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Considerations for ADS-B Implementation according with ICAO SARPs

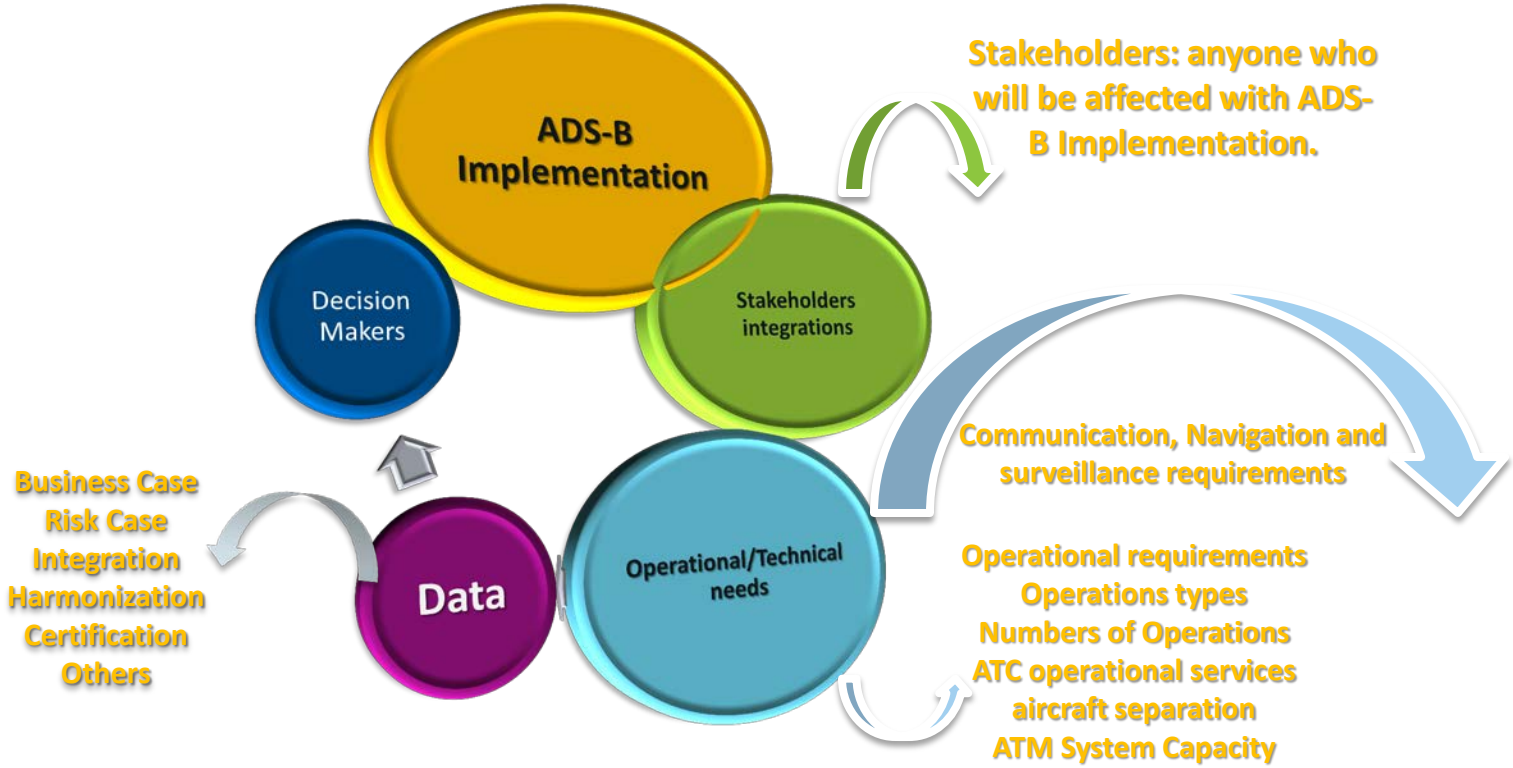
Automatic Dependent Surveillance – Broadcast (ADS-B) Implementation and Regulation Meeting for the NAM/CAR/SAM Regions (ADS-B/LEG)
Mexico City, Mexico, 26-30 November 2018

