B by Brazil occurred in November 2018 in the Campos basin, TMA-Macaé. The structure and services of Air Traffic in TMA-Macaé were implemented to support, mainly, the air operations of interest of the oil activity that is characterized by the movement of helicopters between the continent and the platforms or boats anchored in that Dock, in the oceanic zone, for logistical transport.

7.20 The operational advantages of the NRA ADS-B in TMA-Macaé include a significant improvement of Air Traffic Services in the ocean area, where low-altitude helicopter traffic prevails, improved air traffic management and SAR Service. To support the implementation of ADS-B, an infrastructure of 6 stations located on land and on platforms has been strategically deployed to provide the necessary coverage for the provision of the ATS Surveillance Service to aircraft operating at low altitudes in the ocean. Ads-B, along with other ATS communication and automation capabilities, allow the APP to provide a minimum separation of up to 5 NM between aircraft flying at low altitude, allowing for the reclassification of TMA-Macaé airspace to provide a better level of services to aircraft operators.

7.21 There is a project similar to the Campos Basin project for the application of ADS-B in the Santos Basin, also with the implementation of 6 ADS-B sensors on land and on platforms, to be operational from 2023 on.

7.22 It is important to note that a project is being executed to support all surveillance over the territorial area, with the implementation of continental ADS-B systems. This ADS-B system is being sized to provide surveillance service throughout the continental upper airspace from FL 245, as well as in the main THAs of the country, considering the trajectories of the SID and STAR procedures. The deployment of 66 ADS-B sensors is contemplated throughout the national territory, in four phases, from 2023 to 2025.

7.23 DECEA has initiated studies to establish a mandate for ADS-B in continental Brazilian airspace. The establishment of a mandate is not yet foreseen, at least for the next 4 years.

Cayman Islands

7.24 The Cayman Islands Airports Authority (CIAA) is just starting its ADS-B and Surveillance project. It is still very much in the early stages.

7.25 The CIAA recognizes that it has to implement a surveillance solution and is very keen to push ahead with this extremely important project. The CIAA intends to engage a consultant to advise on what direction the authority should take with regard to a surveillance solution for the Cayman Islands TMA.

7.26 The project has been severely delayed by the COVID pandemic, but is now starting to gain momentum. It is intending to engage with a suitable consultant very early in 2023.

7.27 During the first planning meetings, several solutions were discussed, but surely an SME in the field of surveillance will be able to point the right direction.

7.28 The CIAA hopes to implement a suitable Surveillance/ADS-B solution with all the benefits it will bring.

Chile

Evolution of ADS-B in the DGAC/Chile

Studies

7.29 In 2013, the North American company EXELIS Inc developed a feasibility study to provide low-level surveillance between the Cochrane area and Puerto Montt. The study considered secondary radars, multilateration and ADS-B. As a result, the installation of ADS-B equipment was mainly proposed.

7.30 In 2019, the Subdepartment of Systems developed a study to provide low-level surveillance in all those areas not covered by radar systems throughout the country. It concluded that a total of 14 ADS-B stations are required.

Testing with portable ADS-B equipment

7.31 During 2015, the following tests were carried out with portable ADS-B equipment owned by the DGAC:

1) El Loa/Calama Aerodrome

Antenna installation	TWR top
Testing period	20 days (11 – 30.JUN.2015)
Total operations in the 20 days	684
Total operations with aircraft equipped with ADS-B	489 (71,5%)
Average of operations per day	34
Average operations of aircraft equipped with ADS-B	24

2) La Florida/La Serena Aerodrome

Antenna installation	TWR top
Testing period	20 days (25.AUG – 13.SEP.2015)
Total operations in the 20 days	627
Total operations with aircraft equipped with ADS-B	294 (47%)
Average of operations per day	31
Average operations of aircraft equipped with ADS-B	15

3) Diego Aracena/Iquique Aerodrome

Antenna installation	TWR top
Testing period	20 daus (23.SEP – 12.OCT.2015)
Total operations in the 20 days	1675
Total operations with aircraft equipped with ADS-B	435 (26%)
Average of operations per day	84
Average operations of aircraft equipped with ADS-B	22

4) Chacalluta/Arica Airport

Antenna installation	TWR top
Testing period	20 days (6 – 25.NOV.2015)
Total operations in the 20 days	330
Total operations with aircraft equipped with ADS-B	223 (68%)
Average of operations per day	16,5
Average operations of aircraft equipped with ADS-B	11

