Automatic Dependent Surveillance – Broadcast OUT Implementation Meeting for the NAM/CAR Regions

Ottawa, Canada, 21-23 August 2019

Status of ADS-B implementation in French Guiana

Frederic DANLOUX

September 2019

Direction Générale de l'Aviation Civile

Ministère de la Transition écologique et solidaire

PRESENTATION PLAN

1 – Introduction

2 – Context (Environment – Aeronautical)

3 – Implementation plan

4 – Recommendation

5 – Communication

6 - Mandate

7 – Perspectives

WORKING PAPER 07
STATUS OF ADS-B IMPLEMENTATION IN FRENCH GUIANA

1. Introduction

1.1. France has been involved in ADS-B for many years, and has started the deployment of ground stations in its overseas territories since 2007.

1.2. In the French Guiana FIR, which covers a large Oceanic Airspace (1 383 199,17 km²), Air Traffic Controllers use Automatic Dependent Surveillance-Contract (ADS-C) technology to update the aircraft's position across the Atlantic Ocean every 14 minutes, at least. This implies that flights in this region comply with the ICAO recommendation of tracking oceanic flights every 15 minutes or less.

WORKING PAPER 07
STATUS OF ADS-B IMPLEMENTATION IN FRENCH GUIANA

1.3. Most of French Guiana's continental airspace (83 534 km²) is considered as a Non-Radar Airspace as the coverage of the military radar is poor and the availability of the data not satisfactory. Procedural Approach is conducted from Cayenne Tower.

1.4. The Geography of French Guiana makes it difficult to install and maintain radars compared to the ADS-B option.

1.5. There is no plan so far to use satellite-based ADS-B in French Guiana, except for SAR purposes (Aireon Alerts).

1.6. The main objective is to increase our surveillance capabilities for medium and short-haul flights which are not ADS-C equipped.

CONTEXT (GEOGRAPHY)

Amazon rainforest

Total forest area: 8,063,000 ha

% of land area: 91.8%

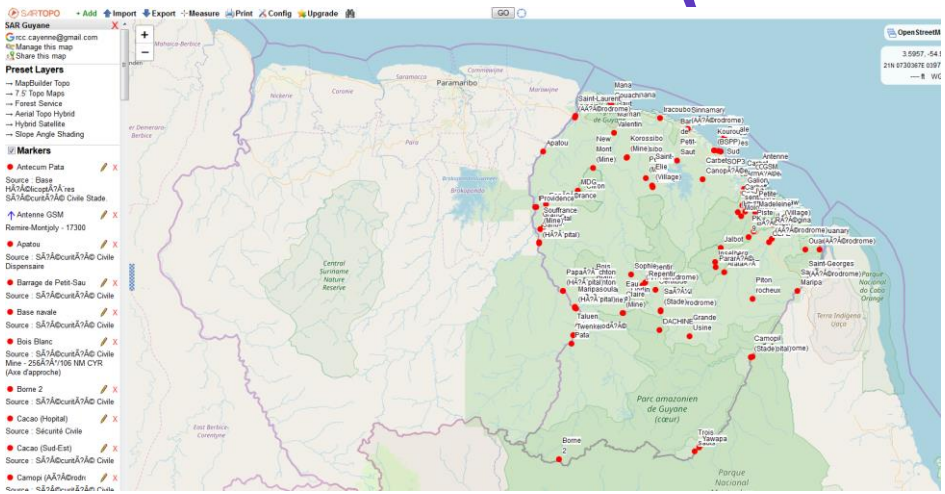
Primary forest cover: 7,701,000 ha

% of land area: 87.7%

% total forest area: 95.5%

Weather : tropical monsoon climate with a lot of precipitation throughout the year. There is a clear drier period and a long rainy season.