Agenda

- Consideration for ADS-B implementation
- Operational Concept
- Benefits Identification
- Basis for planning
- ICAO Documentation

Agenda Item 4: Technical and operational requirements required for the ADS-B implementation

Consideration for ADS-B implementation

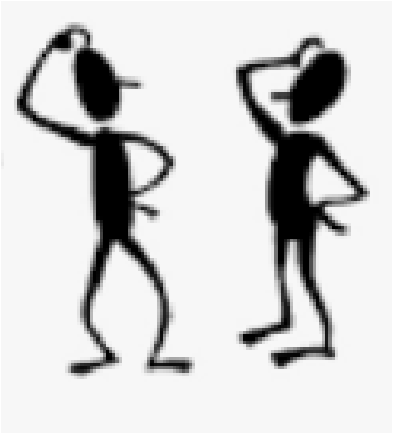


Operational Concept

- Purpose; Definition of the objectives operations, the benefits to obtain.
- Operational environment; Set of circumstances that define the need or not to perform an implementation.
- ATM functions; Have the resources of all kinds necessary to provide the service.
- Infrastructure; I have the necessary infrastructure to implement it.

Benefits Identification

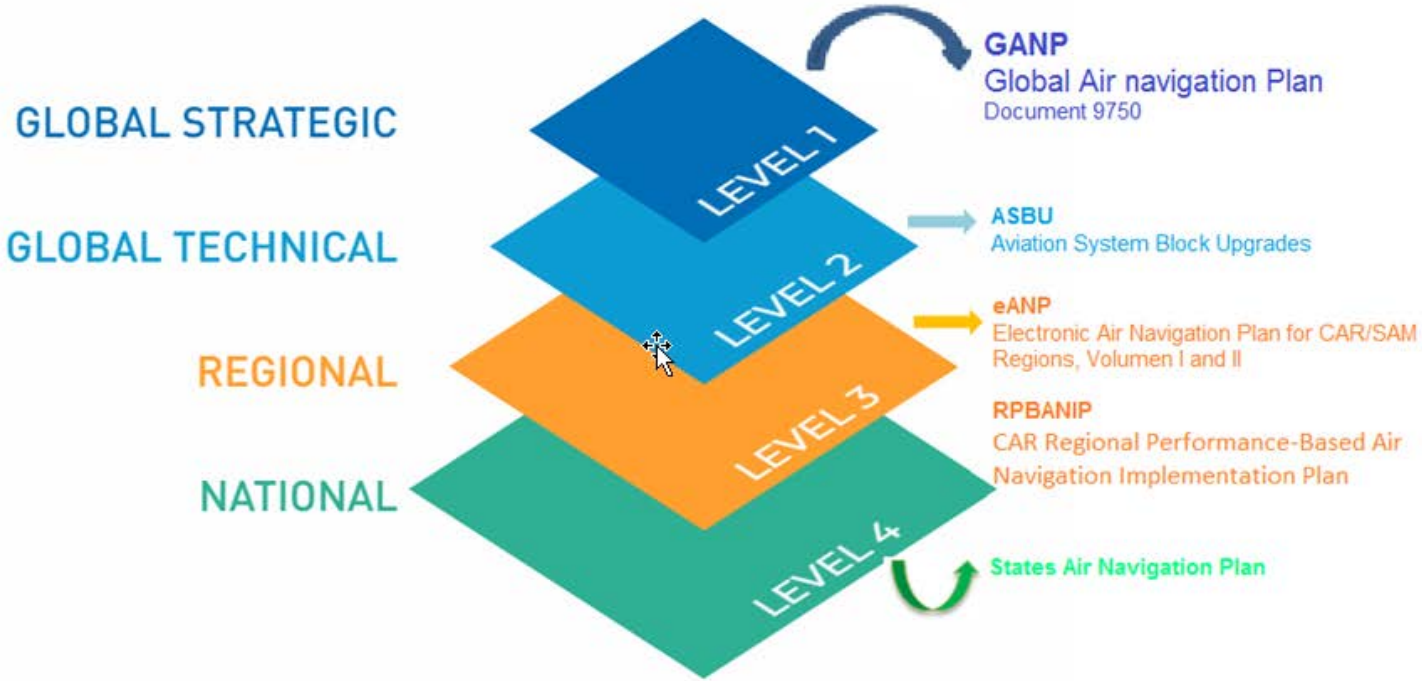
- Efficiency;
- Safety
- Capacity;
- Environmental;
- Cost reductions;
- Access; and
- Other metrics (e.g. predictability, flexibility, usefulness);



