



ICAO

# INTERNATIONAL CIVIL AVIATION ORGANIZATION

A UN SPECIALIZED AGENCY





# ADS-B IN THE ICAO GLOBAL AIR NAVIGATION PLAN

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# AGENDA

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Global Air Navigation Plan

MULTILAYER STRUCTURE OF THE GANP

Aviation System Block Upgrade (ASBU)

Automatic Dependent Surveillance – Broadcast (ADS-B)

ADS-B Description

ADS-B Enables

# The Global Air Navigation Plan (Doc 9750)

Is the ICAO's highest air navigation strategic document and the plan to drive the evolution of the global air navigation system, in line with:

- The Global Air Traffic Management Operational Concept (GATMOC, Doc 9854).
- Manual on Air Traffic Management System Requirements (Doc 9882).

Developed in collaboration with and for the benefit of stakeholders, the GANP is a key contributor to the achievement of ICAO's Strategic Objectives and has an important role to play in supporting the United Nations 2030 Agenda for Sustainable Development.



# MULTILAYER STRUCTURE OF THE GANP

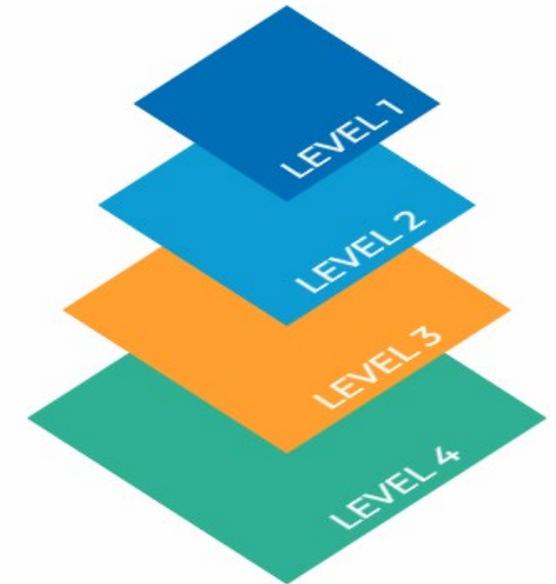
- The content of the GANP is organized into a multilayer structure with each layer tailored to different audiences.
- This allows for better communication with both high-level and technical managers with the objective that no State or stakeholder is left behind.
- The four-layer structure is made up of global (strategic and technical), regional and national levels, and provides a framework for alignment of regional, sub-regional and national plans.
- The four-layer structure facilitates decision making by providing a stable strategic direction for the evolution of the air navigation system and, at the same time, timely relevance in the technical content.

GLOBAL STRATEGIC

GLOBAL TECHNICAL

REGIONAL

NATIONAL



# GLOBAL AIR NAVIGATION PLAN

## WELCOME TO THE GLOBAL AIR NAVIGATION PLAN PORTAL

The GANP Portal is a web portal where all aviation stakeholders will be able to find the most relevant information related to the Seventh edition of the GANP

<https://www4.icao.int/ganportal/>



### GLOBAL STRATEGIC

<https://www4.icao.int/ganportal/GanpDocument#/>



### BASIC BUILDING BLOCKS (BBB) FRAMEWORK

<https://www4.icao.int/ganportal/BBB>



### ASBU ELEMENTS

<https://www4.icao.int/ganportal/ASBU>



## Aviation System Block Upgrade (ASBU)

- ✈ The ICAO GANP ASBU methodology is a programmatic and flexible global approach that allows all Member States to enhance their air navigation capabilities based on their specific operational requirements.