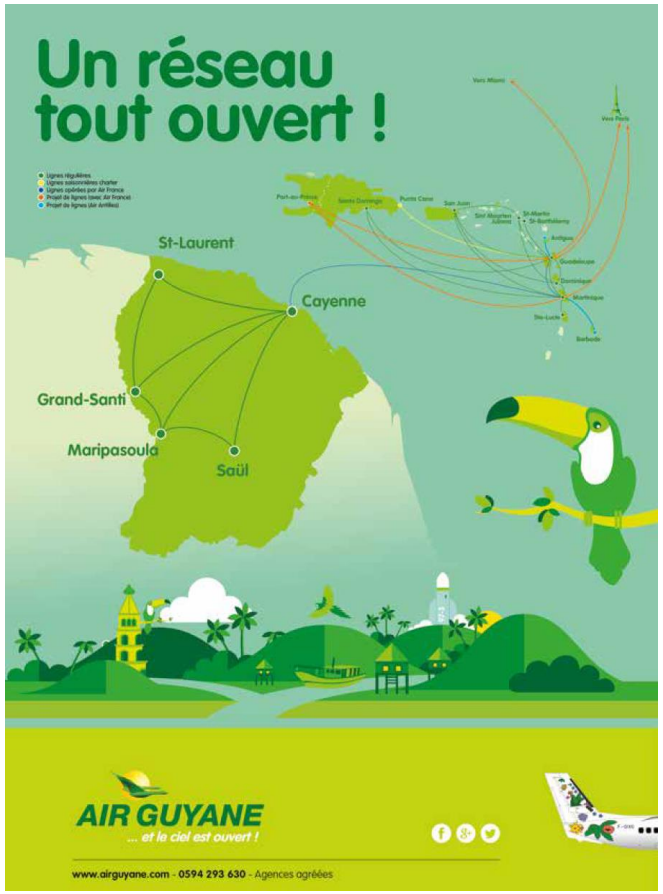
CONTEXT (AERONAUTICAL)



Aircraft : ≃ 30 general aviation aircraft based (helicopters) – Military - 1 local airline (Air Guyane) -3 Intl airlines (AF – FWI – AZU) Cargo (Antonov)

Airfields : 5 + numerous helipads (gold mining)

