

A stylized paper airplane icon in shades of blue is positioned above a dashed grey line that forms a curved flight path across the upper middle section of the cover.

CIVIL AVIATION GUIDANCE MATERIAL – 6008 (VI)

PBCS, ADS, CPDLC & NAT HLA

CIVIL AVIATION AUTHORITY OF MALAYSIA

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Introduction

This Civil Aviation Guidance Material 6008 Part VI (CAGM – 6008 (VI)) is issued by the Civil Aviation Authority of Malaysia (CAAM) to provide guidance for the application of PBCS, ADS, CPDLC and NAT HLA pursuant to Civil Aviation Directives 6 Part 1 – Commercial Air Transport (CAD 6 Part 1 – CAT), Civil Aviation Directives 6 Part 2 – General Aviation (CAD 6 Part 2 – GA) and Civil Aviation Directives 6 Part 3 - Helicopters (collectively referred to as “CAD”). Organisations may use these guidelines to ensure compliance with the respective provisions of the relevant CAD’s issued. Notwithstanding the Regulation 204 and Regulation 205 of the Malaysian Civil Aviation Regulations 2016 (MCAR 2016), when the CAGMs issued by the CAAM are complied with, the related requirements of the CAD’s may be deemed as being satisfied and further demonstration of compliance may not be required.



(Captain Chester Voo Chee Soon)
Chief Executive Officer
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Civil Aviation Guidance Material components and Editorial practices

This Civil Aviation Directive is made up of the following components and are defined as follows:

Standards: Usually preceded by words such as “*shall*” or “*must*”, are any specification for physical characteristics, configuration, performance, personnel or procedure, where uniform application is necessary for the safety or regularity of air navigation and to which Operators must conform. In the event of impossibility of compliance, notification to the CAAM is compulsory.

Recommended Practices: Usually preceded by the words such as “*should*” or “*may*”, are any specification for physical characteristics, configuration, performance, personnel or procedure, where the uniform application is desirable in the interest of safety, regularity or efficiency of air navigation, and to which Operators will endeavour to conform.

Appendices: Material grouped separately for convenience, but forms part of the Standards and Recommended Practices stipulated by the CAAM.

Definitions: Terms used in the Standards and Recommended Practices which are not self-explanatory in that they do not have accepted dictionary meanings. A definition does not have an independent status but is an essential part of each Standard and Recommended Practice in which the term is used, since a change in the meaning of the term would affect the specification.

Tables and Figures: These add to or illustrate a Standard or Recommended Practice, and which are referred to therein, form part of the associated Standard or Recommended Practice and have the same status.

Notes: Included in the text, where appropriate, Notes give factual information or references bearing on the Standards or Recommended Practices in question but not constituting part of the Standards or Recommended Practices;

Attachments: Material supplementary to the Standards and Recommended Practices or included as a guide to their application.

The units of measurement used in this document are in accordance with the International System of Units (SI) as specified in CAD 5. Where CAD 5 permits the use of non-SI alternative units, these are shown in parentheses following the basic units. Where two sets of units are quoted it must not be assumed that the pairs of values are equal and interchangeable. It may, however, be inferred that an equivalent level of safety is achieved when either set of units is used exclusively.

Any reference to a portion of this document, which is identified by a number and/or title, includes all subdivisions of that portion.

Throughout this Civil Aviation Directive, the use of the male gender should be understood to include male and female persons



Record of Revisions

Revisions to this CAGM shall be made by authorised personnel only. After inserting the revision, enter the required data in the revision sheet below. The *'Initials'* has to be signed off by the personnel responsible for the change.

ISS/REV No.	Revision Date	Revision Details	Initials
ISS01/REV01	15 th November 2021	Refer to Summary of Changes	CAAM



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Summary of Changes

ISS/REV No.	Item no.	Revision Details
ISS01/REV01	Attachment A	Removed and link provided.