## Aviation System Block Upgrade (ASBU) Improvements

✈ *The ASBU works according to the following structure:*

- ✈ *ASBU Thread: three different categories, operative, information and technology.*
- ✈ *ASBU Module: is the set of elements of a thread that, according to the enablers' roadmap, will be available for implementation within the defined period established by the ASBU Block.*
- ✈ *ASBU Block: this implies that the element and all the enablers associated with it must be available for implementation in the ASBU block year.*
- ✈ *ASBU Element: This module is the set of elements of a common thread that, according to the enablers' roadmap, will be available for implementation within the defined timeframe established by the ASBU Block.*

## INFORMATION

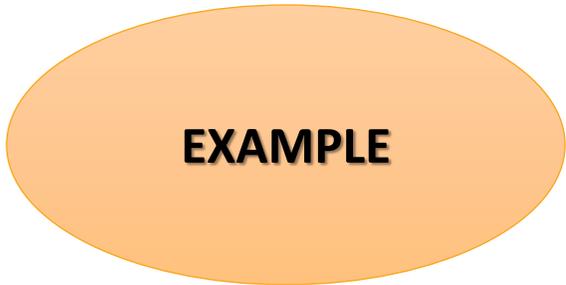
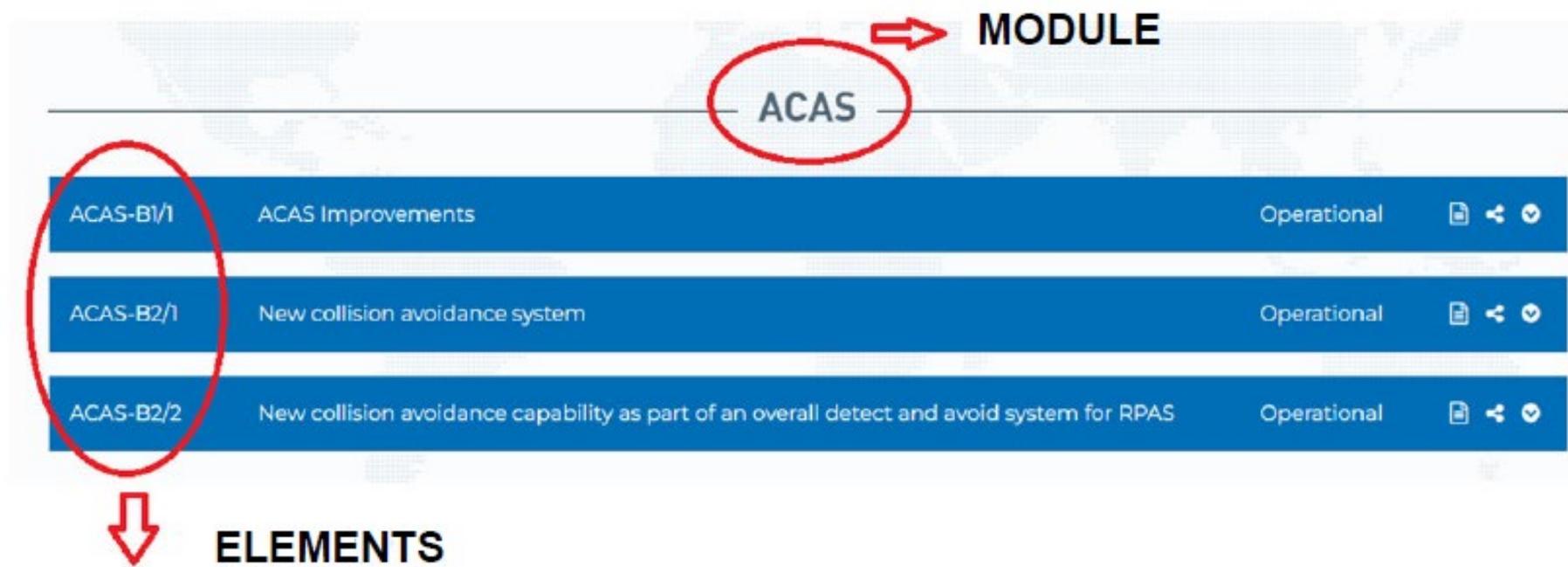
- ✈ *AMET: Información meteorológica*
- ✈ *DAIM: Gestión digital de la información aeronáutica.*
- ✈ *FICE: Información de vuelo y flujo para un entorno colaborativo (FF-ICE).*
- ✈ *SWIM: Gestión de la información en todo el sistema*