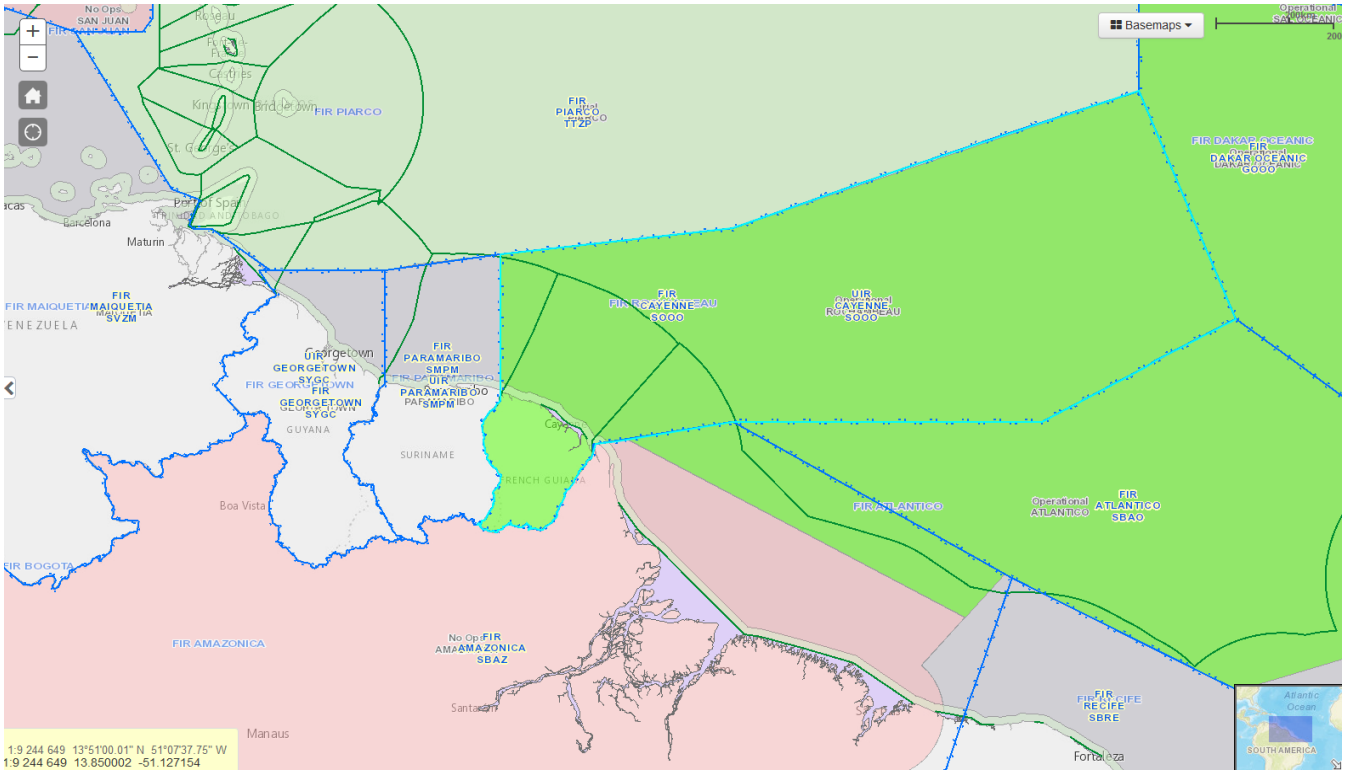
ATS : Procedural



UPPER AIRSPACE ADS-C / CPDLC

≃ 90% of the traffic is ADS-C / CPDLC equipped

≃ 38 aircraft per day are transiting through SOOO



ADS-C coverage in neighboring FIRs

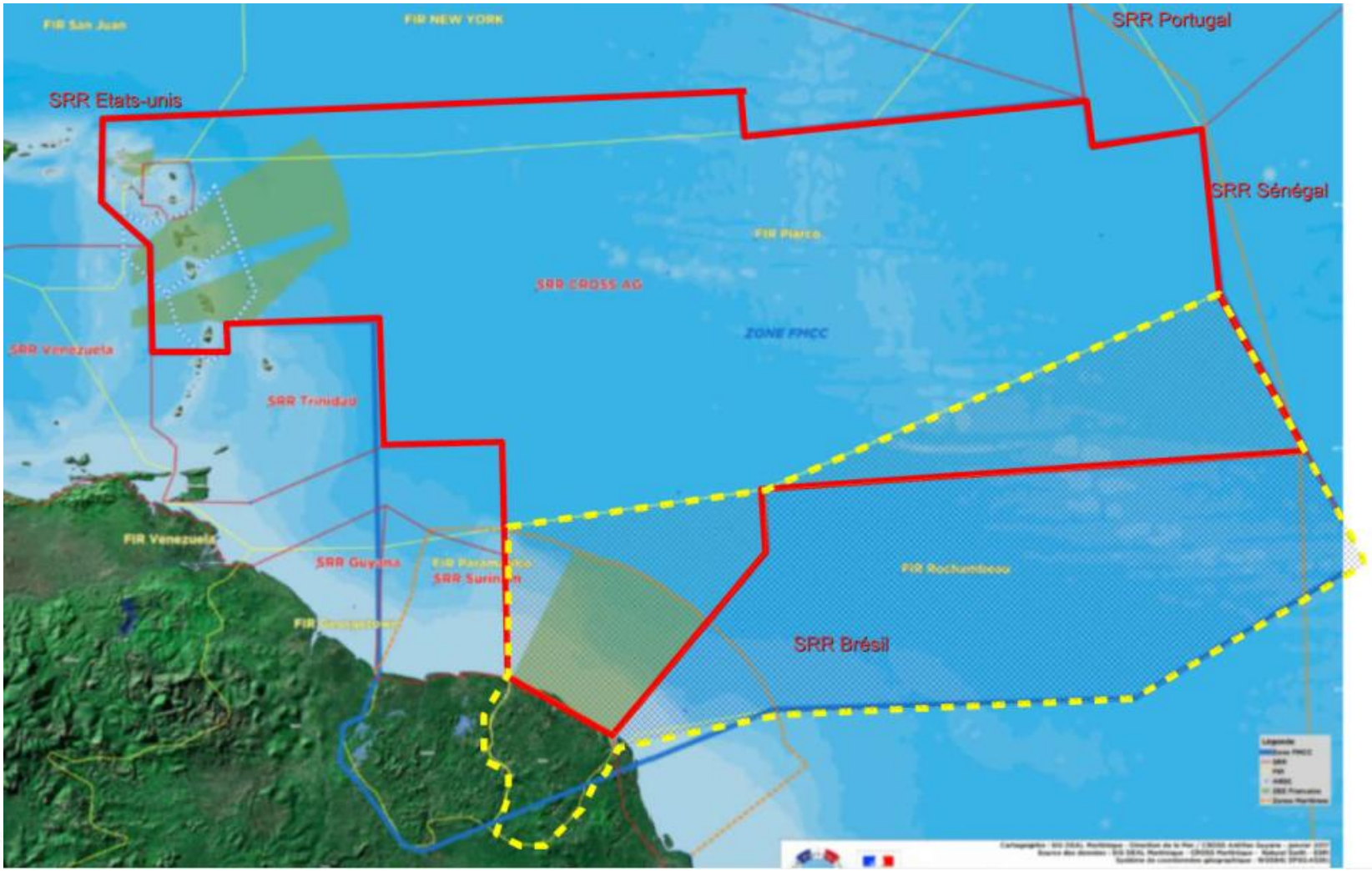
COVERAGE IN EXISTING GAPS - AZUL 8720 BELEM - CAYENNE