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1 General

1.1 Purpose

- 1.1.1 This CAGM provides guidance to demonstrate compliance with the requirements regarding and information related to an operator applying for operational approval for Performance-Based Communication or Surveillance (PBCS), Automatic Dependent Surveillance (ADS) and Controller-Pilot Data Link Communications (CPDLC) and North Atlantic high-level airspace (NAT HLA)

1.2 General

- 1.2.1 CAAM certification procedures are outlined in this CAGM.
- 1.2.2 The general approval process normally consists of two parts, an airworthiness approval and an operational approval.
- 1.2.3 The required information must be provided to the CAAM by an air operator applying for any Specific approval (in this CAGM) at least 60 working days prior to the intended start of operations.
- 1.2.4 Any questions not covered herein, or any point of apparent conflict requiring resolution, should be referred to the CAAM.

1.3 Application for Specific Approvals in this CAGM.

- 1.3.1 The approval process consists of the following phases:

- 1.3.1.1 **Step 1 — Pre-application phase:** Prior to initiating the approval process, the operator will review the requirements and guidelines outlined in the relevant regulations, CADs, and CAGMs which are published by the CAAM.

A pre-application usually commences when a prospective applicant makes his initial inquiries regarding application for an approval in the form of a letter or a personal visit to the CAAM. If the proposed application is complex, the operator may need to obtain advice and assistance from OEMs or other design organisations, training establishments, data providers, etc.

This Phase will include both Flight Operations and Airworthiness division to assist the applicant in queries and highlighting the requirements.

- 1.3.1.2 **Step 2 — Formal application phase:** The operator submits to the CAAM a formal, written application for approval, the CAAM will then appoint a Specific Approvals Manager (SAM) to oversee the application

Note. – An example application form is contained in Attachment A.

- 1.3.1.3 **Step 3 — Document evaluation phase:** The CAAM FOI and AWI evaluate the formal written application for approval to determine if all the requirements are being met. The FOI and AWI, may need to obtain advice and assistance from

other departments within CAAM or organisations such as regional agencies or experts in other States.

1.3.1.4 **Step 4 – Demonstration and inspection phase:** During a formal inspection by the FOI and AWI (assisted as necessary by a team from the CAAM), the operator demonstrates how the requirements are being met.

1.3.1.5 **Step 5 – Approval phase:** Following a successful formal inspection by the CAAM, approval is given via:

- a) an amendment to the OM; and
- b) an Ops Spec associated with the AOC; or
- c) a Specific Approval attached along with the Certificate of Approval.

Note 1. – The demonstration and inspection phase may not be required depending upon the type of operation used, subject to the consideration of the CAAM.

1.4 Approval criteria

1.4.1 Requests for approvals will be considered if the following criteria (set out in greater detail in the chapters in this CAGM) are met:

- a) The aircraft has suitable flight characteristics, an approved list of equipment and acceptable continuing maintenance programme;
- b) The aircraft is operated by a qualified crew in conformity with laid down procedures; and
- c) The aeroplane is suitably equipped and maintained.

1.4.2 For the purpose of obtaining an approval from the CAAM, an operator must submit the application form along with evidence and documentation to confirm that each aircraft is certificated for the intended operations.

1.5 Definitions

Automatic Dependent Surveillance - Broadcast Out (ADS-B OUT) means a function on an aircraft or vehicle that periodically broadcasts its state vector (position and velocity) and other information derived from on-board systems in a format suitable for ADS-B IN capable receivers

Automatic Dependent Surveillance – contract (ADS-C) is a means by which the terms of an ADS-C agreement will be exchanged between the ground system and the aircraft, via a data link, specifying the conditions under which ADS-C reports would be initiated, and the data that would be contained in the report.



Airworthiness approval is the process of assuring the CAAM that aircraft meet an RVSM MASPS. Typically, this would involve an operator meeting the requirements of the aircraft manufacturer service bulletin for that aircraft and having the State authority verify the

Controller-Pilot Data Link Communications (CPDLC) is a means of communication between controller and pilot, using data link for ATC communications.

Future Air Navigation System (FANS 1/A) is the common industry name for the communication / surveillance system that incorporates CPDLC, ADS-C and PBCS.

NOTAM means A notice distributed by means of telecommunication containing information concerning the establishment, condition or change in any aeronautical facility, service, procedure or hazard, the timely knowledge of which is essential to personnel concerned with flight operations.

Controller-Pilot Data Link Communications (CPDLC) is a means of communication between controller and pilot, using data link for ATC communications.

Required Communication Performance (RCP) is a means by which a specification defines performance requirements associated to a communication transaction.