## TECHNOLOGY

- ✈ *ASUR: Alternative Surveillance*
- ✈ *COMI: Communication Infrastructure*
- ✈ *COMS: ATS Communication Service*
- ✈ *NAVS: Navigation Systems*

## OPERATIONAL

- ✈ *ACAS: Airborne collision avoidance system (ACAS)*
- ✈ *A-CDM: Airport Collaborative Decision Making*
- ✈ *APTA: Airport Accessibility*
- ✈ *CSEP: Cooperative Separation*
- ✈ *DATS: Digital Aerodrome Air Traffic Services*
- ✈ *FRTO: Improved operations through enhanced en-route trajectories*
- ✈ *GADS: Global Aeronautical Distress and Safety System*
- ✈ *NOPS: Network Operations*
- ✈ *OPFL: Improved access to optimum flight levels in oceanic and remote airspace*
- ✈ *RSEQ: Improved traffic flow through runway sequencing*
- ✈ *SNET: Ground-based Safety Nets*
- ✈ *SURF: Surface operations*
- ✈ *TBO: Trajectory-based operations*
- ✈ *WAKE: Wake Turbulence Separation*

**EXAMPLE**

**MODULE**

ACAS					
ACAS-B1/1	ACAS Improvements	Operational			
ACAS-B2/1	New collision avoidance system	Operational			
ACAS-B2/2	New collision avoidance capability as part of an overall detect and avoid system for RPAS	Operational			

**ELEMENTS**

# ASBU ELEMENTS

Each ASBU element contains information about its functional description, enablers, implementation applicability, and performance impact assessment. States must understand that ASBU elements are addressed to satisfy an operational need or resolve a deficiency, increase efficiency and safety.

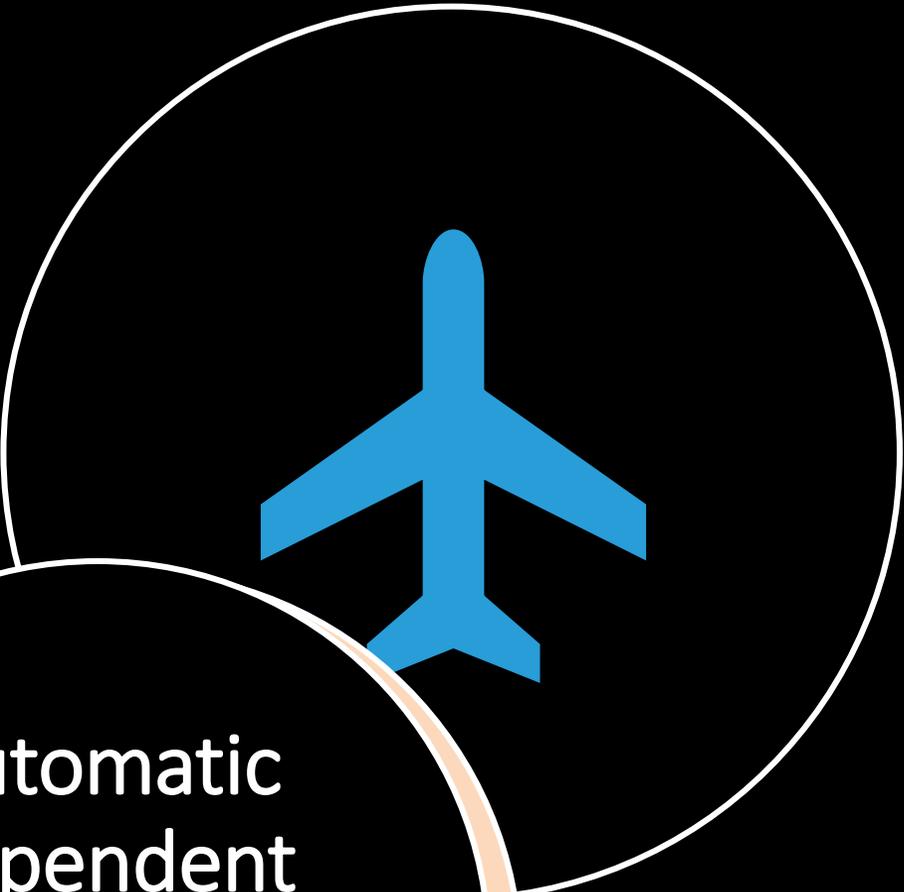
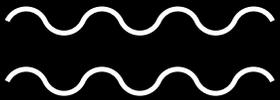