ADS-B equipped & not ADS-C equipped, limited radar detection

COVERAGE IN EXISTING GAPS - AIR FRANCE 605 CAYENNE – FORT DE FRANCE

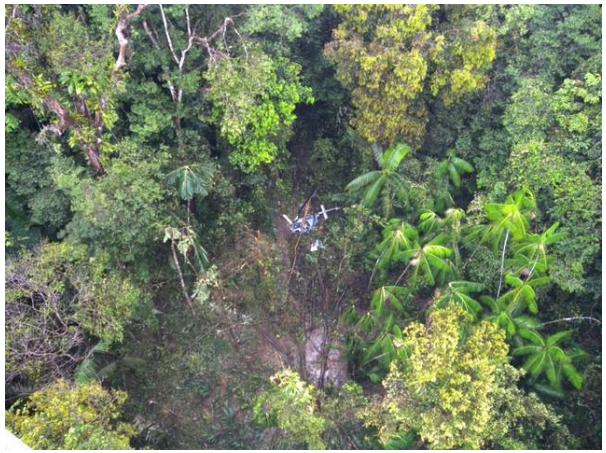
ADS-B equipped & not ADS-C equipped, limited radar detection

CAYENNE ARCC



CAYENNE ARCC – EMERGENCY PHASES

01/19	02/19	03/19	04/19	05/19	06/19	07/19
8	10	5	7	3	2	4



IMPLEMENTATION

2.5. In 2018, DSNA signed a contract with OBS for the provision of an ADS-B Communications Network. This way, all the sites will be connected and will feed a Central Processing System. At the output, the CPS will feed data (in Asterix format) both into IRMA (the DSNA ATM System) and the AURORA ATM System.

2.6. As all flights shall not be displayed (military, some general aviation aircraft…), air traffic controllers will keep performing procedural control to separate aircraft, but their task will be easier, as they have a better representation of the air traffic situation. They will be able to provide better and more accurate traffic information, as most commercial flights will be displayed on ADS-B screens.

