"Ensuring safety, efficiency and Increasing Capacity"

ICAO WORKSHOP
Sharing Experience of ADS-B Implementation Program in Indonesia

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Bangkok, 14-16 August 2024

CONTENTS

Introduction

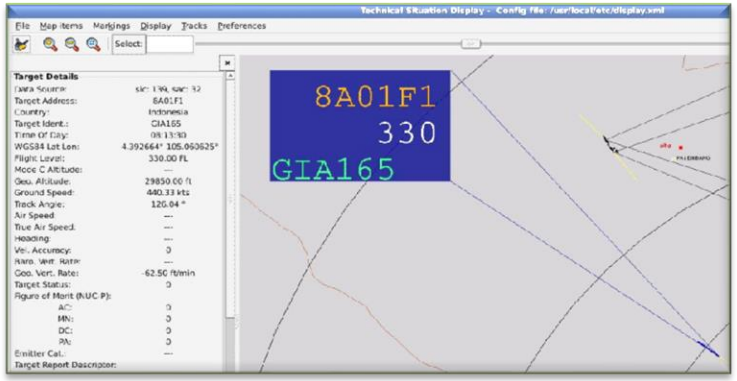
ICAO Air Navigation Conference/11 (2003) recommend states to recognize ADS-B as an enabler of the global ATM Concept bringing substantial safety and capacity benefit; support the cost-effective early implementation of it; and ensuring it is harmonized, compatible and interoperable with operational procedures, data link and ATM Application.

(AIGD Document Edition 14 - August 2021)

1 CONCEPT PHASE

Introduction

CDTI



ADS-B TEST BED

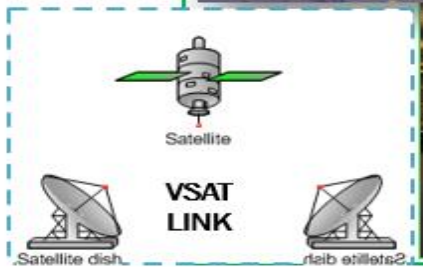
Automatic

- No pilot input required
- No interrogation from Ground

ADS - B 'IN'

ADS - B 'OUT'

ADS-B Ground Station



Dependent

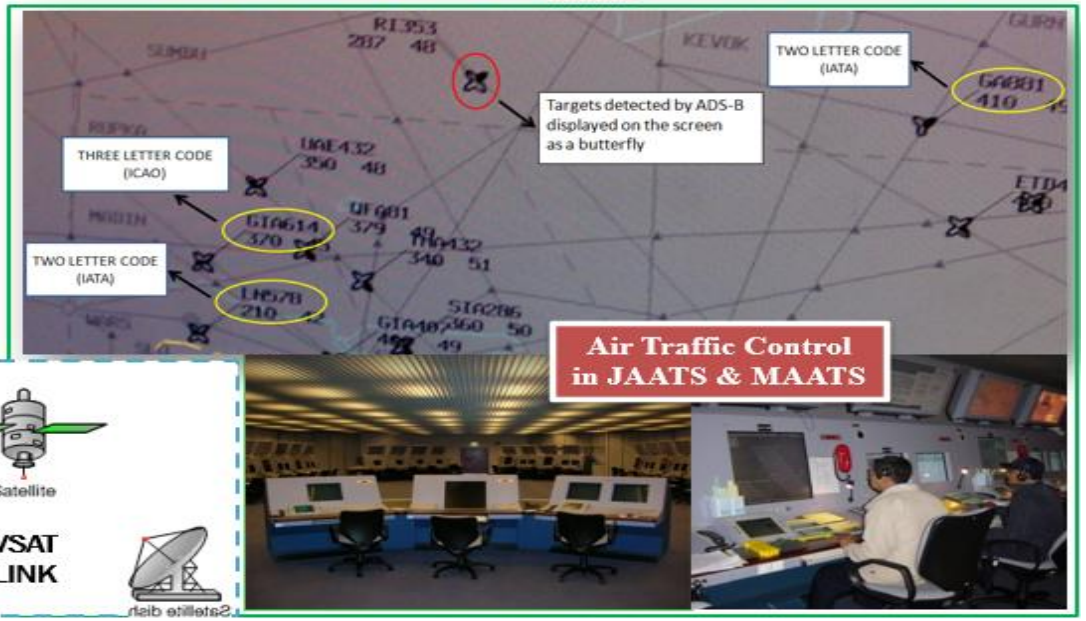
Data parameters (Position, speed,...) from Aircraft (GNSS)

Surveillance

Provides air traffic surveillance information

Broadcast

- One report every 0.5 seconds
- Information sent by aircraft transponder : {altitude, identity (call sign), velocity vector and vertical rate}



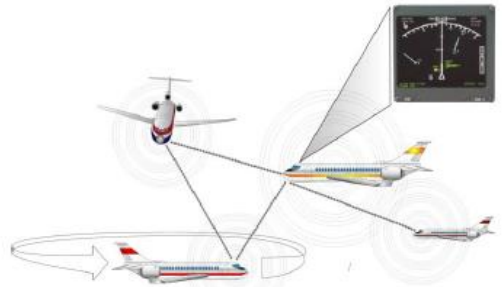
Benefits of ADS-B

ANSP — BENEFITS — AIRLINES

a. **Positive identification** whilst within ADS-B coverage.
b. **No position reporting** requirements whilst ADS-B identified.
c. **Route and altitude** conformance monitoring.
d. **ATC safety net alerting** functions (short term conflict alert, dangerous area infringement warning, cleared level adherence monitoring).
e. **Traffic advisory service** between ADS-B equipped aircraft in Class E and G airspace.
f. **Increased airspace capacity** as a result of the reduction in the ATC separation standard from 50NM laterally and longitudinally to 5NM.
g. **Improved safety resulting** from radar-like surveillance over Indonesia, replacing procedural separation.
h. **Less holding** of aircraft at non-preferred levels thus **improving efficiency** of operations on flexi-tracks.

G. ADS-B Application

Air-to-Air
- Improved Separation Standards
- Enhanced See and Avoid
- Enhanced Operations for En Route Air-to-Air



Airport Surface
- Improved Pilot Situational Awareness
- Enhanced Controller Management of Surface Traffic
- Reduced Potential for Runway Incursion/ Ground Collision

Air-to-Ground
- Surveillance Coverage in Non-Radar Airspace (with Improved Separation Standards)
- Enhanced Special VFR Operations

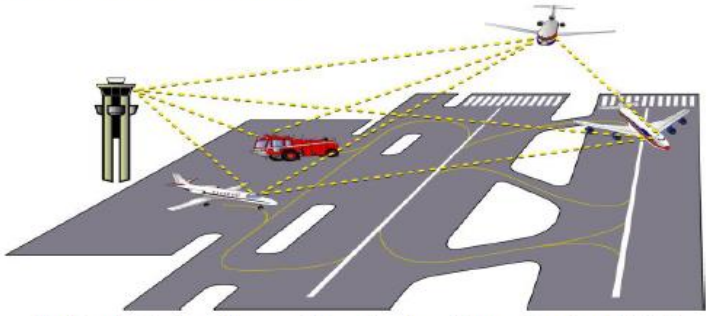


Fig. 16 – Application of Automatic Dependent Surveillance – Broadcast (ADS-B)

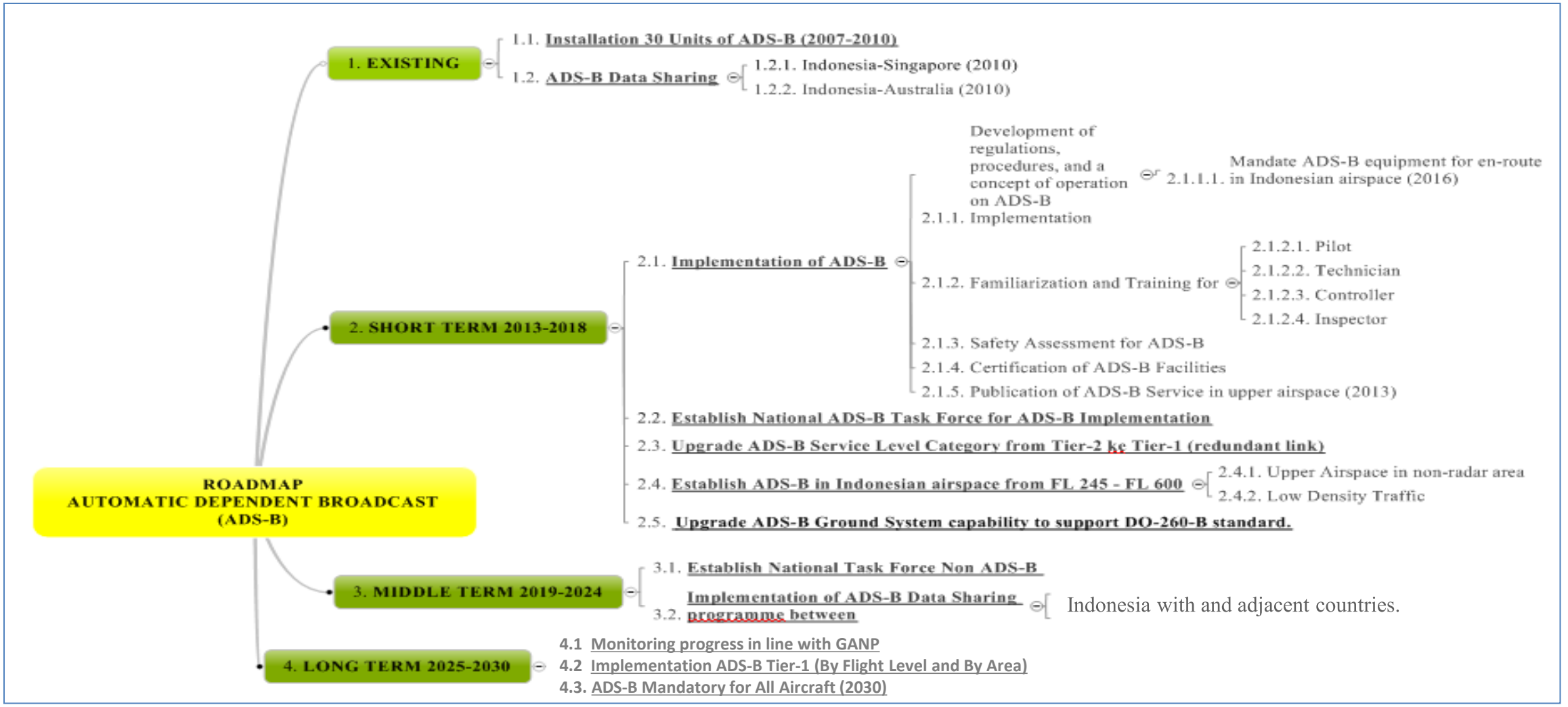
Benefits of ADS-B

For the Environment

- ADS-B groundstation uses significantly less power compared to SSR system because ADS-B groundstation only acts as receiver and has no mechanically-moving parts, thus helping to reduce carbon emissions generated by the power plant.
- ADS-B system should be software-upgradeable thus decreasing the need for new hardware in future updates.
- ADS-B allows better aircraft surveillance and separation to maximize airspace utilisation by providing accurate aircraft information, thus supporting more efficient procedures to be implemented such as ATFM and PBN.

2 DESIGN PHASE

ADS-B Roadmap



2 DESIGN PHASE

Milestone

2006
- Starting **installation** and **familiarization** of ADS-B

2008
- DGCA Indonesia issued **Circular Letter** regarding the Implementation of Automatic Dependent Surveillance (ADS) in Indonesia.

2014
- Publication of an **AIRAC AIP Supp Nr. 10/14** regarding ADS-B Implementation in Indonesia for Situational Awareness (**Tier-2**)

2015
- Publication of an **AIRAC AIP Supp Nr. 08/15** regarding ADS-B Implementation in Indonesia for ATS Surveillance Separation (**Tier-1**)
- The use of ADS-B for ATS Surveillance Separation between FL 290 to FL460

2017
- **AIRAC AIP Supp Nr. 18/17** regarding the use of ADS-B for air traffic service in Indonesia airspace.