BENEFITS OF RISK MANAGEMENT

- Provides a systematic approach to examine the key components of risk and produce a risk assessment;
- Informs the effective allocation of limited resources;
- Provides basis for prioritizing mitigation strategy alternatives; Assesses your safety-security environment focusing on keeping vulnerabilities at an acceptable level; Establishes a common frame of reference for analyzing aviation security, communicating issues, and determining priorities;
- Provides the basis for compliance with Annexes.

Basis for planning



ICAO Documentation

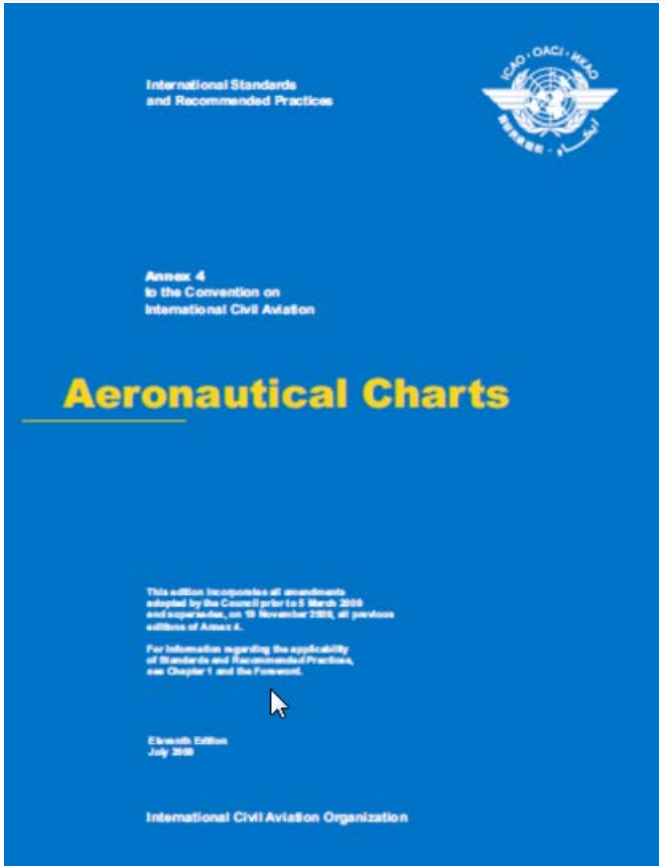
- **Given the international nature of aviation, special efforts should be taken to ensure harmonization though compliance with ICAO Standards and Recommended Practices (SARPs). The choice of systems to support ADS-B should consider not only the required performance of individual components, but also their compatibility with other CNS systems.**

Annex 2

- Applicability of the rules of the air.
- General rules
- Instrument flight rules
- Appendixs

Annex 4: Aeronautical Chart

- The Standards, Recommended Practices and explanatory notes contained in Annex 4 define the obligations of States to make available certain ICAO aeronautical chart types, and specify chart coverage, format, identification and content including standardized symbology and colour use. The goal is to satisfy the need for uniformity and consistency in the provision of aeronautical charts that contain appropriate information of a defined quality. When a published aeronautical chart contains “ICAO” in its title, this indicates that the chart producer has conformed to both general Annex 4 Standards and those pertaining to a particular ICAO chart type.