Required Surveillance Performance (RSP) is a means by which a specification defines performance requirements associated to the delivery of surveillance data.

1.6 Abbreviations

ACAS	=	Airborne collision avoidance system
ACU	=	Aircraft Certification Unit
ADC	=	Air data computer
ADS-B	=	Automatic dependent surveillance - broadcast
AFM	=	Airplane flight manual
AGHMEs	=	Aircraft geometric height measurement elements
AHMS	=	ADS-B height monitoring system
ATC	=	Air traffic control
ATM	=	Air Traffic Management
BITE	=	Built-in test equipment
CAAM	=	The Civil Aviation Authority of Malaysia
CFL	=	Cleared flight level
CNS	=	Communication, Navigation, Surveillance
D-ATIS	=	Datalink Automatic Terminal Information Service
ECAC	=	European Civil Aviation Conference
FAA	=	Federal Aviation Administration
FL	=	Flight level



GMU	=	Global positioning system monitoring unit
GPS	=	Global positioning system
HME	=	Height monitoring element
HMU	=	Height monitoring unit
IATA	=	International Air Transport Association
ICA	=	Instructions for continued airworthiness
ICAO	=	International Civil Aviation Organisation
IFALPA	=	International Federation of Airline Pilots Associations
IFATCA	=	International Federation of Air Traffic Controllers Associations
MAAR	=	Monitoring Agency for Asia Region
MEL	=	Minimum equipment list
MNPS	=	Minimum navigation performance specification
NEXTGEN	=	Next Generation Air Transportation System
NM	=	Nautical mile
PEC	=	Position correction error
RCP	=	Required Communication Performance
RGCSPP	=	Review of the general concept of separation panel
RMA	=	Regional monitoring agency
RSP	=	Required Surveillance Performance
RVSM	=	Reduced vertical separation minimum of (300m) 1,000 ft between flight levels
SB	=	Service Bulletin
SESAR	=	Single European Sky ATM Research
SSEC	=	Static source correction error
SSR	=	Secondary surveillance radar
STC	=	Supplemental type certificate
VHF	=	Very high frequency

2 Performance-Based Communication and Surveillance (PBCS)

2.1 General

2.1.1 The performance-based communication and surveillance (PBCS) concept provides objective operational criteria to evaluate different and emerging communication and surveillance technologies, intended for evolving air traffic management (ATM) operations. Once these criteria have been established and accepted, implementation of a specific ATM operation including its technical and human performance may be evaluated against these operational criteria to assess their viability. The PBCS concept and guidelines provided in this CAGM are applicable to any air traffic services (ATS) system change that is predicated on communication and/or surveillance performance.

2.1.2 The PBCS concept is aligned with that of performance-based navigation (PBN). While the PBN concept applies required navigation performance (RNP) and area navigation (RNAV) specifications to the navigation element, the PBCS concept applies required communication performance (RCP) and required surveillance performance (RSP) specifications to communication and surveillance elements, respectively. Each RCP/RSP specification includes allocated criteria among the components of the communication and surveillance systems involved.

2.1.3 Where beneficial, RCP, RNP/RNAV and RSP specifications are applied to communication, navigation and surveillance elements to ensure that the operational system and its components perform in accordance with the specifications. Figure 1-1 provides an overview of the performance-based communications, navigation, and surveillance (CNS)/ATM model, which characterises the relationship of the performance-based specifications among CNS elements supporting an ATM operation.

Note 1.— While RCP and RSP specifications may be applied where beneficial, the PBCS concept is primarily intended for emerging technologies, and not traditional ones, such as HF voice communication or radar. As such, this edition has considered controller-pilot data link communications (CPDLC), automatic dependent surveillance — contract (ADS-C) and SATVOICE technologies, and may be revised to apply to other technologies, such as automatic dependent surveillance — broadcast (ADS-B), as experience is gained.

Note 2.— Similar to the PBN concept, security is beyond the scope of the PBCS concept. However, in some cases, the RCP and RSP specifications may include criteria to support mitigations from security threats. For example, the RCP and RSP specifications that may be applied to SATVOICE contain provisions for satellite service providers (SSPs) to oversee communication services providers (CSPs), in administering accounts to authorised subscribers with personal identification numbers (PIN) and priority level calling. Aircraft SATVOICE systems only route calls to the flight deck from authorised subscribers or alert the flight crew of the appropriate call priority for ATS communication.