2.7. The ADS-B controller working position will be available at the end of this year.

5 GROUND STATIONS

2. Implementation plan in French Guiana

2.1. The decision to implement ADS-B ground stations was taken in 2016.

2.2. In 2016, DSNA signed a contract with THALES for the provision of an ADS-B Surveillance System.

2.3. The implementation of 5 ground stations is currently in progress and they are located as follows :

EQUIPMENT

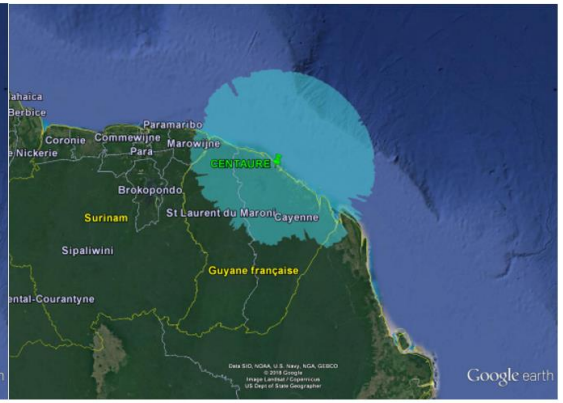
5 redundant ground stations Thales AX680:

- Rochambeau
- Matoury
- Mana
- Maripasoula
- St Georges

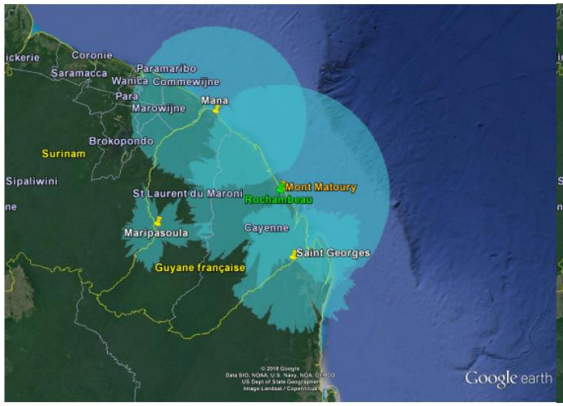
COVERAGE

2.4. The figures below illustrate the simulated coverage of both the current radar and the future ADS-B stations.

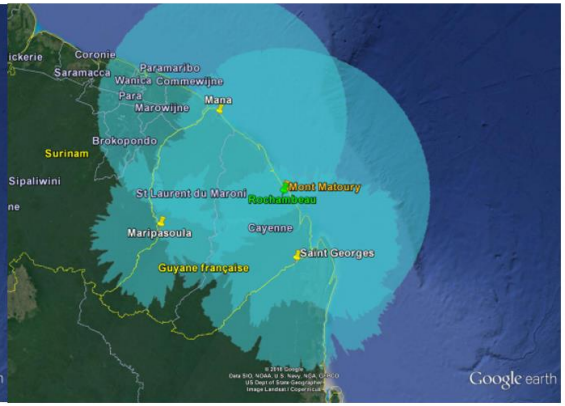
Radar coverage at 3000 ft



Radar coverage at 7000 ft



ADS-B coverage at 3000 ft



ADS-B coverage at 7000 ft

RECOMMENDATION

3. Recommendation

3.1. Aircraft Operators flying through French Guiana sector and to French Guiana airports are invited to equip their fleet.

3.2. French Guiana is exploring opportunities to exchange ADS-B data with neighboring air navigation providers.

4. Action by the meeting

4.1. The meeting is invited to note the information provided in this paper.

HOW TO CONVINCE AIRCRAFT OPERATORS

- Most of military and general aviation helicopters are already equipped with GPS trackers and most of them are reluctant to invest in another system.
- Incentive program : Subsidies – Rebate
- Newsletters (generality, ADS-B vs ADS-C, ATS, equipment, mandate)
- Meetings (SAR – Inhospitable region – cost to fit the aircraft with ADS-B – level of ATS services)

dgac SNA ANTILLES-GUYANE

DSNA

ADS-B NEWSLETTER N°1

Date: 15 May 2019

SEARCH AND RESCUE

On March 8 2014, Malaysia Airlines flight MH370 bound for Pekin disappeared after taking off in Kuala Lumpur. There were 227 passengers and 12 crew member on board. Despite extended maritime research and the use of state-of-the-art means, the aircraft was never found. The event occured not long after AF447 crashed into the sea on its way from Rio to Paris in 2009. It took the rescue teams two years to locate the aircraft off the coast of Brazil.