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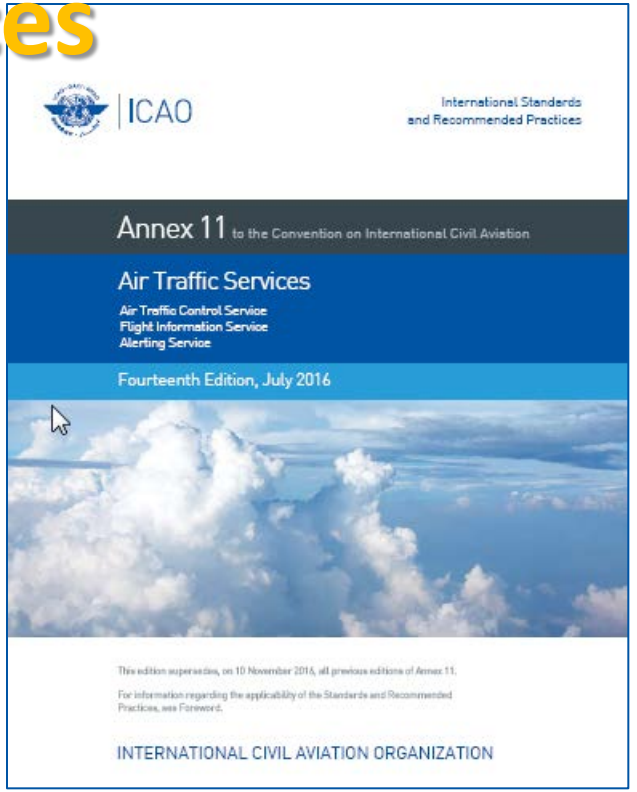
Annex 10

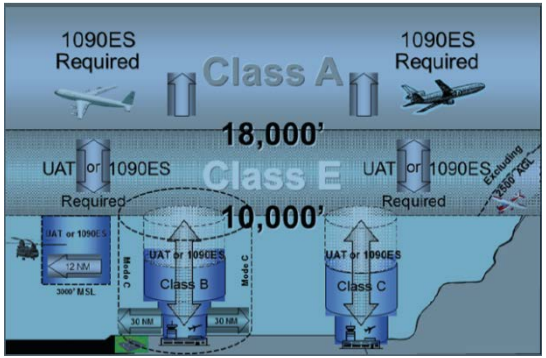
Annex 11: Air Traffic Services

- The Standards and Recommended Practices in this document, together with the Standards in Annex 2, govern the application of the Procedures for Air Navigation Services — Air Traffic Management (Doc 4444, PANS-ATM) and the Regional Supplementary Procedures — Rules of the Air and Air Traffic Services, contained in Doc 7030, in which latter document will be found subsidiary procedures of regional application.



Annex 11

- Divisions of the air traffic services
- Determination of the need for air traffic services
- Classification of airspaces



Class A. IFR flights only are permitted, all flights are provided with air traffic control service and are separated from each other.

Class B. IFR and VFR flights are permitted, all flights are provided with air traffic control service and are separated from each other.

Class C. IFR and VFR flights are permitted, all flights are provided with air traffic control service and IFR flights are separated from other IFR flights and from VFR flights. VFR flights are separated from IFR flights and receive traffic information in respect of other VFR flights.

Class D. IFR and VFR flights are permitted and all flights are provided with air traffic control service, IFR flights are separated from other IFR flights and receive traffic information in respect of VFR flights, VFR flights receive traffic information in respect of all other flights.