✈ *Why?: the main purpose is that it*

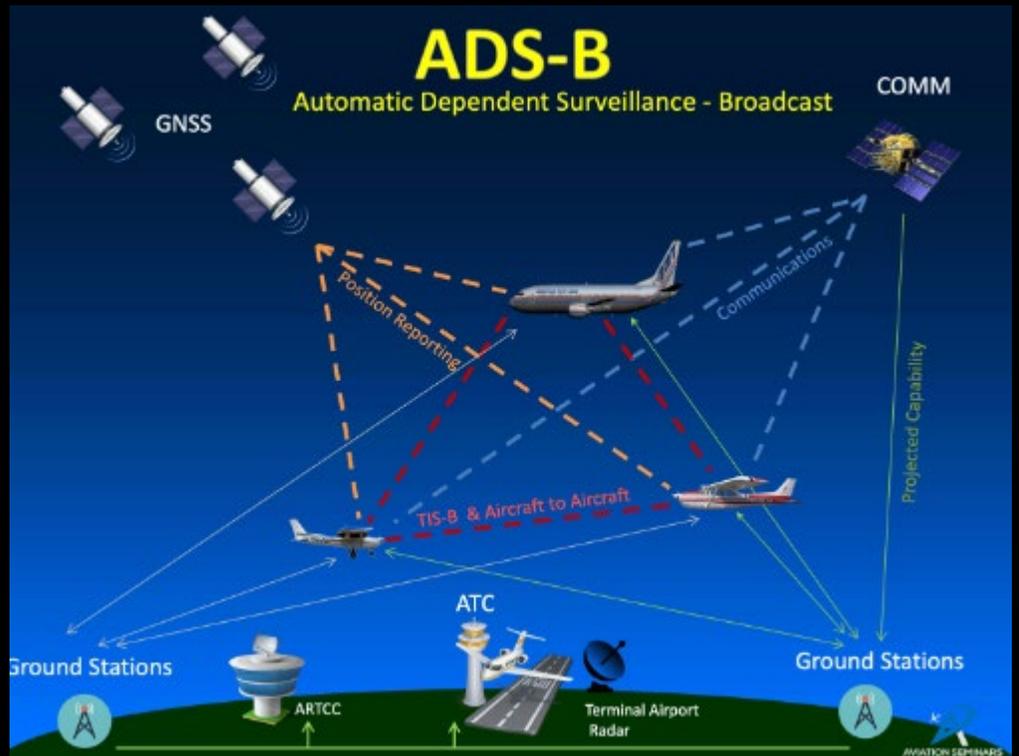
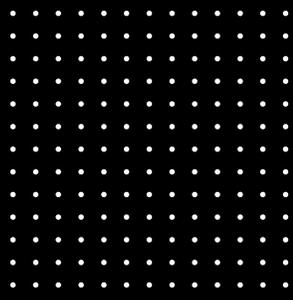
*provides a summary of the essence of the element for the operational elements, it provides information of the direct relationship of the performance.*

✈ *What? description of what stakeholders can do with this element that could not be done before. This section is not intended to describe performance enhancement or benefits*