2018
- **ADS-B Equipage Mandatory** for **Aircraft flying FL 290 to FL 600**

2020
- **ADS-B for ATS Surveillance Separation** at all level in several airspace
- **ADS-B Equipage Mandatory for Aircraft** at all level in several airspace

2 DESIGN PHASE

Regulation

NATIONAL REGULATIONS

- DGCA Blue Print
- CASR Part 91 (General Operating and Flight Rules)
- CASR Part 121 (Certification & Operation. Requirement.: Domestic, Flag and Supp. Air Carrier)
- CASR Part 170 (Air Traffic Rules)
- CASR Part 171 (Aeronautical Telecommunication Service Provider, now change for Flight Callibration)
- CASR Part 172 (ATM Service Provider, now change for ATM and Telecommunication Service Provider)
- AIP Extract

INTERNATIONAL REGULATIONS

- ICAO Doc. 4444, PANS Air Traffic Management
- ICAO Doc. 9426, Air Traffic Services Planning Manual
- ICAO Global Air Navigation Plan 2007
- ICAO Annex 11, Air Traffic Services
- RTCA DO303, Safety, Performance and Interoperability Requirements for the ADS-B Non-Radar Airspace (NRA) Application, December 2006
- RTCA DO260A Minimum Operational Performance Standards for 1090 MHz Automatic Dependent Surveillance - Broadcast dated 10 April 2003
- RTCA DO206B Minimum Operational Performance Standards for 1090 MHz Automatic Dependent Surveillance - Broadcast dated 2 December 2009.
- EASA-approved Means of Compliance AMC 20-24 Certification Considerations for Enhanced ATS in Non-Radar Areas using ADS-B Surveillance (ADS-B NRA) via 1090 MHz Extended Squitter, dated 2 May 2008
- ICAO APAC AIGD, Edition 3.0 ICAO APAC e-docs SUR/ADS-B 2007.
- ICAO Circular 326, Assesment of ADS-B to Support Air Traffic Services and Guidelines for Implementation
- ICAO APAC e-docs SUR/ADS-B “Guidance Material on Building a Safety Case for Delivery of an ADS-B Separation Service”
- FAA Code of Federal Register CFR 14-91 Automatic Dependent - Broadcast (ADS-B) Out Performance Requirements to Support the Air Traffic Control (ATC) Service.

2 DESIGN PHASE

AIP Publication

1. Regulation of The Minister of Transportation of The Republic of Indonesia Number PM 81 year 2017 regarding amendment of Civil Aviation Safety Regulations Part 91 (CASR 91) General Operating And Flight Rules;

2. AIRAC AIP Supplement Nr. 18/17 dated 25 May 2017 regarding Automatic Dependent Surveillance Broadcast (ADS-B) Implementation In Indonesia;

3. AIRAC AIP Amendment Nr. 89 dated 27 Feb 2020 point 1.6.3. Automatic Dependent Surveillance - Broadcast (ADS-B);

4. AIRAC AIP Amendment Nr. 120 dated 28 July 2022 point 1.6.9. Implementation of Automatic Dependent Surveillance - Broadcast (ADS-B)

3 IMPLEMENTATION PHASE

Tier-3, Tier-2, Tier-1 Phase

- **Tier-3** (Phase Monitoring) :
  Circular letter from DG of DGCA Indonesia.
- **Tier-2** (Phase Situation Awareness) :
  Integration to ACC JATSC and ACC MATSC.
- **Tier-1** (Phase Separation) :
  At FL290 to FL460 dan FL245 to FL600.

Indonesia implements ADS-B Implementation according to ADS-B SITF/8 Meeting through 2 methods, namely:

- **by Flight Level** and
- **by Area**.

ADS-B SITF/8
Appendix G to the Report
G - 1

PROPOSED MODIFICATION TO GUIDELINES FOR THE DEVELOPMENT OF ADS-B IMPLEMENTATION PLAN

That, States be advised to use the following guidelines for the development of ADS-B implementation plan.

a) minimize capital and operating costs of ADS-B data facilities;

b) give priority to provide ADS-B coverage over major traffic flows and *those airspaces currently not covered by radar. ADS-B should have overlapping area with existing radar coverage.*

c) provide ADS-B coverage in **areas within 150 NM** from FIR boundaries;

d) suitable sites with power, shelter, access routes and data communication links shall be preferred; and

e) overlapping of ADS-B coverage is preferred.

f) *Integrate ADS-B data with the ATM automation system wherever possible taking advantage of synergies with other means of surveillance (such as radar, ADS-C, flight plan tracks) ;*

g) *Mandate ADS-B OUT equipage on the aircraft operating in the airspaces, **at the Flight Levels or Area** where currently no radar surveillance is available and where ADS-B based services are offered (served with ADS-B ground stations).*

h) *Expand the "mandate" to aircraft operating in other airspace when the ANSP is able to provide ADS-B based services in the airspace.*

i) *ADS-B Implementation is more effective when it is implemented regionally both on the ground and on the aircraft.*

j) *When considering the benefits of ADS-B Implementation, it is necessary to consider the total benefits to all stakeholders (airline operators, passengers, efficiency of the ATM network, and society etc) and not only the benefit derived for airlines operators and air navigation services providers.*

Pre ADS-B Implementation Activities

1. National Taskforce with Stakeholders
2. Gap Analysis
3. Safety Risk Analysis
4. Network Infrastructure
5. Mapping the number of aircraft equipped and non-equipped with ADS-B Transmitter.
6. Upgrade ATM Automation to comply with New CNS/ATM Format, Mode-S radar and ADS-B
7. Refer to Interface Control Document (ICD)
8. Develop Concept of Operational (ConOps)

3 IMPLEMENTATION PHASE

ADS-B Implementation Task Force Activities

22-23 May 2014	▪ Seminar and Task Force Implementation of ADS-B in Indonesia ▪ Development Task List implementation
8 July 2014	▪ Development of ADS-B Task Force Team (KP 404 year 2014)
17-23 July 2014	▪ Development draft AIP Supplement (Tier-2) ▪ Development of SOP ADS-B
July 2014	▪ Training of Technical and Operational Personnel, Socialization to Pilot ▪ Publication of AIP Supplement for ADS-B Implmentation ADS-B Tier-2
15 Sept 2014	▪ Meeting of Task List and Readiness of Implementation Tier-2 and Tier-1
18 Sept 2014	▪ Effective date ADS-B Implementation Tier-2
30 Okt 2014	▪ Technical Meeting of Preparation ADS-B Implementation Tier-1 ▪ Meeting of ADS-B Networking
11-12 Des 2014	▪ Meeting of Assesment and Certification of ADS-B Tier-1
2 Feb 2015	▪ Performance Evaluation of ADS-B filter and VSAT link ▪ Coordination of VSAT link preparation for ADS-B Implementation Tier-1
June 2015	▪ Publication of AIP Supplement related to ADS-B Implementation Tier 1 ▪ Trial Operation and Implementation Surveillance Service use ADS-B at specific route or airspace

Minimum Requirement of ADS-B Groundstation

Service Parameter	Category 1 (Tier 1) 5NM separation capable commensurate with Radars (separation/vectoring/high performance with reliability, integrity & latency)	Category 2 (Tier 2) Situational awareness similar to ADS-C (safety net alerts, SAR, supports procedural separation without voice, not 5NM separation)	Category 3 (Tier 3) Position Reporting with Enhanced Flight Operation
Aircraft Updates	1 second < Rate < 5 seconds as Operationally required	1 second < Rate < 20 seconds as Operationally required	1 second < Rate < 60 seconds as Operationally required
Network Latency	95% < 2seconds of ground-station output	95%: < 15 seconds of ground-station output	95%: < 60 seconds of ground-station output
Reliability I	2 autonomous groundstations including antenna, each providing data, no common point of failure	1 unduplicated groundstation including antenna	1 unduplicated ground-station including antenna
Reliability 2 - MTBF	Each ground-station including antenna to have MTBF >10,000 hrs	Each ground-station including antenna to have MTBF >10,000 hrs	Each ground-station including antenna to have MTBF >10,000 hrs
Reliability -Communications Infrastructure	Completely duplicated, no common point of failure	Unduplicated, MTBF > 400hrs	Unduplicated, MTBF > 200 hrs
Reliability - Total ADS-B Service	Total Service MTBF >50,000 hrs	Total Service MTBF > 400 hrs	Total Service MTBF > 200 hrs
Availability - Total ADS-B Service	Total Service Availability >.999	Total Service Availability >.95	Total Service Availability > .90
Integrity - Ground Station	Site monitor, including GPS RAIM, monitored by RCMS	Site monitor, including GPS RAIM, monitored by RCMS	Site monitor, including GPS RAIM, monitored by RCMS
Integrity - Data Communications & Processings	A11 systems up to ATM system,errors<1xlOE^{-6}	All systems up to ATM system, errors < 1 x 10E^{-6}	All systems up to ATM system, errors < I x lOE^{-6}

3 IMPLEMENTATION PHASE

Installation Phase

1. **2006** :

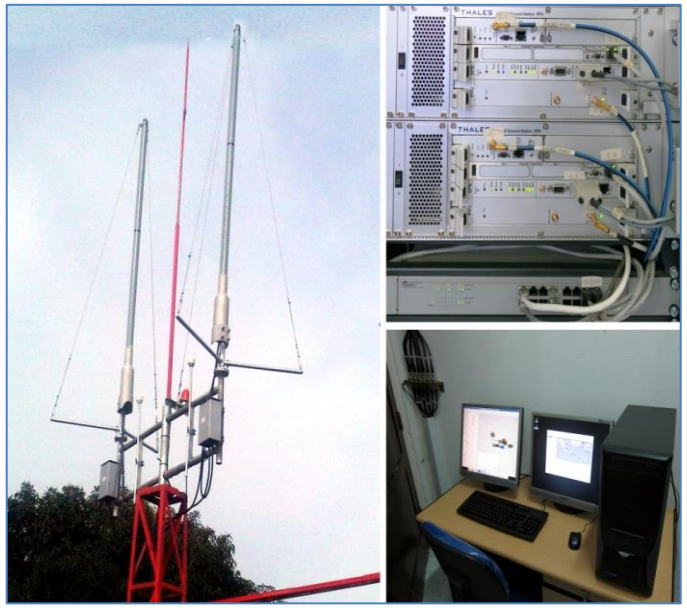
   Installation of 3 ADS-B GS at Natuna, Kintamani, Kupang.

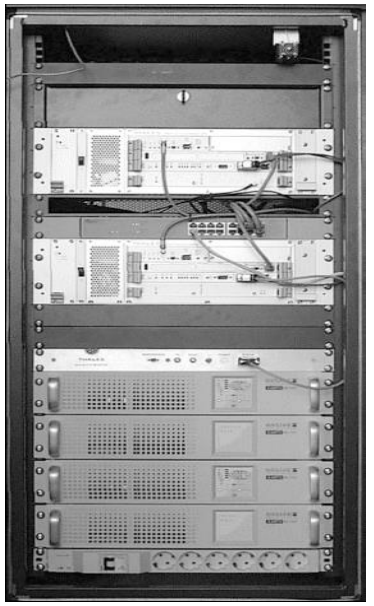
2. **2007** :

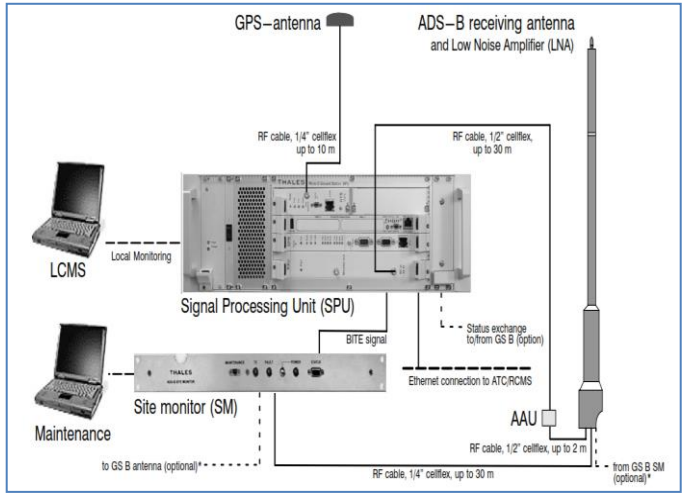
   Installation of 7 ADS-B GS more.