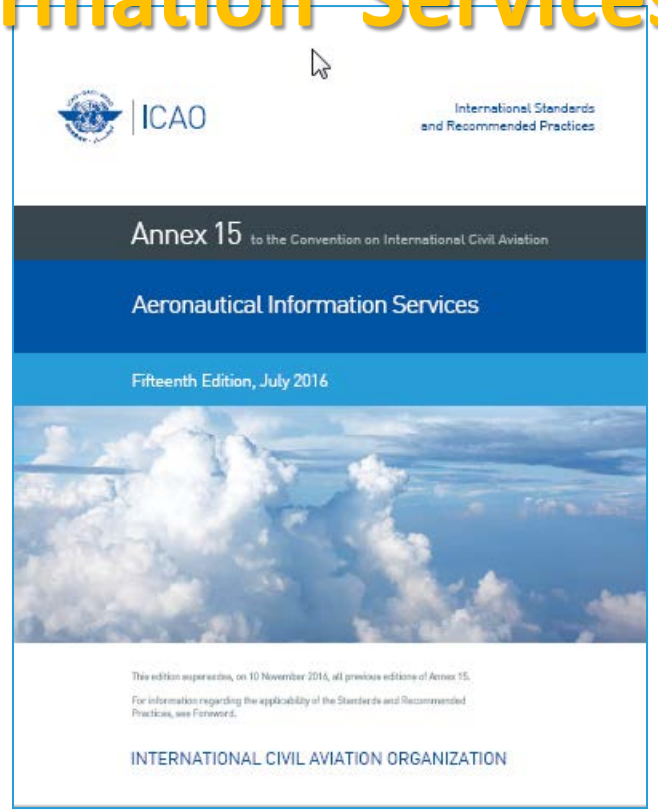
Class E. IFR and VFR flights are permitted, IFR flights are provided with air traffic control service and are separated from other IFR flights. All flights receive traffic information as far as is practical. Class E shall not be used for control zones.

Class F. IFR and VFR flights are permitted, all participating IFR flights receive an air traffic advisory service and all flights receive flight information service if requested.

Annex 15: Aeronautical Information Services

- The object of the aeronautical information service is to ensure the flow of information necessary for the safety, regularity and efficiency of international air navigation.

- Procedures for identifying and notifying differences to ICAO (AIP GEN 1-7 publication).



PAN-ATM (Doc 4444/ATM501)

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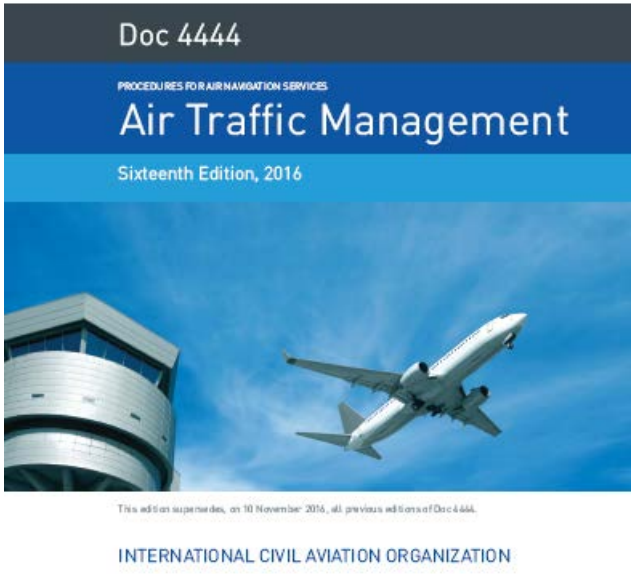


- The *Procedures for Air Navigation Services — Air Traffic Management* (PANS-ATM) are complementary to the Standards and Recommended Practices contained in Annex 2 — *Rules of the Air* and in Annex 11 — *Air Traffic Services*. They are supplemented when necessary by regional procedures contained in the *Regional Supplementary Procedures* (Doc 7030).