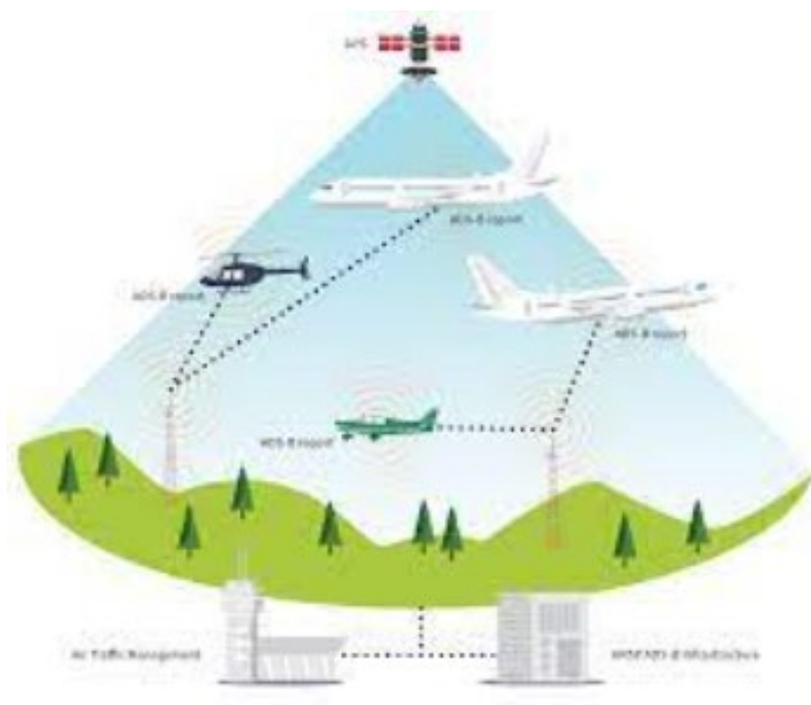
✈ *How? additional information to improve the understanding of the element*



Automatic  
Dependent  
Surveillance –  
Broadcast (ADS-B)



# Automatic Dependent Surveillance – Broadcast (ADS-B)



Surveillance System (ASUR)