Following these accidents, the *International Telecommunication Union* urgently allocated frequencies to satellite-based ADS-B communications and the use of this surveillance means for SAR operations is now officially supported by ICAO. This technology allows for permanent aircraft tracking, and its ground-based version has been in use for several years now. It relies on the new Iridium Next constellation planned to be fully operational in 2019.

Concurrently, ICAO has initiated the elaboration of a Concept of Operations (CONOPS) so as to define the requirements and the objectives for a Global Aeronautical Distress and Safety System. (GADSS)

ADS-B

ADS-B (Automatic Dependent Surveillance - Broadcast) is a means of aircraft surveillance which can act as a radar for Air Navigation Service Providers. The difference with a radar is that the aircraft's location is determined by on-board instruments, such as the GPS receiver; hence the name "dependent".

Information is then collected and transmitted by the aircraft's transponder to ground-based stations. The data sent includes the aircraft's GPS position, its altitude, heading and speed. This data is then sent from the ground station to the control center using various means such as landlines, satellite links and hertzian beams.

SURVEILLANCE

In the vast airspace managed by Cayenne Control Center (FIR Cayenne), the military radar located in Kourou offers but very limited "real-time" coverage. Position information is updated at every radar rotation, meaning, roughly, every 4 seconds. In the rest of the airspace, the information available to the controllers is updated every 15 minutes for aircraft equipped with ADS-C technology in upper airspace.

The deployment of five ground-based ADS-B antennas will allow for improved aircraft tracking for those ADS-B equipped. It will therefore be possible to track aircraft when they are out of radar range (and up to 200 Nm away from the coast) and not equipped with ADS-C equipment.

DEPLOYMENT SCHEDULE

In 2009, the DSNA decided to fit Cayenne Control Center with real-time aircraft tracking means based on ADS-B technology by deploying five ground stations spread throughout French Guiana.

This technology will eventually allow the SNA-AG to improve the quality of the services provided to airspace users, including Search and Rescue operations.

The French West Indies should also be equipped with similar equipment within the next years.

The five first antennas will be installed from September 2019 onwards. The testing phase will start at the end the year.

Commissioning is planned in May 2020.

dgac SNA ANTILLES-GUYANE

DSNA

ADS-B NEWSLETTER N°2

Date: 15 juin 2019

SPACE-BASED ADS-B

Two main companies offer surveillance services which rely on space-based ADS-B: *Aireon* and *Spire*. Each of them uses a respective satellite constellation.

Aireon is an American company created as a joint venture between a satellite communications company, *Iridium*, and five ANSPs. Its purpose is to offer a global, real-time, surveillance system that will outperform secondary radar and ground-based surveillance means.

Spire is another American company specialised in data analysis. It collects ADS-B data from "*Earth*", a network of low-cost nanosatelllites (*CubeSats*). A partnership has been signed between *Airbus* and *Spire* to provide services to the aviation industry.

ONLINE TRACKING

A number of online tools are available to track aricraft. Their cost and features vary widely.

They collect and combine data from various sources, including those generated by individuals owning ADS-B antennas.

flightradar24 FlightAware

ADS-C

Despite similar names, ADS-C and ADS-B are different services.

ADS-B, like primary surveillance radar (PSR) and secondary surveillance radar (SSR), is an ATS surveillance system that enables the ATC to monitor, in an automatic and continuous way, information about equipped aircraft that are in range.

ADS-C relies on the same on-board systems to automatically send out similar information: the aircraft's location, its altitude, velocity and meteorological data. However, these data are only sent to one or several control centers which request the data through a contract.

GLOBAL BEACON

GlobalBeacon is a web-based alerting dashboard that provide global tracking, minute-by-minute position updates.

It is a direct response to ICAO's GDASS Concept of Operation and leverages *Aireon*'s position data and *FlightAware* interface.

This service enables aircraft operators to monitor their fleet and to be immediately notified if an aircraft is in distress.

ADS-B OUT vs IN

ADS-B "Out" refers to the "standard" equipment with which the aircraft broadcasts its position, speed and altitude. It is a surveillance technology aimed at Air Traffic Surveillance Units.