3. **2008 to 2010** :

   - Installation of 20 ADS-B GS more.
   - In total, 30 ADS-B Groundstation spread throughout Indonesia
   - Indonesia also build an ADS-B Testbed at DGCA office for research, monitoring and testing the ADS-B GS System
   - Indonesia still increase the amount of ADS-B Groundstation to cover the blank spots area.







ADS-B Ground Station :

- Receiver ADS-B Signal Unit
- GPS Receiver Unit
- Processing Unit
- GPS Rx Antenna
- ADS-B Rx Antenna
- Site monitor
- UPS
- RCMS
- LCMS

Jane's ATC Global Award 2008

As a result of the test program, Indonesia received the "Enabling Technology Award" from Jane's ATC Global Awards in 2008.

As a follow up to the program above, from September 2006 until August 2007, **Indonesia in collaboration with Airservices Australia (ASA), SITA and Thales**, conducted trials of ADS-B equipment by installing 3 ADS-B Ground Stations in **Bali, Kupang and Natuna** for **1 year as a pilot phase (trial)** in order to plan the implementation of ADS-B.

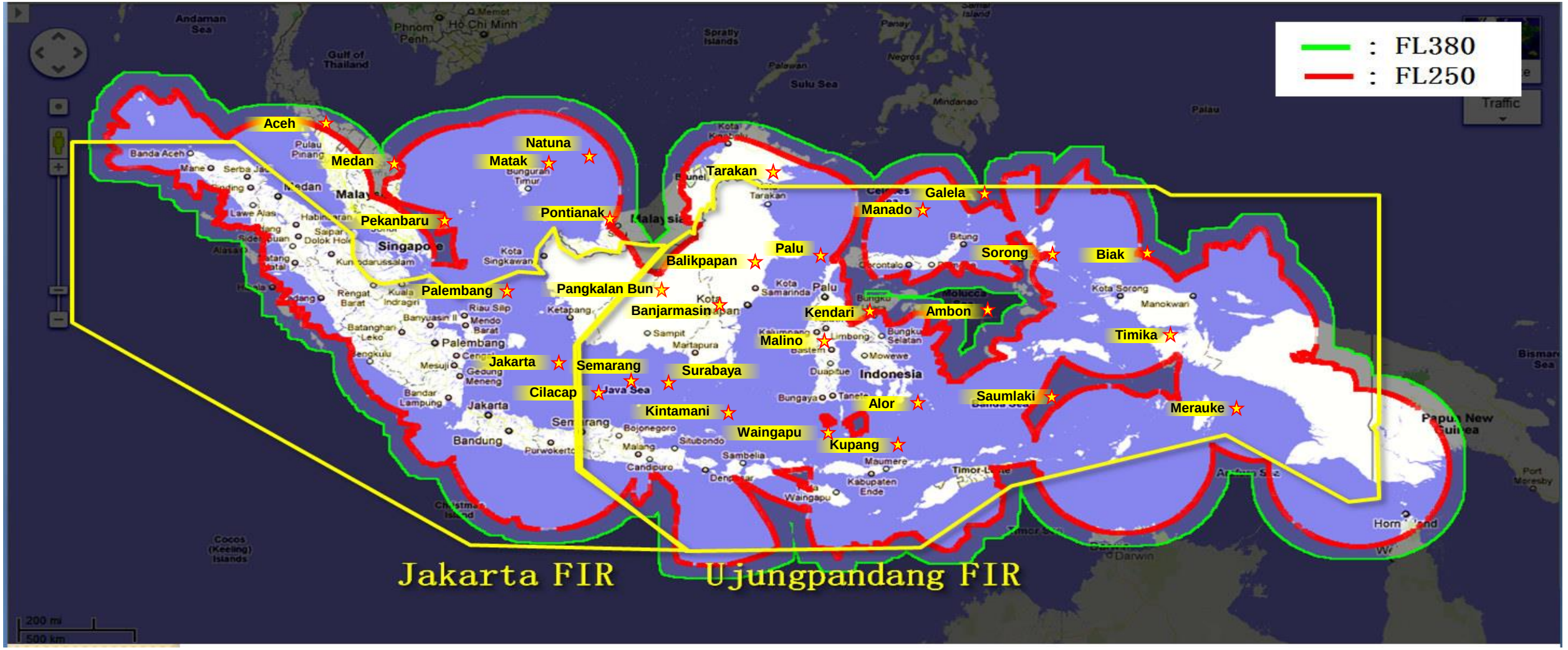
The Trial purpose was:

- **Predicting** the use of ADS-B in the aircraft
- **Assessment** of the performance and functionality of equipment.
- **Introduce** ADS-B technology to Indonesian air traffic controllers.
- **Data Distribution ADS-B** (ADS-B Data sharing) with adjacent countries.

3 IMPLEMENTATION PHASE

ADS-B Coverage

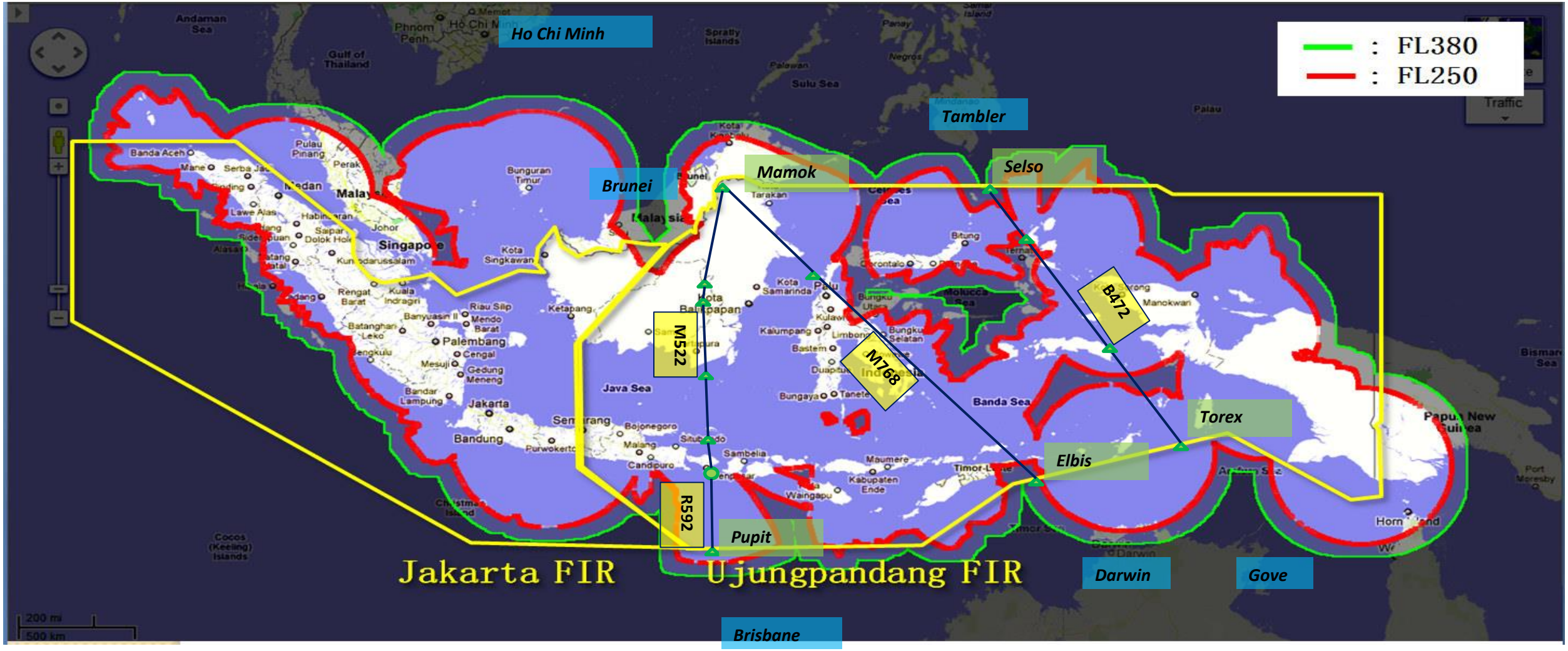
Jakarta FIR and Ujung Pandang FIR



3 IMPLEMENTATION PHASE

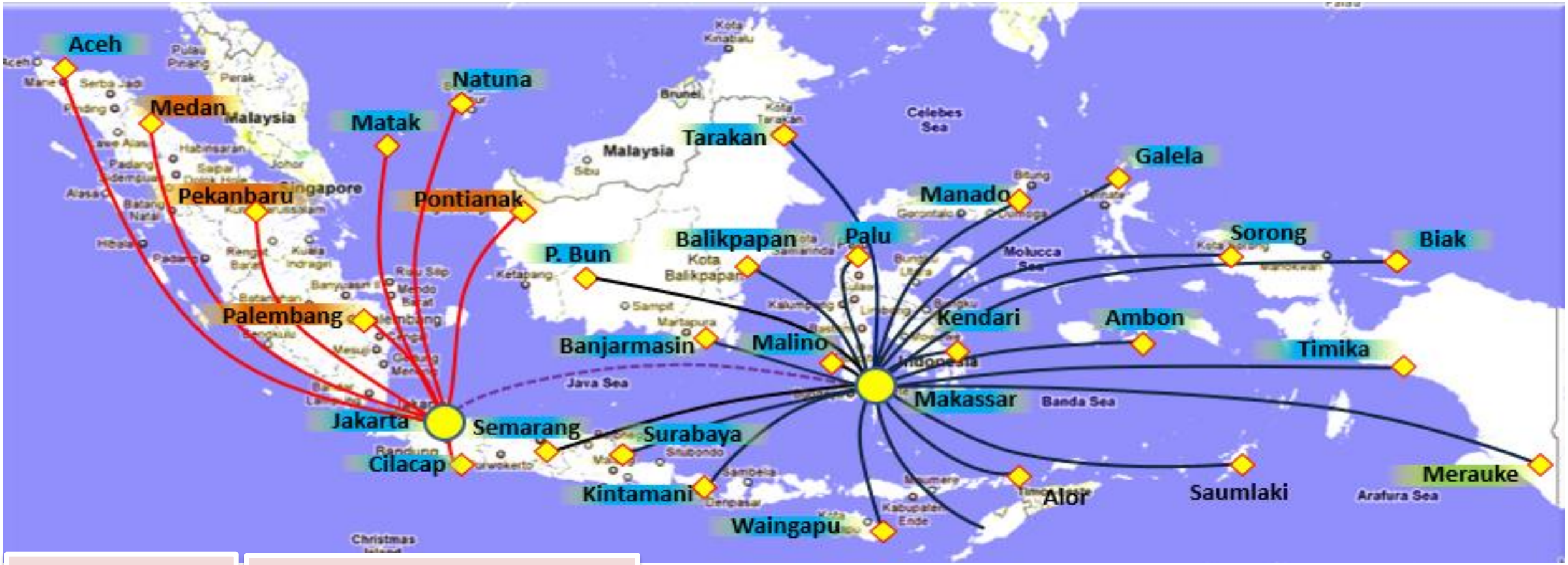
Proposed Route Trial for (Tier-1)