ASUR-B0/1



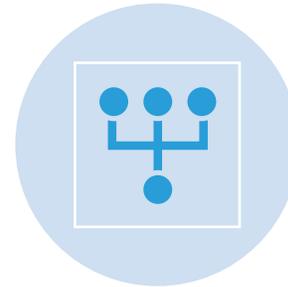
Technology

# Automatic Dependent Surveillance – Broadcast (ADS-B)

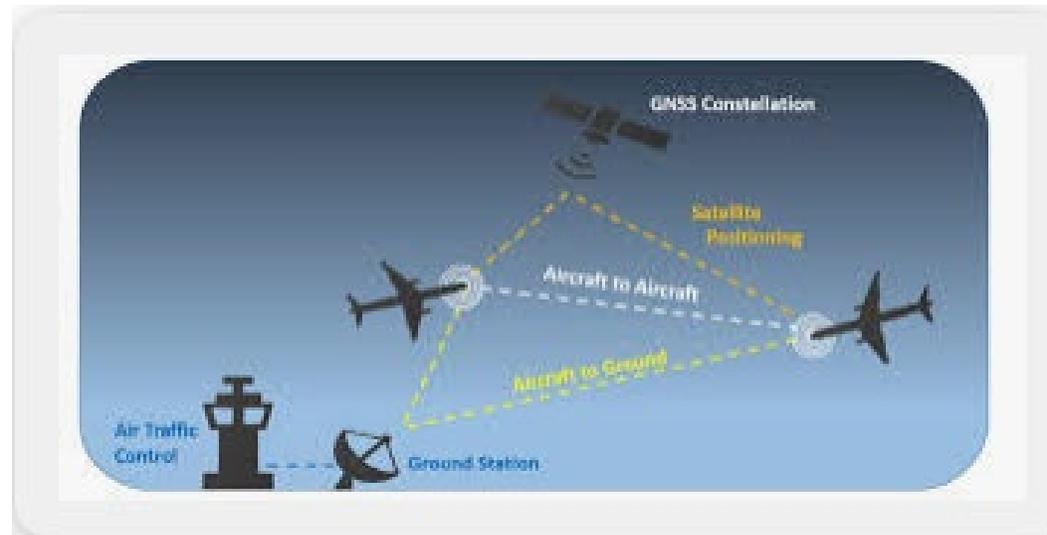
## Main purpose



*To support the provision of Air Traffic Services and operational applications at reduced cost and increased surveillance coverage.*



**The why:** *summary of the essence of the element. For operational elements this should have a direct relationship with performance.*



## New Capabilities

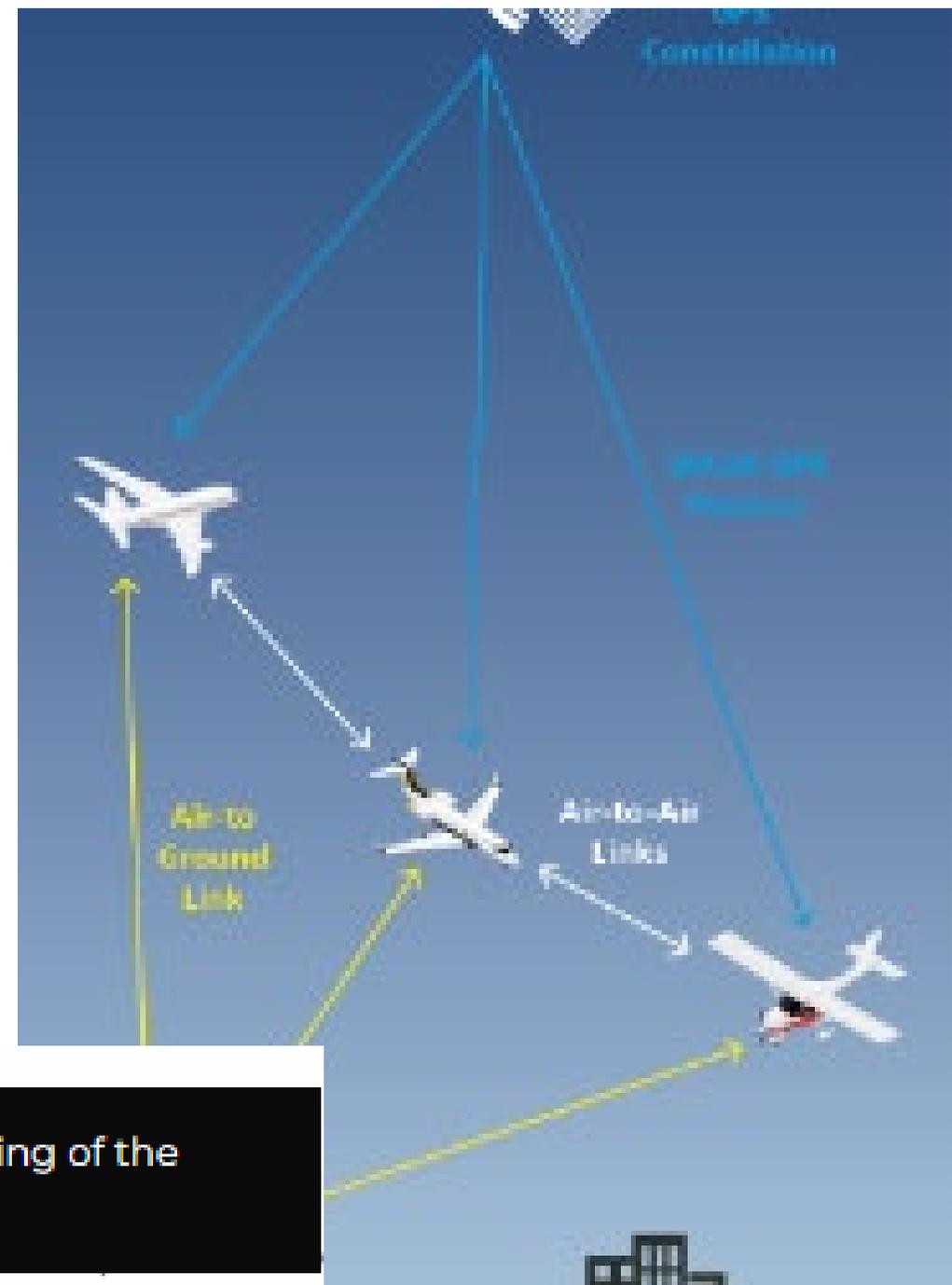
- ✈ *ADS-B provides precise position/velocity information in all airspace (accuracy not range-dependent as with radar). It also provides aircraft call sign and precise position/velocity information to nearby aircraft with ADS-B-In receivers.*
- ✈ *ADS-B can also support State aircraft airspace access, however it should, when possible, leverage benefits from dual-use of State aircraft capabilities to reduce cost and technical impact.*