ADS-B "In", however, requires a specific receiver to be installed on the aircraft in order to receive ADS-B data from other aircraft flying in the vicinity.

ADS-B "In", therefore, is a tool aimed at pilots. The data supplied via the system can be displayed on an interface called CDTI (Cockpit Display of Traffic Information).

This system provides the crew with more detailed information about surrounding traffic than TCAS: their registration, speed, altitude and trajectory.

Aireon ALERT

ALERT is an emergency aircraft location service operated by the Irish Aviation Authority that uses *Aireon*'s space-based ADS-B data.

It aims at ensuring search and rescue personnel have the most accurate aircraft position data available when responding to an incident, regardless of global location.

MANDATE

Regulation (EC) No 551/2004 of the European Parliament and of the Council of 10 March 2004 on the organisation and use of the airspace in the single European sky (the airspace Regulation)

CHAPTER I - GENERAL

Article 1 - Objective and scope

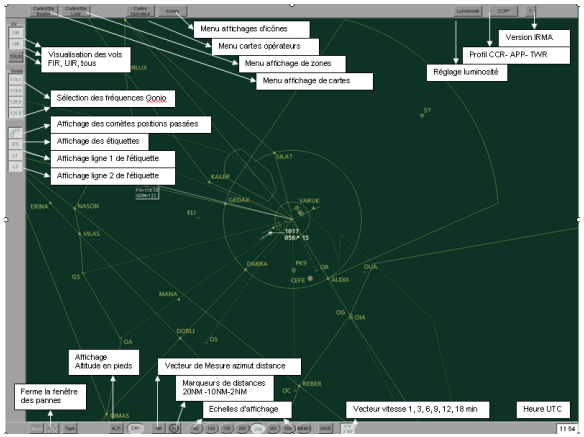
3. Without prejudice to Article 10, this Regulation shall apply to the airspace within the ICAO EUR and AFI regions where Member States are responsible for the provision of air traffic services in accordance with the service provision Regulation. Member States may also apply this Regulation to airspace under their responsibility within other ICAO regions, on condition that they inform the Commission and the other Member States thereof.

The European ADS-B mandate applies only to aircraft with an mtow exceeding 5,700 kg (12,566 pounds) or having a maximum cruising true airspeed capability greater than 250 knots, and received its individual certificate of airworthiness before June 8, 2016.

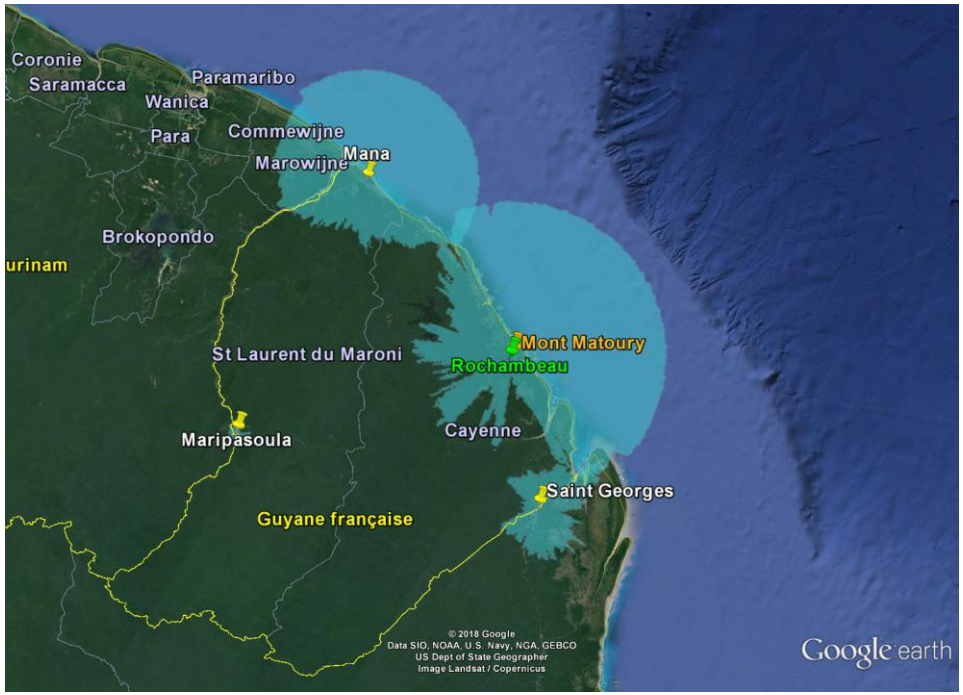
The ADS-B Out retrofit requirement in Europe takes effect June 7, 2020.