M522, R592, M768 and B472



ADS-B Networking

INTEGRATION



: Thales System
: ERA System
: Sensis System

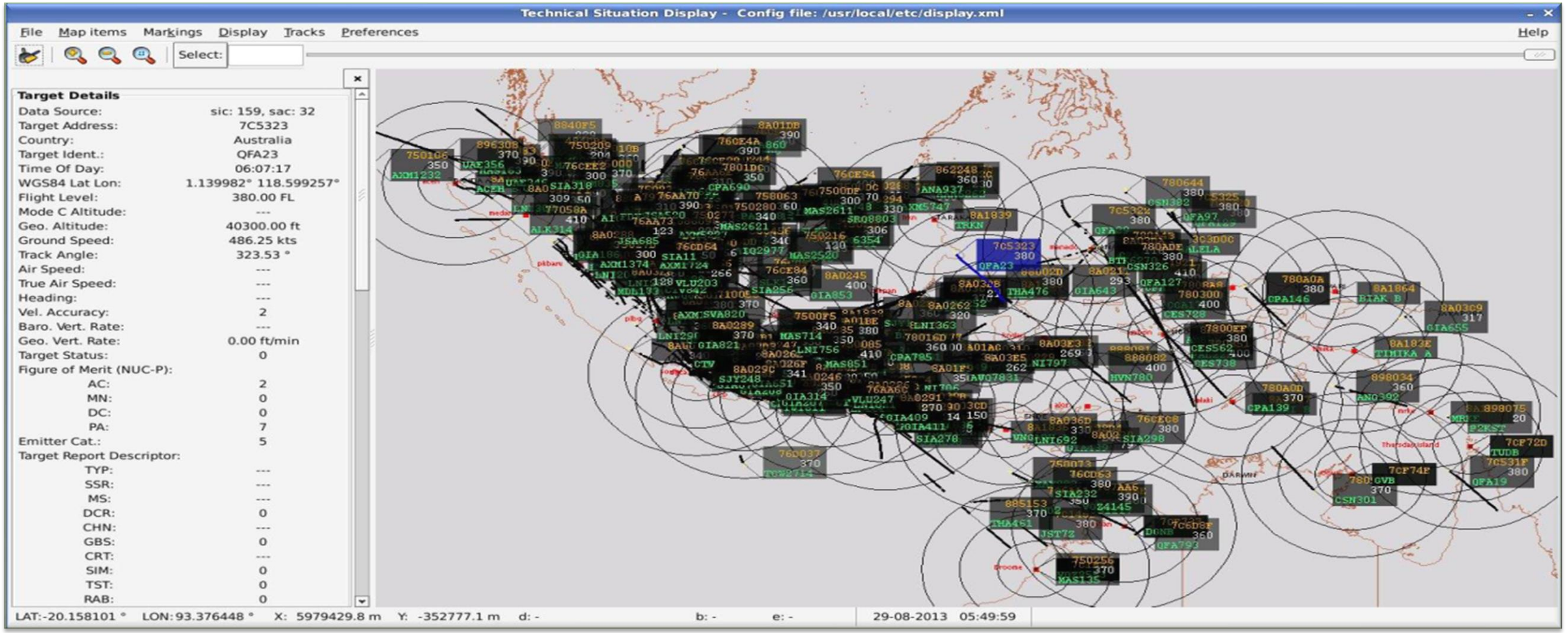
: Integration with MATSC : 21 Units
: Integration with JATSC : 9 Units
: East – West ADS-B Interconnection

ADS-B Test Bed : 1 Units

3 IMPLEMENTATION PHASE

ADS-B Test Bed

30 LOCATIONS OF ADS-B



TOTAL ADS-B in Indonesia

49 LOCATIONS OF ADS-B

3 IMPLEMENTATION PHASE

TOTAL ADS-B in Indonesia

49 LOCATIONS ADS-B IN INDONESIA

No.	GS Site	Brand	Type
1	Aceh	THALES	AX-680
2	Alor	THALES	AX-680
3	Ambon	THALES	AX-680
4	Balikpapan	THALES	AX-680
5	Banjarmasin	THALES	AX-680
6	Bengkulu	INTELCAN	S7121
7	Biak	THALES	AX-680
8	Cilacap	THALES	AX-680
9	Dekai	INTI	AGS-216
10	Elelim	INTI	AGS-216
11	Galela	THALES	AX-680
12	Jambi	INTELCAN	S7121
13	Kaimana	INTELCAN	S7121
14	Kendari	THALES	AX-680
15	Kintamani	THALES	AX-680
16	Kulonprogo	INTELCAN	S7121
17	Kupang	GECI	GT280-RX

No.	GS Site	Brand	Type
18	Lasikin	INTELCAN	S7121
19	Malino	THALES	AX-680
20	Manado	THALES	AX-680
21	Manokwari	INTELCAN	S7121
22	Matak	THALES	AX-680
23	Medan	GECI	GT280-RX
24	Melonguane	INTELCAN	S7121
25	Merauke	GECI	GT280-RX
26	Nabire	INTI	AGS-216
27	Natuna	THALES	AX-680
28	Nias	INTELCAN	S7121
29	Oksibil	INTI	AGS-216
30	Palembang	GECI	GT280-RX
31	Palu	THALES	AX-680
32	Pangkal Pinang	ERA	P3DWS
33	Pangkalan Bun	THALES	AX-680

No.	GS Site	Brand	Type
34	Pekanbaru	GECI	GT280-RX
35	Pontianak	GECI	GT280-RX
36	Putusibau	INTELCAN	S7121
37	Saumlaki	THALES	AX-680
38	Semarang	THALES	AX-680
39	Senggeh	INTI	AGS-216
40	Sentani	INTI	AGS-216
41	Soetta	THALES	AX-680
42	Sorong	THALES	AX-680
43	Surabaya	THALES	AX-680
44	Tanjung Pandan	INTELCAN	S7121
45	Tanjung Pinang	INTELCAN	S7121
46	Tarakan	THALES	AX-680
47	Timika	THALES	AX-680
48	Waingapu	THALES	AX-680
49	Wamena	INTI	AGS-216

ADS-B COLLABORATION

1. **ICAO APANPIRG/15 Meeting (2004)** recommend states decided to encourage neighboring countries to collaborate on ADS-B data and build mechanisms and infrastructure to achieve this goal.

New Guinea, Fiji, New Zealand; Indonesia & Singapore and China & Japan. In view of foregoing, the meeting adopted the following Conclusion.

Conclusion 15/26 – Exchange of ADS-B surveillance data with neighbours

That, States be encouraged to share ADS-B surveillance data with neighbouring States and to develop mechanisms to achieve this as ADS-B ground infrastructure requirements are being identified during the design phase.

2. **The result of the ICAO ADS-B SITF/7** meeting in Chengdu-China on April 2008,
3. **The 2nd SEA Subregional ADS-B Implementation Working Group** (Bali), 3rd (Malaysia) and 4th (Australia), where Indonesia, Australia, Singapore, and Vietnam have agreed to collaborate on ADS-B data at *area boundary in adjacent center.*

ADS-B DATA SHARING

1. **Indonesia actively share ADS-B data to Australia,** which are :
   - **Send to Australia** : Saumlaki, Merauke, Waingapu, Kintamani;
   - **Receive from Australia** : Thursday Island, Broome, Dongan, Goove;

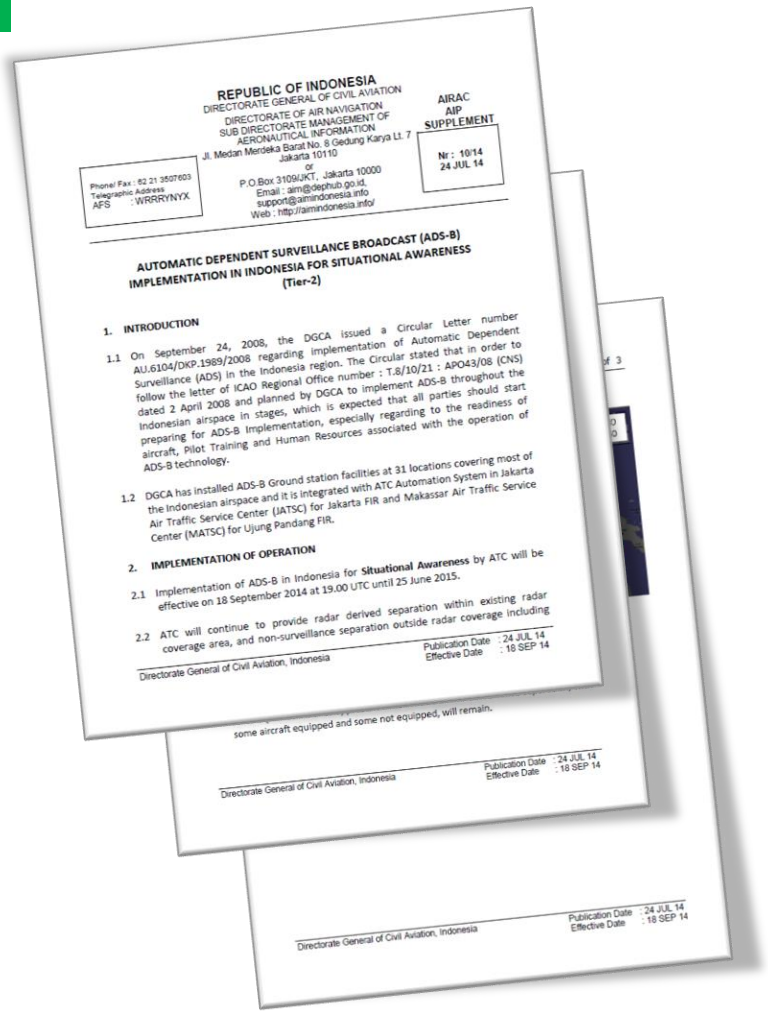
2. **Indonesia actively share ADS-B data to Singapore,** which are :
   - **Send to Singapore** : Natuna, Matak;
   - **Receive from Singapore** : Singapore

3 IMPLEMENTATION PHASE

ADS-B Implementation TIER-2 (Situational Awareness)

Ref : AIP Supplement No:10/14 dated 24 Juli 2014

- ADS-B Tier-2 (Situational Awareness) Implementation in Indonesia effective since dated 18 September 2014, 19.00 UTC.
- In this phase, it performed monitoring performance ADS-B data from Aircraft not equipage / not standard.
- Safety assessment performed at Januari 2015 after fine tuning at ATC system.



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AIRAC AIP SUPPLEMENT
Nr : 10/14
24 JUL 14

AUTOMATIC DEPENDENT SURVEILLANCE BROADCAST (ADS-B) IMPLEMENTATION IN INDONESIA FOR SITUATIONAL AWARENESS (Tier-2)

1. INTRODUCTION

1.1 On September 24, 2008, the DGCA issued a Circular Letter number AU.6104/DKP.1989/2008 regarding implementation of Automatic Dependent Surveillance (ADS) in the Indonesia region. The Circular stated that in order to follow the letter of ICAO Regional Office number : T.8/10/21 : APO43/08 (CNS) dated 2 April 2008 and planned by DGCA to implement ADS-B throughout the Indonesian airspace in stages, which is expected that all parties should start preparing for ADS-B Implementation, especially regarding to the readiness of aircraft, Pilot Training and Human Resources associated with the operation of ADS-B technology.

1.2 DGCA has installed ADS-B Ground station facilities at 31 locations covering most of the Indonesian airspace and it is integrated with ATC Automation System in Jakarta Air Traffic Service Center (JATSC) for Jakarta FIR and Makassar Air Traffic Service Center (MATSC) for Ujung Pandang FIR.

2. IMPLEMENTATION OF OPERATION

2.1 Implementation of ADS-B in Indonesia for **Situational Awareness** by ATC will be effective on 18 September 2014 at 19.00 UTC until 25 June 2015.

2.2 ATC will continue to provide radar derived separation within existing radar coverage area, and non-surveillance separation outside radar coverage including

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Effective Date : 18 SEP 14

some aircraft equipped and some not equipped, will remain.