The What: Description of what the stakeholders can do with this element that could not be done before. This section is not meant to describe performance improvement or benefits.

# Automatic Dependent Surveillance – Broadcast (ADS-B)

## Description

✈ ADS-B provides an aircraft's identification, position, altitude, velocity, and other information to any receiver (airborne or ground) within range. The broadcasted aircraft position/velocity is normally based on the global navigation satellite system (GNSS) and transmitted at least once per second.



The How: Additional information to improve understanding of the element.

# Automatic Dependent Surveillance – Broadcast (ADS-B)

## ENABLERS



**Ground system infrastructure**



**Airborne system capability**



**Training**



**Legislation/  
regulation**



# Automatic Dependent Surveillance – Broadcast (ADS-B)

## ENABLERS

### ***Ground system infrastructure***

**Enabler Category:** *Ground system infrastructure*

**Enabler Type:** *Surveillance*

**Enabler Name:** *ADS-B ground stations*

#### **Description / References:**

ADS-B ground stations receive information from aircraft and transmit it to one or more Service Delivery Points.

Reference material: Technical standards and guidance material:

- ❑ ICAO Annex 10 Volume IV Chapter 2,3 and 5
- ❑ ICAO Doc. 9871 Technical Provisions for Mode S Services and Extended Squitter
- ❑ RTCA/EUROCAE MOPS: DO-260/ED-102, DO-260A, or DO-260B/ED-102A EUROCAE ED-129, ED-129A or ED-129B ICAO Doc. 9924 Aeronautical Surveillance Manual

# Automatic Dependent Surveillance – Broadcast (ADS-B)

## ENABLERS

### ***Ground system infrastructure***

Enabler Category: ***Ground system infrastructure***

Enabler Type: ***Surveillance***

Enabler Name: ***Service Delivery Point(s) for ADS-B information***

#### **Description / References:**

Service Delivery Point(s) receive ADS-B information provides it to ATC automation for processing and display to controller Reference material: Guidance material: ICAO Doc. 9924 Aeronautical Surveillance Manual

# Automatic Dependent Surveillance – Broadcast (ADS-B)

## ENABLERS

### ***Ground system infrastructure***

Enabler Category: ***Ground system infrastructure***

Enabler Type: ***Technical systems***

Enabler Name: ***HMI that supports controller awareness***

#### **Description / References:**

Human Machine Interface (HMI) of the Air Traffic Controller Working Position (ATCo CWP) Reference: Guidance material:

- ❑ ICAO Doc. 9924 Aeronautical Surveillance Manual

# Automatic Dependent Surveillance – Broadcast (ADS-B) **ENABLERS: Airborne system capability**

Enabler Category: ***Airborne system capability***

Enabler Type: ***Surveillance***

Enabler Name: ***SSR Mode S transponder with extended squitter version 0, version 1 and version 2***