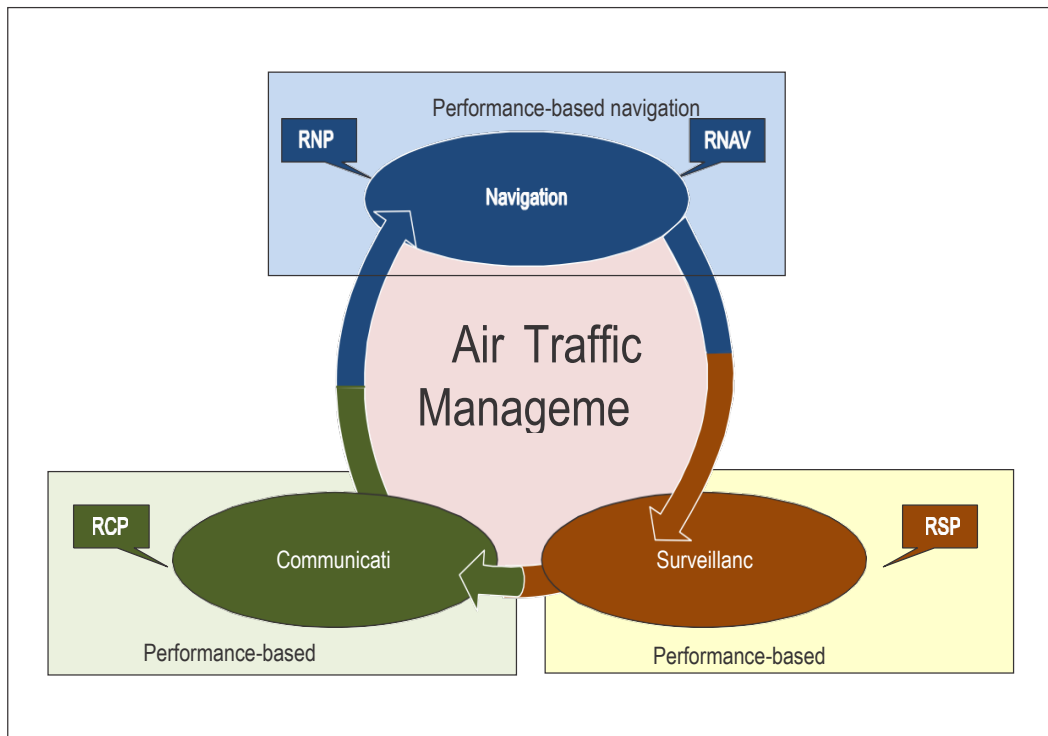


Figure 1-1. Performance-based CNS/ATM model

2.1.4 PBCS has been implemented in some areas where reduced oceanic separation standards are applied. One or more of the separation minima as shown in Table 1 may be used in the following airspace at the time of publication of this CAGM:

- a) PAC FIRs: Anchorage, Auckland, Brisbane, Fukuoka, Nadi, Oakland, Port Moresby, Tahiti
- b) NAT FIRs: Gander, Shanwick, Reykjavik, New York, Santa Maria
- c) Asia: Some routes over Bay of Bengal and South China Sea

Dimension of Separation	Separation Minima	Required Surveillance Performance (RSP) Requirement	Required Communication Performance (RCP) Requirement	Associated Navigation Requirement
Lateral	42.6 km (23 NM) *	180	240	RNP2 or RNP4
Performance-based Longitudinal	5 minutes	180	240	RNP2 or RNP4 or RNP10
Performance-based Longitudinal	55.5 km (30 NM)	180	240	RNP2 or RNP4
Performance-based Longitudinal	93 km (50 NM)	180	240	RNP4 or RNP10

* Also applicable to existing and future applications of 30NM lateral separation minima

Table 1. Separation Minima that Require PBCS Approval

2.1.5 An operator must obtain a PBCS operational approval from CAAM to operate using the separation minima in Table 1.

2.2 Application

2.2.1 Pre-Requisites for PBCS Operational Approval.

2.2.1.1 Airworthiness Requirements

2.2.1.1.1 The RCP and RSP specifications in airspace where procedural separation could be applied is as shown in Table 2. Other RCP specifications may be added, pending the introduction of new ATM operations or the use of new communication or surveillance technologies