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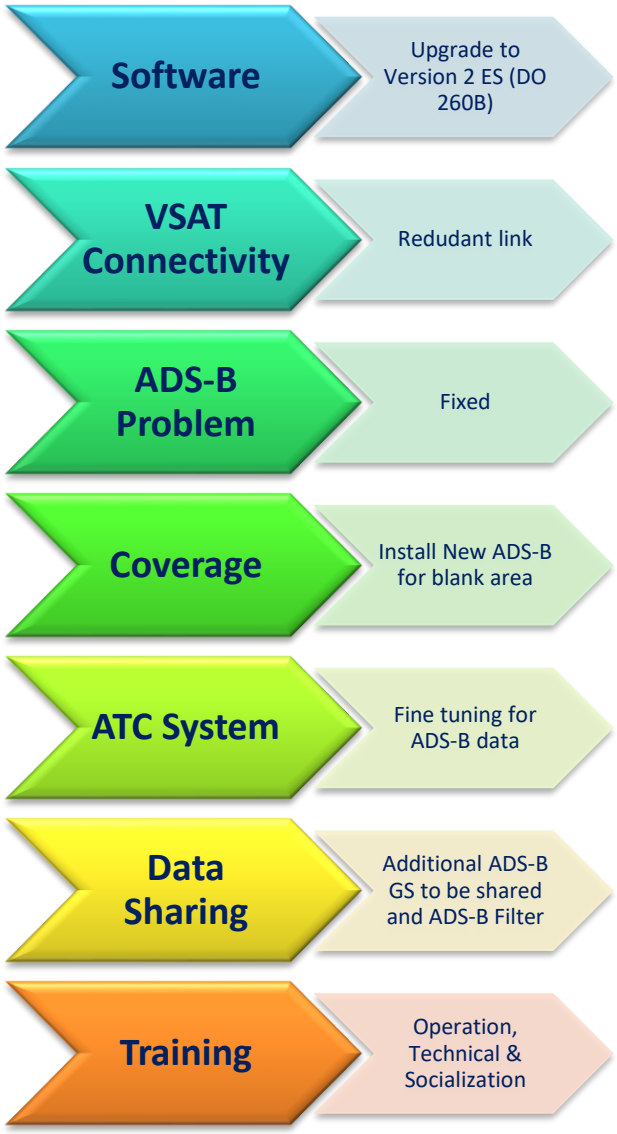
Publication Date : 24 JUL 14
Effective Date : 18 SEP 14

3 IMPLEMENTATION PHASE

Progress Tier-2 to Tier-1

1. All Aircraft that operate at FL290 above mandatory with Equipage ADS-B Transponder, meanwhile below FL290, all Aircraft with ADS-B Equipage Transponder as voluntary.
2. Training /Socialization complete performed at June 2015.
3. Trial Operation for Tier-1 performed at 28 May - 25 June 2015 in specific route.
4. Implementation Tier-1 effective at **25 June 2015.**



Progress Tier-2 to Tier-1

NO	ITEM	TIER-2	TIER-1	PIC	TIME LIMIT	STATUS
1	SOFTWARE	▪ AST. 21 (0.23, 0.26) ▪ Version 0 ES (DO260) ▪ DO260A (Version 1 ES) ▪ Master-Slave Configuration	▪ Upgrade AST 21 (2.1) ▪ Upgrade Version 2 ES (DO260B) ▪ Master-Master Configuration		August 2015	Upgrade groundstation one by one.
2	VSAT	Single Link (VSAT)	Redundant Link Data		December 2015	DNP will coordinate with Law Division and LPPNPI about VSAT contract.
3	ADS-B PROBLEM	Galela, Alor, Merauke.	Fixed the problem		November 2014	Galela, Alor, Merauke off due to electricity problem.
4	COVERAGE	▪ IOS (blank spot) ▪ Airspace around Luwuk	Install new ADS-B		April 2016	Will be proposed for RKA 2016
5	PROBLEMS	▪ Supply/Electricity, ▪ Grounding ▪ Lightning Protection ▪ Tower Antenna	▪ Programme for Back up (Genset, UPS, Solar Cell, and so on). ▪ Fixed grounding ▪ Fixed Lightning Protection ▪ Fixed Tower Antenna		May 2015	Will be proposed for RKA 2015
6	ATM System (JATSC and MATSC)	ADS-B and Radar are not couple	▪ Need fine tuning to associate between ADSB and Radar data (MAATS) ▪ Need fine tuning to associate between ADS-B and flight plan data (E-JAATS)		End of November 2014	MAATS : Fine tuning after MAATS upgrade. E-JAATS: Need further evaluation

Progress Tier-2 to Tier-1

NO	ITEM	TIER-2	TIER-1	PIC	TIME LIMIT	STATUS
			▪ There are separate Safety Net functionality between ADS-B and radar data.			for ADS-B data especially: Pontianak, Palembang, Pekanbaru.
7	DATA SHARING	▪ Australia There are 4 additional ADSB Groundstation need to be shared to Australia (Semarang, Timika, Waingapu, Alor). ▪ Singapore	▪ Activate server ADS-B Filter in MATSC		–	To be discussed by DGCA and CASA/ASA
8	TRAINING ADS-B	FT and Site Training	Prepare TCC and Socialization		–	–
9	IMPLEMENTATION (Upper Airspace FL290)	Situational Awareness Tier-2	Separation Tier-1		–	–

Surveillance Service Phase (Tier 1)

1. **Starting from 25 May 2017, DGCA Indonesia published AIRAC AIP Supp Nr. 18/17 regarding ADS-B Implementation in Indonesia.**

Which states that :

Starting from 20 July 2017 the following rules will apply :

- ADS-B implementation for ATS surveillance separation (Tier-1) is applied in Class A airspace, between FL245 to FL600.
- ADS-B implementation for ATS surveillance separation (Tier-1) is applied in particular of Class B, C, D and E airspace, between SFC to FL245, in Air Traffic Service Airspace;
- ADS-B implementation for Position reporting for traffic advisory service / flight information services (Tier-3) is applied in Class G airspace, between SFC to FL245, in Air Traffic Service Airspace;
- ADS-B implementation for Position reporting for traffic advisory service / flight information services (Tier-3) is applied in Aerodrome Traffic Zone (ATZ), in Air Traffic Service Airspace;

(AIRAC AIP Supp Nr. 18/17 dated 25 May 2017)

Surveillance Service Phase (Tier 1)

2. **The implemented area of ADS-B will continue to be added.**

3. **The latest Publication (AIRAC AIP AMDT Nr. 120 , 28 July 2022) states that the implemented areas are as follows :**

1.6.9. Implementation of Automatic Dependent Surveillance - Broadcast (ADS-B)

1.6.9.1. Area of Implementation

a. The implementation of ADS-B mandate in Indonesia will be applied in Class A, B, C, D, E and G airspace within ADS-B coverage, according to each type of the implementation, as follows:

1) ADS-B implementation for ATS surveillance separation (Tier 1) is applied in Class A airspace, between FL 245 to FL 600, in Air Traffic Service airspace as mentioned in 1.6.9.1 letter b;
2) ADS-B implementation for ATS surveillance separation (Tier 1) is applied in particular of Class B, C, D and E airspace, between Surface (SFC) to FL 245, in Air Traffic Service airspace as mentioned in 1.6.9.1 letter c;
3) ADS-B implementation for Position reporting for traffic advisory service/flight information services (Tier 3) is applied in Class G airspace, between SFC to FL 245, in Air Traffic Service airspace as mentioned in 1.6.9.1 letter d;
4) ADS-B implementation for Position reporting for traffic advisory service/flight information services (Tier 3) is applied in the vicinity of aerodrome of Aerodrome Control Tower as mentioned in 1.6.9.1 letter e.

Surveillance Service Phase (Tier 1)

b. Air Traffic Service airspace which implement ADS-B as ATS surveillance separation between FL 245 – FL 600 are as follows:
   1) Jakarta Upper Control Area;
   2) Ujung Pandang Upper Control Area.

c. Air Traffic Service airspace which implement ADS-B as ATS surveillance separation between SFC – FL 245 are as follows:
   1) Bali TMA and CTR;
   2) Bengkulu CTR;
   3) Jakarta TMA and CTR;
   4) Jambi CTR;
   5) Palembang TMA and CTR;
   6) Pangkal Pinang TMA and CTR;
   7) Pekanbaru TMA and CTR;
   8) Pontianak TMA and CTR;
   9) Surabaya TMA and CTR;
   10) Tanjung Pandan CTR;
   11) Tanjungpinang TMA and CTR;
   12) Ujung Pandang TMA and CTR;
   13) Yogyakarta MCA and CTR.

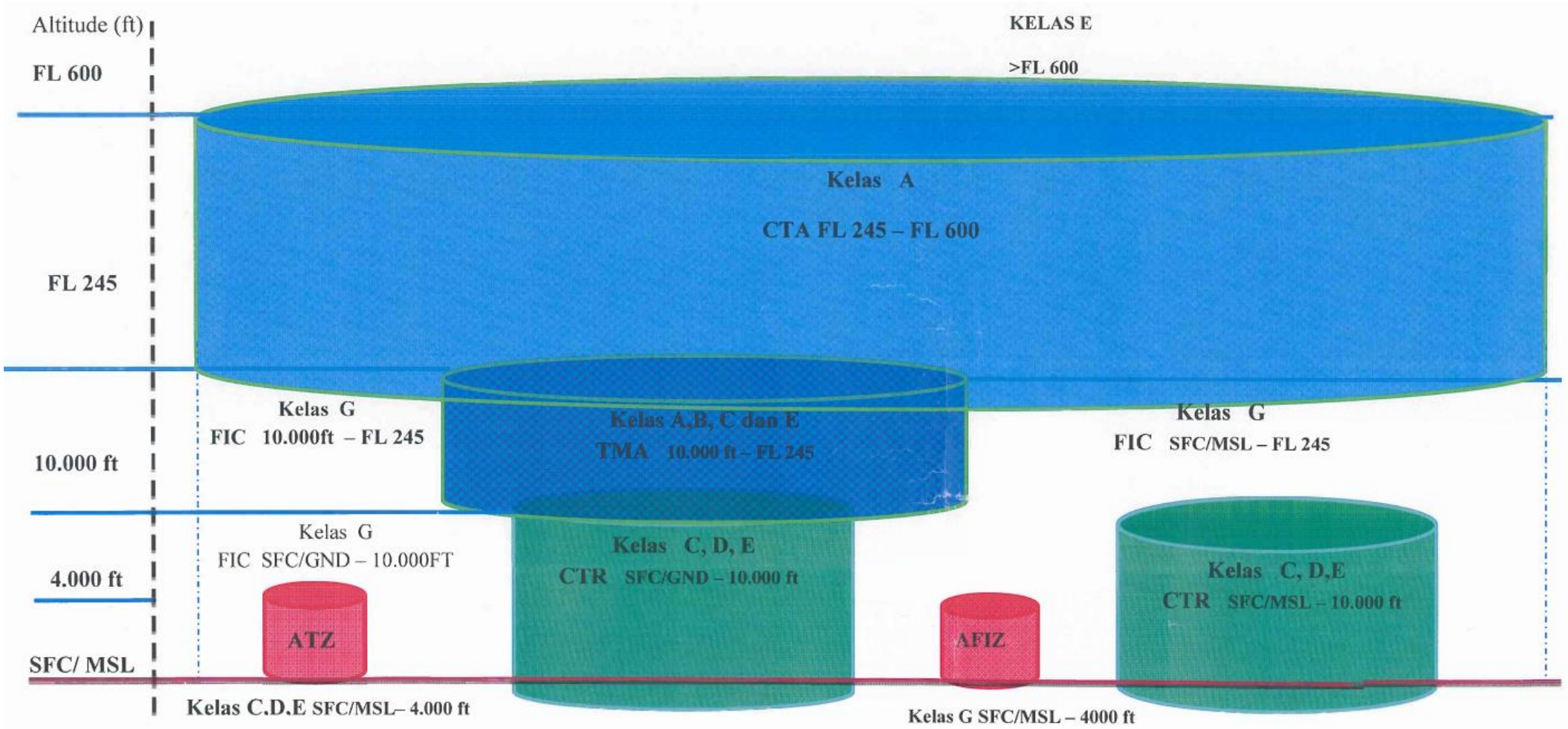
Note: The dimension (Lateral limit and Vertical limit) of each airspace is in accordance with AIP Indonesia Vol. I ENR 2 Air Traffic Service Airspace.