## **Description / References:**

Technical standards and guidance material:  
ICAO Annex 10 Volume IV Chapter 2,3 and 5  
ICAO Doc. 9871 Technical Provisions for Mode S Services and Extended Squitter RTCA/EUROCAE MOPS: DO-260/ED-102, DO-260A, or DO-260B/ED-102A ICAO Doc. 9924 Aeronautical Surveillance Manual



# Automatic Dependent Surveillance – Broadcast (ADS-B)

## ENABLERS: Airborne system capability

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Enabler Category: ***Airborne system capability***

Enabler Type: ***Navigation***

Enabler Name: ***Basic Aviation GNSS receiver with RAIM***

### **Description / References:**

Position source. Basic Aviation GNSS receiver with RAIM. Such a receiver must comply with the technical performance requirements of either [E]TSO-C129, or [E]TSO-C196, or [E]TSO-C145/-C146. (Note that the US/Europe and equivalent ADS-B mandates require more – see FAA AC 20-165 or EASA CS-ACNS).



# Automatic Dependent Surveillance – Broadcast (ADS-B)

## ENABLERS: Training

Enabler Category: *Training*

Enabler Name: *Training requirements ADS-B implementation*

### Description / References:

Depending on the ANSP implementation, some controller training on new symbology may be required. If phraseology is changed by an ANSP, then controller and pilot training on the new phraseology is required. If new ANSP equipment is installed, then training for maintenance personnel may be required (see ICAO Doc 8071).



# Automatic Dependent Surveillance – Broadcast (ADS-B) **ENABLERS: Legislation/regulation**



# Stakeholders

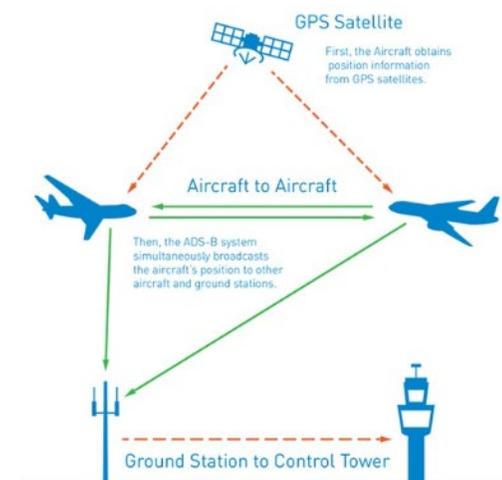


**ANSP: *AIR NAVIGATION SERVICE PROVIDER***

**AIRCRAFT MANUFACTURER**

**AIRCRAFT OPERATOR**

**OTHERS**





ICAO  
Headquarters  
Montréal

European and  
North Atlantic  
(EUR/NAT) Office  
Paris

Asia and Pacific  
(APAC) Sub-office  
Beijing

Middle East  
(MID) Office  
Cairo

Western and  
Central African  
(WACAF) Office  
Dakar

North American  
Central American  
and Caribbean  
(NACC) Office  
Mexico City

Asia and Pacific  
(APAC) Office  
Bangkok

South American  
(SAM) Office  
Lima

Eastern and  
Southern African  
(ESAF) Office  
Nairobi



Thank You!

FIRST WORKSHOP ASSIGNMENT FOR PARTICIPANTS' WORK

Enabler Category	Enabler Type	Enabler Name	Stakeholders	State Status implementation
Ground system infrastructure	Surveillance	ADS-B ground stations		
Ground system infrastructure	Surveillance	Service Delivery Point(s) for ADS-B information		
Ground system infrastructure	Technical systems	HMI that supports controller awareness		
Airborne system capability	Surveillance	SSR Mode S transponder with extended squitter version 0, version 1 and version 2		
Airborne system capability	Navigation	Basic Aviation GNSS receiver with RAIM		
Training	-----	Training requirements ADS-B implementation		