5) El Tepual/Puerto Montt Airport

Antenna installation	TWR top
Testing period	20 days (17.DIC.2015 – 5.JAN.2016)
Total operations in the 20 days	1.254
Total operations with aircraft equipped with ADS-B	456 (36%)
Average of operations per day	63
Average operations of aircraft equipped with ADS-B	23

6) Balmaceda/Balmaceda Aerodrome

Antenna installation	TWR top
Testing period	20 days (30.APR – 19.MAY.2016)
Total operations in the 20 days	210
Total operations with aircraft equipped with ADS-B	161 (77%)
Average of operations per day	10,5
Average operations of aircraft equipped with ADS-B	8

Surveillance projects under development including ADS-B

7.32 To provide surveillance to the El Loa de Calama Aerodrome, a surveillance project is in full development that includes primary radar, secondary radar and a dual ADS-B station. It is estimated that the system will enter into operations in the month of April of the year 2023.

7.33 The renovation project of the surface movement surveillance system of the AMB Airport is under development. This project, among others, includes the renovation of the surface radar (SMR) and the installation of 42 MLAT/ADS-B antennas. It is estimated that this system will enter into operations in the month of March 2023.

COCESNA

7.34 COCESNA, as shown in the presentation on the Safety Case of the Implementation of ADS-B Satellite Surveillance, considers it essential to work together and involve all stakeholders in a process of implementation of ADS-B in the region in a coordinated and homologous manner.

7.35 COCESNA has in continental airspace and in the Caribbean, a Double Layer of Surveillance, a primary layer provided by a network of Secondary Radars Mode S and a secondary layer of ADS-B receivers, which increases Operational Safety through the overlapping of coverage and the sharing of Radar data.

7.36 Through the installation of the ADS-B receiver network within the COCESNA FIR and through a software development carried out by the It Technology staff, it was possible to begin collecting information on the equipment of the aircraft that transit the upper airspace of the region, the ADS-B standard they use and the percentage of aircraft equipped. All of the above gave rise to the development of a CONOPS for the Terrestrial ADS-B using the CONOPS of the Surveillance Group of the NAM/CAR Region, as well as the basis for the analysis from there of the information of the fleet that covered the Pacific Ocean, with the intention in that environment of implementing the Space-based ADS-B, as a surveillance solution.

7.37 In the case of Space-based ADS-B, by verifying the high percentage of aircraft in the airspace of the Pacific Ocean with transponders enabled to send and process ADS-B information, it made it possible to analyze and hire a provider for this service, prior development as in the previous case of CONOPS.

7.38 It is important to note that for an implementation of a technology like this, it is essential to know the characteristics of the traffic that flies over a region, the equipment of the aircraft, the ability of the Control Centers to process and deploy ADS-B information, the competencies of air traffic personnel, maintenance personnel and other elements of the solution, all of which makes a deep analysis necessary, from an approach where not only efficiency but operational safety is prioritized, that is where the execution of a Safety Case becomes vital.

7.39 As indicated during the Workshop, to maximize the operational benefits of the implementation of ADS-B, it must be undertaken with a regional approach, which brings all members of the NAM/CAR/SAM regions to a common base level. Although one cannot fail to observe the particularities, limitations and different interests that may arise between different countries or regions, this regional approach enhances the benefits of a planned implementation.

7.40 El intercambio de experiencias entre diferentes proveedores de Servicios y de los Estados que han implementado o están en proceso de implementación del ADS-B, es una ayuda necesaria y conveniente para hacer estos esfuerzos más eficaces y efectivos.

Colombia

7.41 The representatives of Colombia made a presentation describing the initiatives for the implementation of ADS-B Surveillance. In the link below allows access to the presentation:

https://www.icao.int/SAM/Documents/2022-RLA06901-ADSBYADSBANP1/Agenda%20Item%207%20-%20IMPLEMENTACION%20ADS-B%20COLOMBIA.pdf

7.42 The implementation of ADS-B in Colombia has 25 ground stations and 2 mergers, providing practically full coverage in the FL245.

7.43 Automatic Dependent Surveillance Broadcasting (ADS-B) may be used in combination with other ATS surveillance systems such as Primary Surveillance Radar (PSR), Secondary Surveillance Radar (SSR–SSR/MODO S), in the following configuration and scenario to provide air traffic services:

- **ADS-B RA**: airspace in which ADS-B information is used in combination with information obtained from ground-based radars, according to published coverage graphs.
- **ADS-B**: areas in which the information presented to the controller comes exclusively from ADS B, either because there is no radar coverage in it or because there is a failure of the radar system, the controller may use the information from ADS B to maintain surveillance on the march of air traffic, in order to obtain:
  - Better position information regarding aircraft under control;
  - Supplementary information regarding other transit;
  - Information on any significant deviation of aircraft, with respect to the relevant air traffic control authorisations, including authorised routes and flight levels where applicable;
  - No separation by surveillance shall apply; and
  - Vector guidance will not be provided.