Surveillance Service Phase (Tier 1)

d. Air Traffic Service airspace which implement ADS-B as position reporting for traffic advisory service/flight information services are as follows:
   1) Bali Sector;
   2) Jakarta Sector;
   3) Makassar Sector.

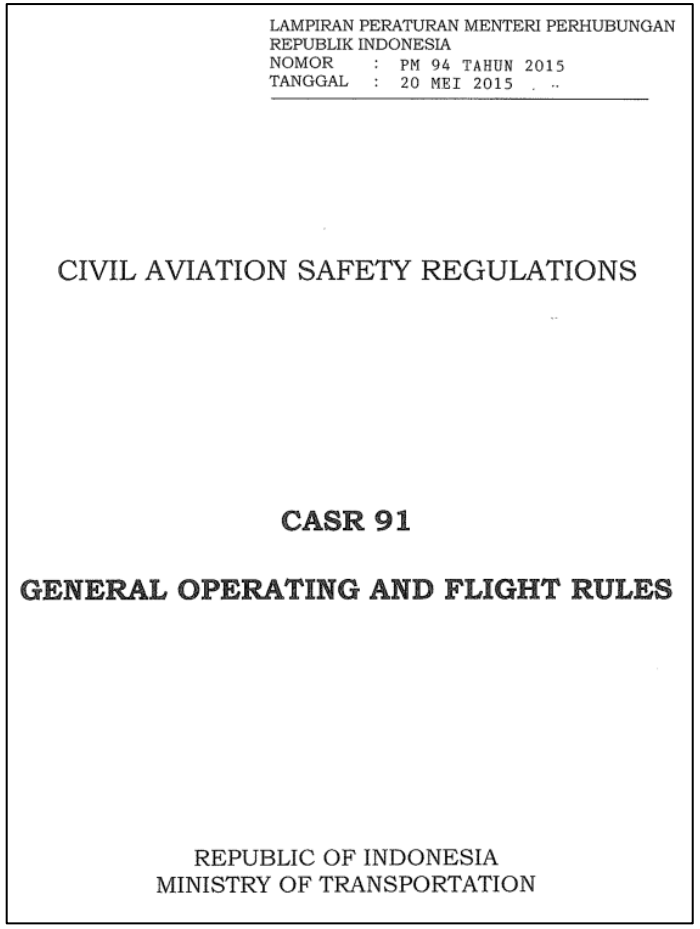
e. Aerodrome Controlled Tower which implement ADS-B as Position reporting for traffic advisory service / flight information services are as follows:
   1) Ngurah Rai Tower – Bali ;
   2) Soekarno-Hatta Tower – Jakarta;
   3) Sultan Mahmud Badaruddin II Tower – Palembang;
   4) Sultan Syarif Kasim II Tower – Pekanbaru;
   5) Supadio Tower – Pontianak;
   6) Juanda Tower – Surabaya;
   7) Raja Haji Fisabilillah Tower – Tanjungpinang;
   8) Hasanuddin Tower – Ujung Pandang;

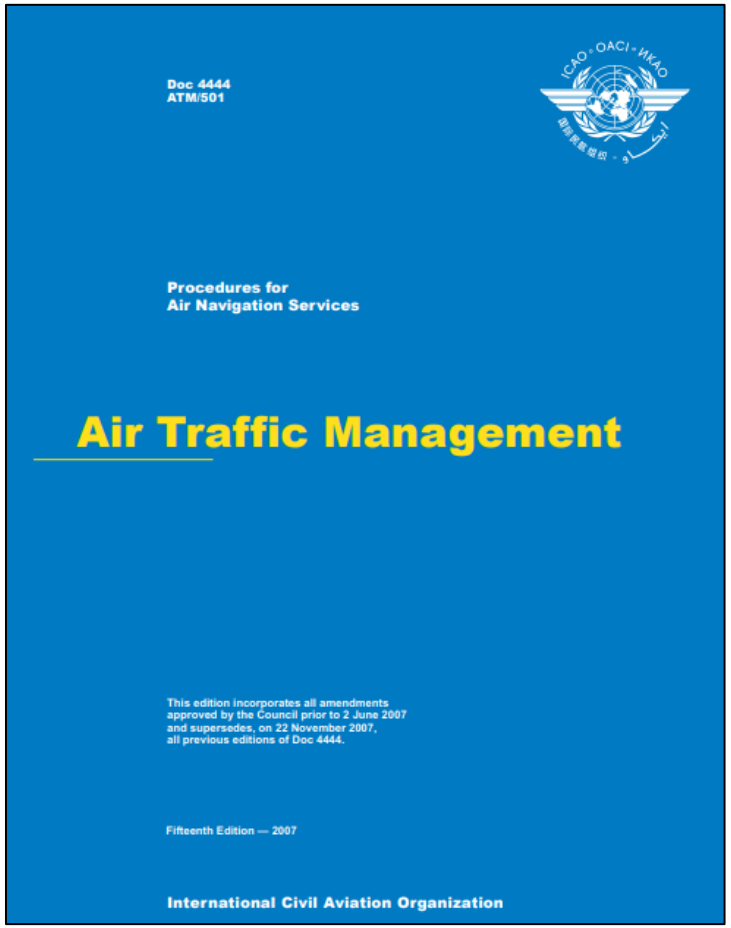
Airspace Classification

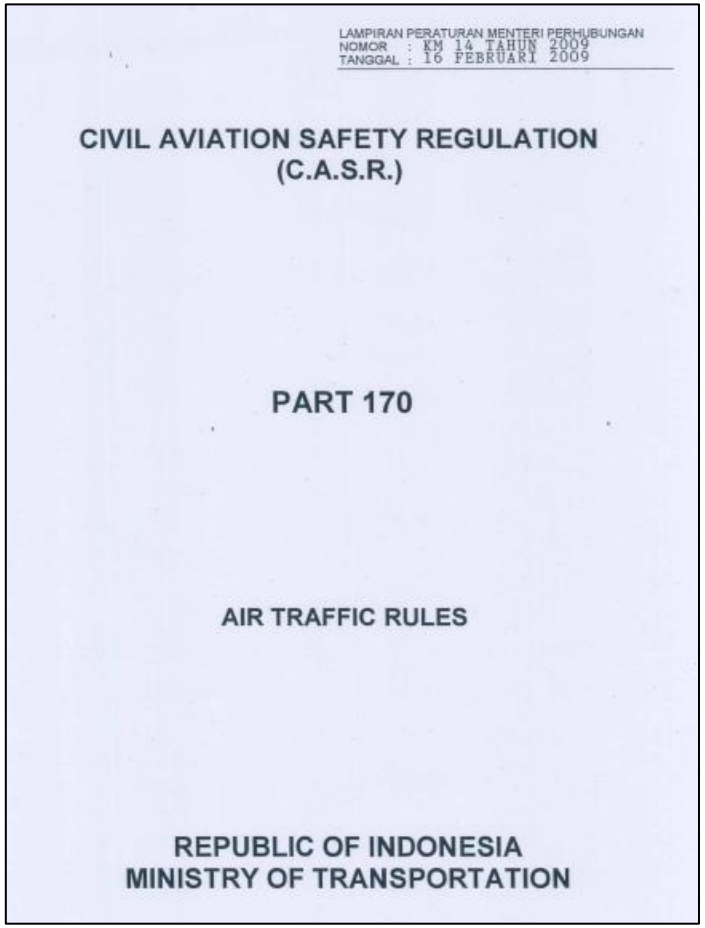


3 IMPLEMENTATION PHASE

Mandatory Phase







3 IMPLEMENTATION PHASE

Mandatory Phase

Ref. to Regulation of The Minister of Transportation of The Republic of Indonesia Number PM 81 year 2017 regarding amendment of Civil Aviation Safety Regulations Part 91 (CASR 91) General Operating And Flight Rules;

(2) After 31 December 2017, unless otherwise authorized by Director General, no person may operate an aircraft within Class A airspace, between FL 290 to FL 600 unless that aircraft is equipped with the applicable ADS-B equipment specified in Section 91.226.

Starting from 1 January 2020, unless otherwise authorized by Director General, no person may operate an aircraft within Class A from FL 245 up to FL 290 unless that aircraft is equipped with the applicable ADS-B

(e) Equipment requirements. Transport category aircraft. Starting from 1 January 2020, unless otherwise authorized by Director General, no person may operate a transport category aircraft within Class G from ground up to FL 245 unless that aircraft is equipped with the applicable ADS-B equipment specified in Section 91.226.

(f) Equipment requirements. All Aircraft. Starting from 1 January 2030, unless otherwise authorized by Director General, no person may operate an aircraft within Class G from ground up to FL 245 unless that aircraft is equipped with the applicable ADS-B equipment specified in Section 91.226

(d) Equipment requirements. Transport Category Aircraft. Starting from 1 January 2020, unless otherwise authorized by Director General, no person may operate a transport category aircraft within Class E from ground up to FL 245 unless that aircraft is equipped with the applicable ADS-B equipment specified in Section 91.226.

(e) Equipment requirements. All Aircraft. Starting from 1 January 2030, unless otherwise authorized by Director General, no person may operate an aircraft within Class E from ground up to FL 245 unless that aircraft is equipped with the applicable ADS-B equipment specified in Section 91.226

ADS-B Requirement, Aircraft Aplicability

Aircraft (Airplane & Rotorcraft) Category Definitions

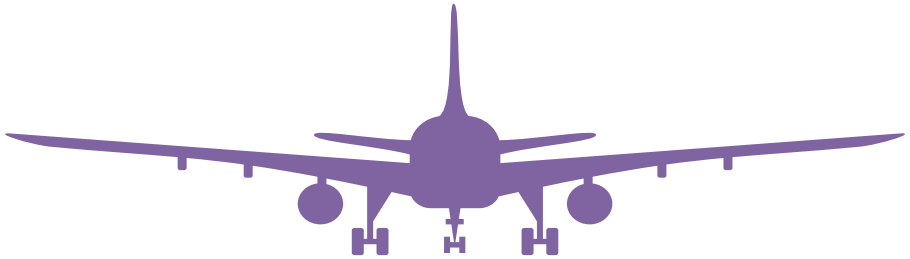
3 IMPLEMENTATION PHASE

Aircraft Transport Category (Airplane)

- Fokker 27 MK 50
- A320 Series
- B737-800/ 900ER
- B737-300/ 400/ 500
- A330 Series
- ATR 72 Series
- B747-400
- B777 Series
- CL-600 (CRJ 1000)
- ATR 42 Series
- EMB 135 BJ/ LR
- Gulfstream IV-SP/ X

- CL-601-3A
- Avro 146-RJ85
- BAE 146 Series
- Fokker 28 MK 70
- Dornier 328
- Hawker 800XP/ 900XP
- DHC8 Series
- MD-82/ 83
- BAE ATP
- 560XL (Citation XLS)
- Beechjet 400A
- Learjet 31A
- Etc.

TRANSPORT CATEGORY:
CERTIFICATED UNDER CASR PART 25



1 JAN 2020 ADS-B

Aircraft Transport Category (Airplane)

- Stated as **TRANSPORT CATEGORY** at the Certificate of Airworthiness
- Multi-engine, passenger seating configuration more than 19, MTOW more than 19,000 pounds.