PERSPECTIVES

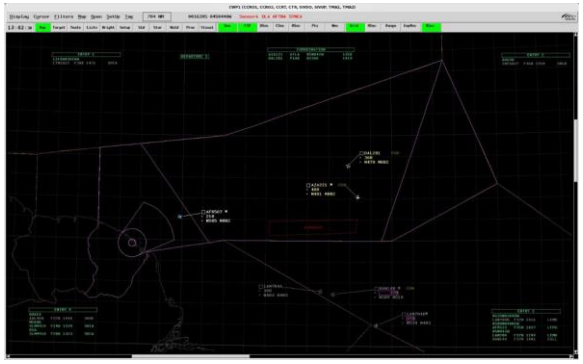
- TIER 3 (IRMA2000) then TIER 2 (SEAFLIGHT),
  Very little chance to implement TIER 1
- Regional mandate vs local mandate ?
- Regional cooperation to promote surveillance data sharing ?
- Coverage at low altitude (500ft to 1500ft) : Would space-based ADS-B be a better option for SAR purposes (continental airspace) ?

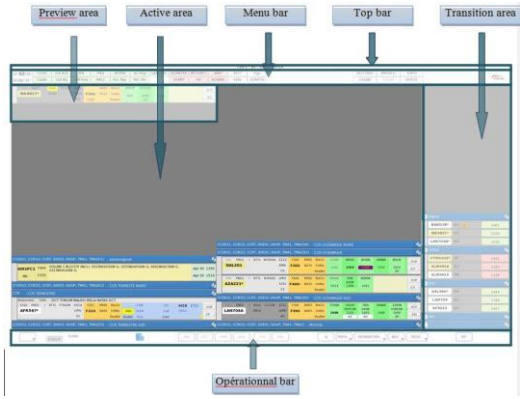


IRMA 2000 (summer 2020)



ADS-B 500 ft



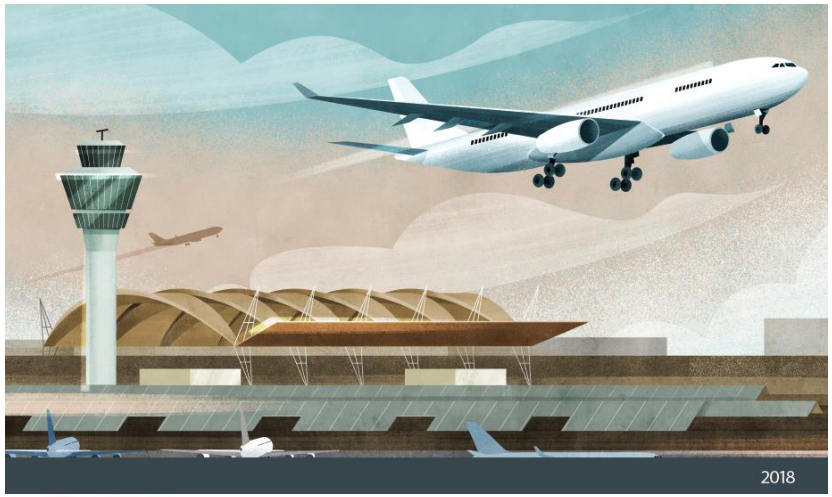


SEAFLIGHT (end of 2021)

SPACE BASED ADS-B COST BENEFIT ANALYSIS

ICAO

Study on the convenience and feasibility of space-based ADS-B for regional implementation



Thank you !

Direction Générale de l'Aviation Civile

Ministère de la Transition écologique et solidaire