Jamaica

7.44 The provision of air traffic services in the Kingston Flight information Region (KFIR) is aided by the use of radar. Currently there are three (3) radar stations, a long-range radar at Mt Denham and two others at Norman Manley and Sangster International Airports, respectively. These radars allow for the surveillance services in the Terminal and En-route airspace. However, even with these 3 radars, coverage in the northwest and southwest quadrant of the KFIR is limited. As such, through radar data sharing with COCESNA, currently a feed from their radar in Grand Cayman and Puerta Cabeza is received, which allow for 100% coverage of the KFIR.

7.45 Notwithstanding, in order to improve safety, operational efficiency, and manage our operational cost, a strategic decision was made to transition from radar as our primary surveillance source to the use of ADS-B.

7.46 To that end, the below is a summary of our ADS-B implementation plan which is linked to the Air Navigation Services Master Plan for the period 2022 – 2032.

ADS-B Implementation Plan

7.47 The implementation of ADS-B for our KFIR, will see us implementing at least one ground station in the FY2022/23 to assist with data collection, development of our future role out of ADS-B and safety case.

7.48 The implementation of ADS-B for KFIR should install at least one ground station in the period 2022/2023 to assist with data collection, the development of the future role in service delivery with ADS-B and the Safety Case study.

7.49 Thereafter, the plan is to use ground-based ADS-B to replace 2 radars (Norwood and Manley) within the next 6 – 8 years:

- Fase 1: will involve the installation of ADS-B stations to be co-located with the Mount Denham and Norwood radars as well as the installation of a Station at the Cooper's hill site to give ground movement coverage;
- Fase 2: the installation of a station in the Cayman Islands to give coverage west of the FIR; and
- Fase 3: the possible installation of a station in Haiti to give coverage east of the FIR.

7.50 The decision on the use of space-based ADS-B has not been concluded.

Paraguay

Paraguay made a presentation on the DINAC Paraguay Surveillance System. The presentation can be accessed through the link below:
https://www.icao.int/SAM/Documents/2022-RLA06901-ADSBYADSBANP1/Agenda%20Item%207%20-%20SG%20-INF_SURV-ADSB%20-%20PARAGUAY.pdf

7.51 Currently, the ATS surveillance system in Paraguay's airspace consists of ground-based equipment and most are Secondary Radar Systems Mode S (MSSR-S) modernized with redundant ADS-B receivers with DO-260, DO-260A and DO-260B capacity.

7.52 The aeronautical surveillance system is composed of the following systems with ADS-B 1090 ES capacity, (DO-260, DO-260A and DO-260B), in the different locations of the country:

a) Asunción - (MSSR-S/ADS-B);
b) Concepción (PSR/MSSR-S/ADS-B);
c) Minga Guazú (ADS-B);
d) SJB - Misiones (ADS-B);
e) Mcal. Estigarribia – Chaco (ADS-B); and
f) Bahia Negra (ADS-B).

7.53 Additionally, radar data shared by the adjacent FIR is available:

- Corrientes, Argentina;
- Posadas, Argentina; and
- Foz de Iguaçu – Brazil.

7.54 These SSR components of integration to the SAGITARIO ATM arrive from Argentina through the MPLS Link and VSAT transport of REDDIG II.

7.55 All data is routed through DINAC's telecommunications network (ATN) and is combined by a data processor at the ACCU/MRA Surveillance Station, to obtain a single source of input data to the SAGITARIO ATM Surveillance Data Processor (ATECH). Both the ADS-B sensors of the different stations and those of the control center are formatted and processed using ASTERIX CAT 021, Edition 2.3, which allows the exchange of data DO-260, DO-260 A and DO-260 B.

7.56 DINAC uses ADS-B surveillance information as a second layer of surveillance to improve the quality of existing RADAR-based surveillance information for ATC automation system functions.

7.57 In the short term, ADS-B will continue to support conventional ATC surveillance systems. Due to the high refresh rate and accuracy of position reports, ADS-B is as reliable as SSR systems and through its use, the same minimum separation minimums can be applied in the near future for a particular airspace as if they were monitored with a conventional SSR system. By using SSR and ADS-B together, the accuracy of composite trajectories is increased.