TRANSPORT CATEGORY:
CERTIFICATED UNDER CASR PART 25

REPUBLIK INDONESIA
Republic of Indonesia

KEMENTERIAN PERHUBUNGAN
Ministry of Transportation

DIREKTORAT JENDERAL PERHUBUNGAN UDARA
Directorate General of Civil Aviation

SERTIFIKAT KELAIKUDARAAN STANDARD
(*Standard Certificate of Airworthiness*)

1. Nomor Pendaftaran *(Registration Number)*
2. Tanda Kebangsaan dan Pendaftaran *(Nationality and Registration Marks)*
3. Pabrik Pembuat dan Tipe/Model Pesawat Udara *(Manufacturer and Manufacturer's Designation of Aircraft)*
4. Nomor Seri Pesawat Udara *(Aircraft Serial Number)*
5. Kategori *(Category)* : **TRANSPORT**
6. Sertifikat Kelaikudaraan ini dikeluarkan berdasarkan Konvensi tentang Penerbangan Sipil Internasional tanggal 7 Desember 1944 dan Undang-Undang Republik Indonesia Nomor 1 Tahun 2009 tentang Penerbangan serta Peraturan Keselamatan Penerbangan Sipil (PKPS) yang berlaku, sehubungan dengan pesawat udara tersebut di atas, dianggap laik udara apabila dirawat dan dioperasikan sesuai dengan batasan-batasan operasional yang berlaku dan terkait.
(This Certificate of Airworthiness is issued pursuant to the Convention on International Civil Aviation dated 7 December 1944 and to the Republic of Indonesia Aviation Law Number 1 Year 2009 and applicable Civil Aviation Safety Regulations (CASRs) in respect of the above-mentioned aircraft which is considered to be airworthy when maintained and operated in accordance with the foregoing and pertinent operating limitations)

Batasan-Batasan / *Limitations* :

7. Tanggal Diterbitkan *(Date of Issuance)* :
8. Berlaku Sampai *(Valid Until)* :
9. A.n. Direktur Jenderal Perhubungan Udara
(On behalf of the Director General of Civil Aviation)

Tanda Tangan (Signature)

DGCA Form No. 21-20 (Oct 2017)

Aircraft Transport Category (Rotorcraft)

- Maximum weight 20,000 pounds and 10 or more passanger seats (category A), Or nine or less passanger seats (category B)
- Stated as **TRANSPORT CATEGORY** at the Certificate of Airworthiness

- Bell 212/ 412
- MI 171
- Bell 430
- AS 332
- AW 139
- MBB BK 117
- Sikorsky S76
- KA32A11BC
- EC 155
- Etc.

TRANSPORT CATEGORY:
CERTIFICATED UNDER CASR PART 29

1 JAN 2020 ADS-B

Aircraft Normal Category (Airplane)

- Nine or less passenger seating configuration, MTOW 12,500 pound or less, intended for non-acrobatic
- Stated as **NORMAL CATEGORY** at the Certificate of Airworthiness

- Cessna C208 Caravan;
- Cessna 172
- PA28-181
- Pilatus Porter PC6
- Piagio P180 Avanti II
- DHC6-300
- PAC 750XL
- PC-6/B2-H4
- Tecnam P2006T
- Etc

NORMAL CATEGORY:
CERTIFICATED UNDER CASR PART 23

Other Aircraft Type Category (Airplane)

NORMAL CATEGORY:
CERTIFICATED UNDER CASR PART 23

- **UTILITY** : Nine or less passenger seating configuration, MTOW 12,500 pound or less, intended for limited acrobatic
- **ACROBATIC** : Nine or less passenger seating configuration, MTOW 12,500 pound or less, intended for acrobatic without restriction.
- **COMMUTER** : Multi-engine, passenger seating configuration 19 or less, MTOW 19,000 pounds or less. (ie: Beechraft 1900D)

Aircraft Normal Category (Rotorcraft)

NORMAL CATEGORY:
CERTIFICATED UNDER CASR PART 27

- Maximum weight 7,000 pounds or less, nine or less passenger seats
- Stated as **NORMAL CATEGORY** at the Certificate of Airworthiness

- Bell 429
- Bell 505
- Bell 206L-4
- Bell 407
- EC 130 T2
- AW 119 MKII
- AS 350 B3
- ETC

ICAO 24 bit Address Allocation

DGCA Indonesia also regulate and allocate **ICAO 24 bit address** to used by aircraft, vehicle or site monitor of surveillance facilities such as ADS-B, Radar or MLAT.

ALOKASI KODE ICAO 24-BIT ADDRESS
ALLOCATION OF ICAO 24-BIT ADDRESS CODE

DIREKTORAT JENDERAL PERHUBUNGAN UDARA
Directorate General of Civil Aviation
DIREKTORAT NAVIGASI PENERBANGAN
Directorate of Air Navigation
Jalan Medan Merdeka Barat No. 8 Gdg Karya Lt 23 - Jakarta Pusat

1. Nomor Surat *(Letter Number)* : DNP.0000/MODES/00/0000
2. No. Pendaftaran *(Registration Number)* : 0000

3. Nama Operator *(Operator Name)* : .....

4. Alamat Operator *(Operator Address)* : .....

Registrasi Pesawat Udara *(A/C REG)*	Tipe Pesawat Udara *(A/C TYPE)*	Nomor Seri *(S/N)*	ICAO 24-BIT ADDRESS CODE *(Binary)*	ICAO 24-BIT ADDRESS CODE *(Hexadecimal)*
XX-XXX	XXXXXXX	XXX	bbbb bb bbb bbb bb bb bbbb bbbb	HHHHHH

Alokasi Kode ICAO 24-bit *Address* tidak dapat dialihkan kepada pesawat udara lain.
(ICAO 24-bit Address Code shall not be transferred to another aircraft)

Operator Pesawat Udara wajib melaporkan kepada Ditjen Perhubungan Udara secara periodik setiap 2 (dua) tahun pada bulan Januari terkait penggunaan alokasi Kode ICAO 24-bit Address sesuai ketentuan yang berlaku.
(Air Operator is obligated to periodically report to the DGCA every 2 (two) years in January regarding the utilization of the ICAO 24-bit Address Code allocation in accordance with the applicable regulations.)

Alokasi kode berlaku sepanjang pesawat udara masih dioperasikan.

Alokasi kode dinyatakan tidak berlaku apabila :

a. Pesawat udara sudah tidak beroperasi;
b. Pesawat udara sudah dipindahtangankan ke pihak lain;
c. Pesawat udara mengalami perubahan tanda pendaftaran.

Tempat Terbit, Tanggal Bulan Tahun

a.n. DIREKTUR JENDERAL PERHUBUNGAN UDARA
On Behalf Director General of Civil Aviation
DIREKTUR NAVIGASI PENERBANGAN
Director of Air Navigation

TTD

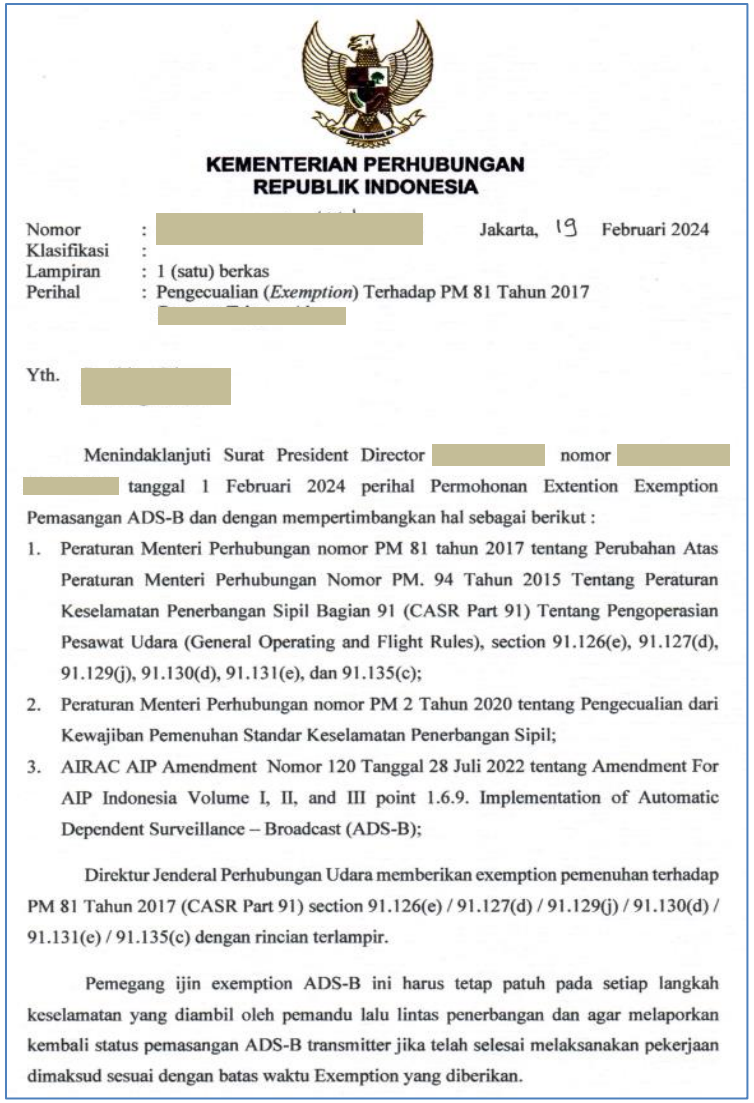
NAMA
Pangkat
NIP

3 IMPLEMENTATION PHASE

ADS-B EXEMPTION

After ADS-B mandatory in Indonesia was declare, there were several aircraft that had not been able to fulfill their obligations due to queues at the aircraft maintenance and repair center.

Therefore, DGCA provides an exemption and permit the aircraft to operate in the implemented area until the given time limit.



KEMENTERIAN PERHUBUNGAN
REPUBLIK INDONESIA

Nomor : [redacted] Jakarta, 19 Februari 2024
Klasifikasi :
Lampiran : 1 (satu) berkas
Perihal : Pengecualian (*Exemption*) Terhadap PM 81 Tahun 2017

Yth. [redacted]

Menindaklanjuti Surat President Director [redacted] nomor [redacted] tanggal 1 Februari 2024 perihal Permohonan Extention Exemption Pemasangan ADS-B dan dengan mempertimbangkan hal sebagai berikut :

1. Peraturan Menteri Perhubungan nomor PM 81 tahun 2017 tentang Perubahan Atas Peraturan Menteri Perhubungan Nomor PM. 94 Tahun 2015 Tentang Peraturan Keselamatan Penerbangan Sipil Bagian 91 (CASR Part 91) Tentang Pengoperasian Pesawat Udara (General Operating and Flight Rules), section 91.126(e), 91.127(d), 91.129(j), 91.130(d), 91.131(e), dan 91.135(c);
2. Peraturan Menteri Perhubungan nomor PM 2 Tahun 2020 tentang Pengecualian dari Kewajiban Pemenuhan Standar Keselamatan Penerbangan Sipil;
3. AIRAC AIP Amendment Nomor 120 Tanggal 28 Juli 2022 tentang Amendment For AIP Indonesia Volume I, II, and III point 1.6.9. Implementation of Automatic Dependent Surveillance – Broadcast (ADS-B);

Direktur Jenderal Perhubungan Udara memberikan exemption pemenuhan terhadap PM 81 Tahun 2017 (CASR Part 91) section 91.126(e) / 91.127(d) / 91.129(j) / 91.130(d) / 91.131(e) / 91.135(c) dengan rincian terlampir.

Pemegang ijin exemption ADS-B ini harus tetap patuh pada setiap langkah keselamatan yang diambil oleh pemandu lalu lintas penerbangan dan agar melaporkan kembali status pemasangan ADS-B transmitter jika telah selesai melaksanakan pekerjaan dimaksud sesuai dengan batas waktu Exemption yang diberikan.

Direktur Jenderal Perhubungan Udara dapat mencabut persetujuan exemption bila diperlukan dengan mempertimbangkan keselamatan penerbangan.