Doc 4444: *Air Traffic Management*

Appendix 2

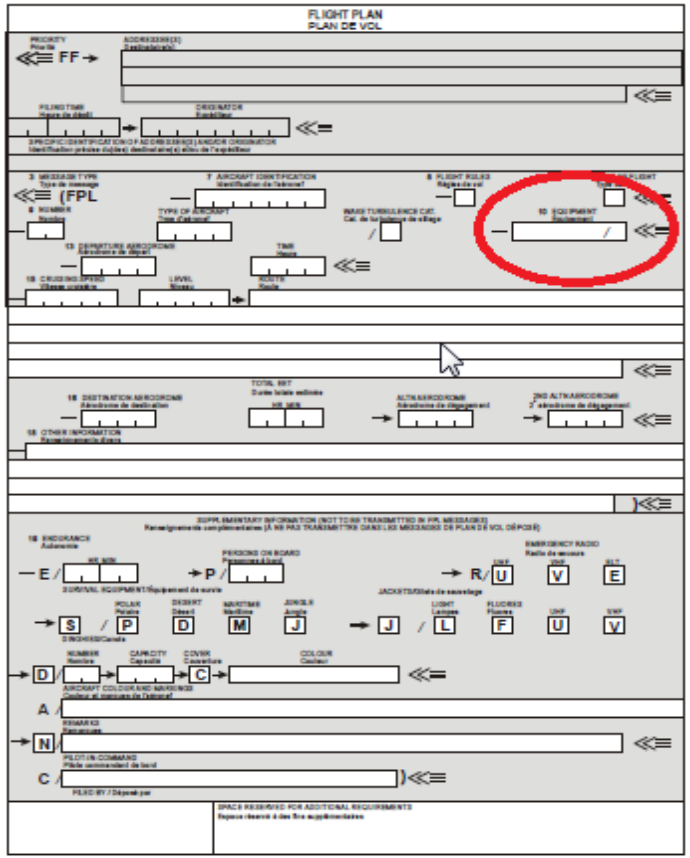
FLIGHT PLAN

1. ICAO model flight plan form
2. Instructions for the completion of the flight plan form
3. Instructions for the transmission of a filed flight plan (FPL) message
4. Instructions for the transmission of a supplementary flight plan (SPL) message
5. Example of a completed flight plan form
6. ICAO model repetitive flight plan (RPL) listing form
7. Instructions for the completion of the repetitive flight plan (RPL) listing form
8. Example of a completed repetitive flight plan (RPL) listing form

Doc 4444: *Air Traffic Management*

- Air Traffic Control makes use of these new capabilities, and uses the Flight Plan information as a decision support tool – to allow the Air Traffic Controller to predict the surveillance capability of a particular aircraft before it enters radar or ADS-B coverage.

1. ICAO model flight plan form



Doc 4444

Air Traffic Management

ITEM 10: EQUIPMENT AND CAPABILITIES

Capabilities comprise the following elements:

a) presence of relevant serviceable equipment on board the aircraft;

b) equipment and capabilities commensurate with flight crew qualifications; and

c) where applicable, authorization from the appropriate authority.

Surveillance equipment and capabilities

INSERT N if no surveillance equipment for the route to be flown is carried, or the equipment is unserviceable,
OR

INSERT one or more of the following descriptors, to a maximum of 20 characters, to describe the serviceable surveillance equipment and/or capabilities on board:

SSR Modes A and C

A Transponder — Mode A (4 digits — 4 096 codes)
C Transponder — Mode A (4 digits — 4 096 codes) and Mode C

SSR Mode S

E Transponder — Mode S, including aircraft identification, pressure-altitude and extended squitter capability
H Transponder — Mode S, including aircraft identification, pressure-altitude and enhanced surveillance capability
I Transponder — Mode S, including aircraft identification, but no pressure-altitude capability
L Transponder — Mode S, including aircraft identification, pressure-altitude, extended squitter (ADS-B) and enhanced surveillance capability
P Transponder — Mode S, including pressure-altitude, but no aircraft identification capability
S Transponder — Mode S, including both pressure altitude and aircraft identification capability
X Transponder — Mode S with neither aircraft identification nor pressure-altitude capability

Note.— Enhanced surveillance capability is the ability of the aircraft to down-link aircraft derived data via a Mode S transponder.