7.58 Radar will continue to be a source of surveillance until they reach the end of their life and could be replaced by ADS-B. ADS-B systems could be installed in anticipation of certain radars becoming obsolete to provide sufficient time for acceptance as radar replacements. Cost-benefit is an enabling factor for early deployment.

Peru

7.59 Peru has completed a process of modernization of its automated system of the Area Control Center that allows the integration of all the signals of its combined surveillance sensors of SSR, ADS-B and MLAT, it has also contracted the communication service by data link that allows to provide the service of ADS-C and CPDLC for the oceanic part. In the last two years the repowering of the 8 Secondary Radars has been completed, which has included the installation of 8 integrated DUAL ADS-B receivers, in addition to having an independent ADS B system currently installed in Pisco.

7.60 The Peruvian State has published its National Air Navigation Plan in October 2020, which among the selected ASBU elements is the implementation of the terrestrial ADS-B as the first ASBU CNS element to be implemented.

7.61 In this sense, the DGAC together with the CNSP have formed a work team which has been coordinating the development of an ADS-B implementation plan. Last February, the meetings were resumed, agreeing to complete the elaboration of the Plan in a collaborative manner with the stakeholders, after the experience obtained in this Workshop.

7.62 Additionally, for the knowledge of all participants of the Meeting/Workshop, on March 7, 2022, a high-level coordination meeting between the DGAC – CORPAC is planned, which will be the official Kickoff of the beginning of the National Air Navigation Plan PNNA implementation.

Trinidad & Tobago

7.63 Trinidad and Tobago has submitted its ADS-B implementation plan which can be accessed through the link below:

https://www.icao.int/SAM/Documents/2022-RLA06901-ADSBYADSBANP1/Agenda%20Item%207%20-%20ADS-B%20PRESENTATION%20MAR%204%202022%20updated.pdf

7.64 In December 2021, the contract with the equipment supplier was signed and the installation consists of the following phases:

- Phase I: to be completed by February 2023 includes the installation of sites in Trinidad & Tobago and Barbados; and
- Phase II: to be completed by May 2023 includes the installation of sites in Antigua and Saint Lucia.

7.65 Studies for a future use of ADS-B Satellite are being carried out.

ADS-B Implementation Tasks

7.66 The following tasks were identified for ADS-B deployment:

- Develop Concept of Operations (CONOPS):
  - Perform analysis of ADS-B aircraft equipage, 87% - June 2020 (completed);
  - Perform Safety case for the use of ADS-B; and
  - ADS-B Training for TTCAA ANS personnel – ATS, CNS, AIM.
- Update Regulations as they pertain to ADS-B;
- Develop and Promulgate ADS-B Aeronautical Information Circular (AIC);
- Validation of ADS-B data; and
- System Monitoring and problem reporting.

Uruguay

7.67 Uruguay divides the ADS-B implementation into three phases:

- Phase 1: ADS-B as a backup or contingency of SSRs. This phase was precipitated in 2020 with the failure of Carrasco's radar. The two SSRs (Carrasco - SUMU, Durazno-SUDU) have ADS-B backing today;
- Phase 2: Gap Filler for areas without SSR coverage. Planned for the period 2019-2023, the installation begins in the month of April 2022 in the Terminal area of the Laguna del Sauce Airport (Punta del Este) SULS. This system works integrated to an MLAT, to allow the surveillance of aircraft that do not have the ADS-B OUT avionics. No further coverage gaps detected.
- Phase 3: Installation of 5 ADS-B/MLAT ground stations (to configure a WAM) in the period 2023-2025, and maintain surveillance of aircraft without ADS-B OUT avionics. After installation, the need to install more stations will be determined.
  - Remaks:
    1) ADS-C/CPDLC is used in the oceanic region, where there are routes with regular flights, so for the moment it has been evaluated, that it is not profitable to use Space-based ADS-B;
    2) All the development is designed to avoid having the need to issue a mandate to the operators, and only work on the manuals and operational or contingency plans in the ATS. Due to the characteristics of Uruguayan airspace, the issuance of a mandate related to ADS-B must be aligned and coordinated with the region/sub-region; and
    3) There was one enabler, which was pending: the RAIM SATDIS prediction system, which is already about to be restored. Although this tool is focused on navigation, it impacts surveillance dependent on accuracy and availability.

Venezuela

7.68 The Project start date for ADS-B Implementation has been set at October 2022. With an Initial Phase comprising five (05) stations: San Carlos de Río Negro, Santa Elena de Uairén, Los Colorados, San Jacinto and Maiquetía.

7.69 Still in development the requirements for implementation, as mentioned:

- Development of Procedures and Regulation for ADS-B; and
- Training for operational and technical support staff.

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