Demikian disampaikan, atas perhatiannya diucapkan terimakasih.

a.n. Menteri Perhubungan
Direktur Jenderal Perhubungan Udara,

M. Kristi Endah Murni
NIP. 19640907 199403 2 001

Tembusan Yth. :
1. Menteri Perhubungan RI;
2. Direktur Navigasi Penerbangan, Ditjen Hubud;
3. Direktur Kelaikudaraan dan Pengoperasian Pesawat Udara, Ditjen Hubud;
4. Direktur Utama Perum LPPNPI.

Lampiran Surat Menteri Perhubungan,
Nomor : [redacted]
Tanggal :

Daftar Pesawat yang diberikan Exemption Terhadap PM. 81 Tahun 2017 section 91.126(e) / 91.127(d) / 91.129(j) / 91.130(d) / 91.131(e) / 91.135(c)

No.	Aircraft Type	Registration	Berlaku Sampai Dengan
1	[redacted]	[redacted]	[redacted]
2			
3			
4			
5			
6			
7			

a.n. Menteri Perhubungan
Direktur Jenderal Perhubungan Udara,

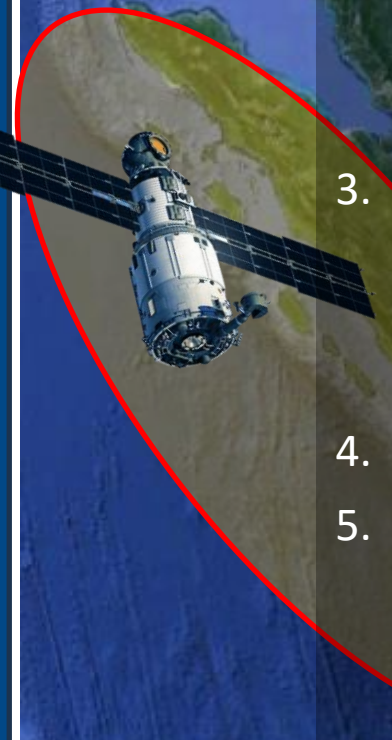
M. Kristi Endah Murni
NIP. 19640907 199403 2 001

TRIAL PHASE
SPACE BASED ADS-B IN INDONESIA

Indonesia will use space based ADSB to cover blankspot in Oceanic area and Papua area.

SPACE BASED TRIAL RESULTS ARE :

1. **Improve Coverage** (almost any position)
2. **Reduce Workload** (Non-surveillance to Surveillance environment)
   a. Reducing voice communication load for position reports;
   b. Remove need for step climb, reaching level report,
3. **Increase Safety**
   a. Safety Nets
   b. Search and Rescue (SAR) response
   c. Situational Awareness (FIR boundary safety, remote airport without TWR)
4. **Reduce Separation Standard** (Procedural to Surveillance separation)
5. **Cost Avoidance and Personnel Safety**
   a. No requirement for ground-based infrastructure and reduce risk for maintenance staff, especially in remote area.
   b. Remove cost for installation, maintenance, and repair ground-based infrastructure.



The Lesson Learned Implementation ADS-B in Indonesia

Implementation ADS-B in Indonesia has been successful implemented since 2010, which through the **process, significant step, challenge and valuable insight** to enhance air navigation safety.

The implementation of ADS-B in Indonesia has significantly **improved situational awareness** for air traffic controllers and pilots. With ADS-B, more accurate and real-time position information of aircraft is available, which helps reduce the risk of mid-air collisions and enhances overall flight safety.

ADS-B implementation requires adequate **infrastructure**, such as **ground stations** distributed across Indonesia's airspace, **ATM Automation system**, and **communication link**. The challenge become greator for remote areas and regions with limited access.

THE LESSON LEARNED

Therefore from the our experience, we have lesson learned from ADS-B Implementation in Indonesia as follows:

1. **Comprehensive Planning**

   There are a number of activities required to advance ADS-B implementation from the initial concept level to operational use that address issues of collaborative decision making, system compatibility and integration to assist in managing ADS-B implementation activities.

   DGCA Indonesia started the implementation ADSB started with comprehensive planning such as:

   a. **Commitment** from higher-up
   b. **Define goal** and **timeline** ADS-B Implementation

THE LESSON LEARNED

c. **Feasibility study**/Benchmarking other state, consists of:
   - **Assessment** of the current air traffic situation, including volume, density, and geographical distribution.
   - **Evaluation** of existing infrastructure and its suitability for ADS-B integration.
   - **Cost-benefit analysis** to justify the investment in ADS-B technology.
   - **Coordination** between state and Region to achieve maximum benefit.

d. **Procurement and installation**, maintenance, including timelines and budgets.

e. ADS-B Implementation **Plan**
   - **Preparation** Phase
   - **Socialization** Phase
   - **Initial Implementation** Phase (Shadow)
   - **Full** Implementation Phase

THE LESSON LEARNED

2. Regulatory Framework

Indonesia's experience with ADS-B implementation shows that supportive regulations and policies need to be carefully developed to ensure compliance by all relevant parties, including airline companies.

a. Development of clear and comprehensive **ADS-B regulations**.

b. Standard and Operational Requirement

c. Establishment of **certification** for ADS-B equipment.

d. Safety oversight for compliance with regulations.

THE LESSON LEARNED

3. Funding and Budget Management

ADS-B implementation requires significant investment. The lesson learned here is the importance of **effective budget** management and long-term planning, considering future maintenance costs and technological upgrades.

4. Technical Challenge/Installation Infrastructure Development

a. Line of Sight limitation

Indonesia's **Geographical** have issue such as terrain, significant change clime and remote ground station installation.

b. Population of ADS-B

Many population of ADS-B Equipment so Indonesia has the right choice of ADS-B equipment suitable for aircraft and ground stations.

THE LESSON LEARNED

c. ATC Automation

- **Fine tuning** is carried out on the ATC system and team communicates with the system manufacturer to assess the result of configuration.
- **Duplicate target** in the ATC system when integrated with data from the ADS-B groundstation.
- Ensure ATC System is **correctly configured** and **specific symbol** for ADS-B track is available and is distinguishable from other surveillance track.

d. Backup System

Ensuring sufficient **power supply**.

e. VSAT Link

Provision of transmission media (VSAT) for connection from the ground station to the ATC system and fulfilment of **continuity of service requirements for ADS-B Tier-1** implementation (**redundant network**).

THE LESSON LEARNED

f. X-ponder ADS-B

- The need to **install transponders** and **GNSS on board** on civil aircraft to support ADS-B operation.
- Gradually encourage the installation of necessary onboard equipment through flight level restrictions for aircraft that have not yet been equipped, socialization of the benefits of ADS-B, and holding discussion forums to find solutions to the obstacles to installing ADS-B, as well as arrangements for **granting exemptions** for certain types of aircraft.

g. X-ponder Accuracy

- The need to ensure the **accuracy of the onboard ADS-B equipment** on the aircraft.
- It was found that there was a combination of transponder and onboard GNSS that was **not fully compatible**.
- The creation of a **white list and black list** to increase safety awareness in the provision of separation services.
- Formation of ADS-B performance **monitoring and analysis team**.

THE LESSON LEARNED

h. Training and Awareness

Another important lesson learn is the need for **sufficient training and awareness programs** for all stakeholders, including air traffic controllers, pilots, and airport operators.

THE LESSON LEARNED

5. Operational

a. Need for procedures for surveillance services using ADS-B.

1) The **SOP** was prepared by AirNav Indonesia with reference to CASR and AC, as well as a **reference to ICAO Doc 4444** for surveillance services with a separation of 5NM.

2) SOPs are discussed together with the Directorate General of Civil Aviation on a regular basis to **ensure compliance** with applicable regulations.

3) The SOPs compiled include:

- **pilot and controller** actions and responsibilities;
- **phraseologies**;
- **separation/spacing** criteria and requirements;
- controller's responsibility to **maintain a monitoring function**, if appropriate;
- **contingency** procedures;
- **emergency** procedures

THE LESSON LEARNED

b. Legality aspect in the provision of flight traffic services using ADS-B for separation.

Preparation and revision of regulations related to aviation traffic services to accommodate the use of ADS-B for separation services as well as the publication of aeronautical information related to the time, application area, and category of flights that will be provided with surveillance services with ADS-B.

c. Exemption ADS-B

- Provision of ADS-B equipment **exemption** creates an airspace with "mixed" services.
- **Regulation through restrictions** from optimal flight levels, giving priority to flights that have been equipped with ADS-B.

THE LESSON LEARNED

6. Cost and Benefit Analysis

DGCA Indonesia **identify and assessing economic impact** of ADS-B implementation. It is significant for justifying investments and optimizing resource allocation.
The importance of quantifying the benefits in terms of **safety, efficiency, increasing capacity** in the air space, **reducing installation cost and maintenance** for air surveillance facilities and providing surveillance of airspace outside radar coverage.

THE LESSON LEARNED

7. Collaboration

a. DGCA Indonesia have **effective collaboration** between Air Navigation Indonesia as Air Navigation Service Provider, Airlines, Training Provider, and other stakeholders is essential for a smooth implementation process.

b. An **intense and periodic discussion and coordination forum** is needed to realize the implementation of ADS-B according to the specified time target.

- The formation of the ADS-B implementation **task force** consisting of representatives of the DGCA, aviation navigation service providers, airlines, professional organizations (IATCA, INACA, IAEETA, IFATCA), airport operators, airport authorities, KNKT/NTSB, Basarnas, BPSDM, R&D, BPPT, Coordinating Minister for Politics and Security, Ministry of Foreign Affairs.
- **Inviting expert from ICAO** to provide input and suggestions related to the implementation of ADS-B.
- Preparation of ADS-B implementation **road map and monitoring** of implementation achievements.

THE LESSON LEARNED

8. International Coordination and Cooperation

a. The implementation of ADS-B in Indonesia highlighted the importance of international coordination and cooperation, especially in **data sharing** and ensuring compatibility with ADS-B systems **in neighboring countries**. This is vital for ensuring the **safety and efficiency of cross-border** flight operations.

b. Indonesia's experience underscores the importance of **developing efficient data processing systems**. Data management and Utilization (**Data sharing other state with protocol and security measures, design of data processing and storage systems, data analysis tools and applications**).

BOOK of ADS-B IMPLEMENTATION IN INDONESIA

Feel free to download the book at:
https://bit.ly/adsb_idn

No Country Left Behind

Thank You

Remember!!!

1 January 2018
ADS-B mandatory fitment deadlines
for ADS-B technology in Indonesian airspace
Are You FITTED??

Tier 3 Phase Monitoring

Safety Circular Date 24 September 2008 Nomor : AU.6104/DKP.1989/2008 of ADS-B Implementation in Indonesia FIR

Tier 2 Phase Situational Awareness

AIRAC AIP Supplement Date 24 Juli 2014 Nr : 10/14 of ADS-B Implementation in Indonesia for Situational Awareness (Tier-2)
Tier-2 Implementation is effective on 18 September 2014.

Tier 1 Phase Separation

AIRAC AIP Supplement Date 30 April 2015 Nr : 08/15 of ADS-B Implementation in Indonesia for ATS Surveillance Separation (Tier-1)
Area of ADS-B implementation for ATS surveillance separation is in Jakarta FIR and Ujung Pandang FIR, Class A airspace, between FL290 to FL460 within ADS-B coverage
Tier-1 Implementation is effective on 25 June 2015

Expansion Area of ADS-B Implementation

AIRAC AIP Supplement Date 25 May 2017 Nr : 18/17 on Automatic Depedent Surveillance Broadcast (ADS-B) Implementation in Indonesia

a. Tier 1 implementation is applied in Class A airspace, between FL245 to FL600;
b. Tier 1 implementation is applied in particular of Class B, C, D and E airspace, between SFC to FL245, in Airspace as mentioned in Paragraph 2.3;
c. Position reporting for traffic advisory service / flight information services (Tier 3) is applied in Class G airspace, between SFC to FL245, in Airspace as mentioned in Par. 2.4
d. Position reporting for traffic advisory service / flight information services (Tier 3) is applied in Aerodrome Traffic Zone (ATZ), in Airspace as mentioned in Par 2.5

Effective on July 20, 2017