ADS-B

B1 ADS-B with dedicated 1 090 MHz ADS-B "out" capability
B2 ADS-B with dedicated 1 090 MHz ADS-B "out" and "in" capability
U1 ADS-B "out" capability using UAT
U2 ADS-B "out" and "in" capability using UAT
V1 ADS-B "out" capability using VDL Mode 4
V2 ADS-B "out" and "in" capability using VDL Mode 4

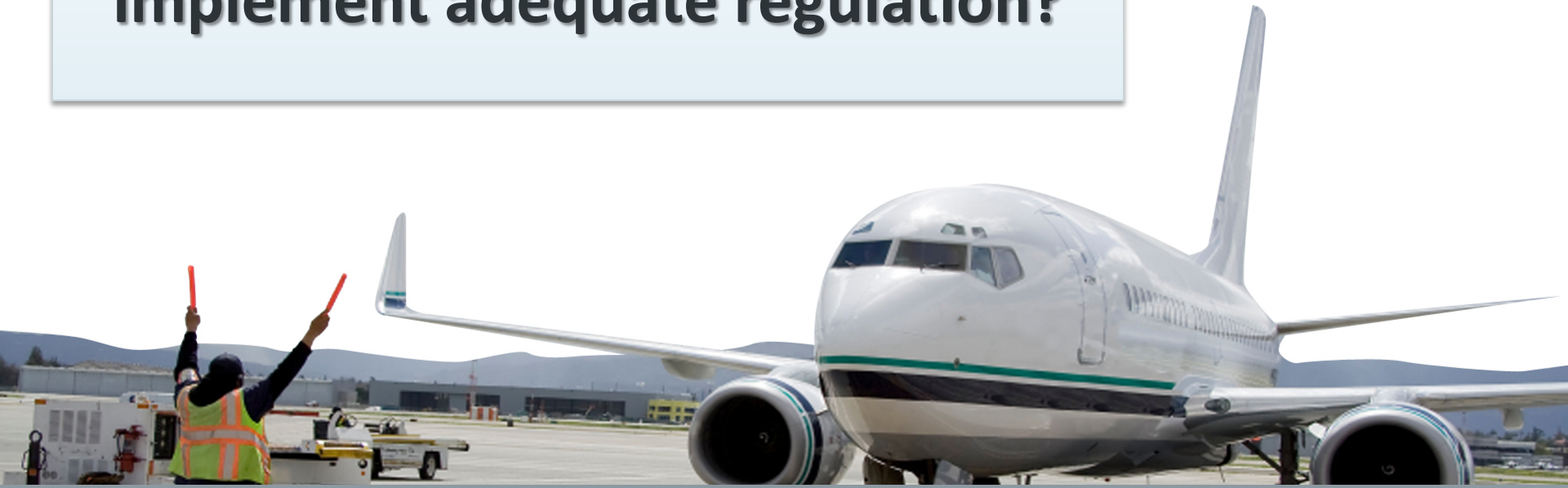
Other ICAO Reference Documents

- Manual on Airspace Planning Methodology for the Determination of Separation Minima (Doc 689/AN953).
- Doc 9859 Safety Management Manual (SMM).
- Annex 19: Safety Management.
- ICAO Circular 326 AN/188 “Assessment of ADS-B and Multilateration Surveillance to Support Air Traffic Services and Guidelines for Implementation.
- Regional Supplementary Procedures (Doc 7030).

Communications, Navigation, Surveillance and Air Traffic Management (CNS/ATM) environment is an integrated system including physical systems (hardware, software, and communication networks), human elements (pilots, controllers and engineers), and the operational procedures for its applications.

ADS-B is a surveillance system that may be integrated with other surveillance technologies or may also operate as an independent source for surveillance monitoring within the CNS/ATM system.

Why is it important to develop and implement adequate regulation?



- Define requirements; ADS-B equipment.
- define the airspace affected by the regulations.
- Establish the technical and operational standards.
- Determine the responsibility of each of the parties.

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Questions?