RCP/RSP Specification	RCP/RSP Transaction Time (seconds)	RCP/RSP Continuity (probability)	RCP/RSP Availability (probability)	RCP/RSP Integrity (acceptable rate/flight hour)
RCP 240	240	0.999	0.999 0.9999 (efficiency) (see Note 2)	10 ⁻⁵
RCP 400	400	0.999	0.999	10 ⁻⁵
RSP 180	180	0.999	0.999 0.9999 (efficiency) (see Note 2)	Figure of Merit (FOM)= navigation specification (see Note 3) Time at position accuracy = +/-1s Data integrity (malfunction)= 10 ⁻⁵
RSP 400	400	0.999	0.999	FOM = Navigation specification (see Note 3) Time at position accuracy = +/-30s Data integrity (malfunction) = 10 ⁻⁵

Table 2. RCP and RSP specifications in airspace for procedural separation

Note 1 – Further information and rationale for the criteria provided in these specifications are contained in RTCA DO-306/EUROCAE ED-122.

Note 2. – The values for availability are based on a safety assessment, taking into account assumptions about the environment, such as mitigating procedures for failed communication and contingencies. For RCP 240 and RSP 180, an additional and more stringent value has been assigned, based on the operational effect of frequent losses of the service in providing an efficient and orderly flow of air traffic. Two values are used to determine corrective action when the service availability degrades below the assigned value. The corrective action may vary depending on whether the criterion is for safety or for efficiency.

Note 3. – The navigation Figure of Merit (FOM) is specified based on the navigation criteria associated with this specification. For example, if RNP 4 is prescribed, the FOM level would need to be 4 or higher for ADS-C surveillance services.

2.2.1.1.2 The operator is to demonstrate that the aircraft system is capable of meeting the applicable RCP and RSP specifications prescribed for the intended operations. The aircraft system is to meet the continuity, availability and integrity requirements as described in ICAO Document 9869 as follows:

- a) Continuity: The aircraft system, when operating with a representative ATS provision (i.e. simulation or real ground system), is capable of meeting the operational RCP/RSP time and continuity criteria.
- b) Availability: The aircraft system meets the RCP/RSP availability criteria. RCP/RSP availability is typically shown by evaluation of equipment failure and the number of similar components installed on the aircraft.
- c) Integrity: The aircraft meets the RCP/RSP integrity criteria and associated safety requirements. RCP/RSP integrity is typically shown by analysis, design, system architecture, and evaluations of human-machine interaction.

2.2.1.1.3 The operator should provide the following documents as a demonstration of compliance with the RCP and RSP specifications:

- a) Type Certificate (TC);
- b) Supplemental Type Certificate (STC);
- c) Aircraft Flight Manual (AFM), AFM supplement; or
- d) A Statement of Compliance (SoC) from the TC holder, STC holder or the entity that owns the design approval for their data link installation.

Note 1. – For a FANS 1/A CPDLC and ADS-C aircraft system, RTCA DO-306/EUROCAE ED-122, Safety and Performance Standard for Air Traffic Data Link Services in Oceanic and Remote Airspace, is equivalent to RCP 240, RCP 400, RSP 180 and RSP 400 specifications. For an Aeronautical Telecommunications Network (ATN) Baseline 1 (B1) or FANS 1/A CPDLC aircraft system, RTCA DO-290/ED-120, Safety and Performance Requirements Standard for Air Traffic Data Link Services in Continental Airspace, provides performance criteria for the European Region.

Note 2. – FAA AC20-140A or later satisfies the requirement for RCP240, RCP400, RSP 180 and RSP 400.

2.2.1.1.4 If the operator is unable to provide the documents (a) to (d), the operator may provide a detailed submission validating that the aircraft's current

system meets the applicable RCP and RSP specifications. One possible approach is to seek the aircraft or equipment manufacturer to provide the substantiation.

2.2.1.1.5 The operator is to ensure that any items related to PBCS capability are specified in the Minimum Equipment List (MEL).

2.2.1.1.6 The operator is to ensure that the aircraft system is properly maintained, including configuring user-modifiable software, such as those used to manage communication media and routing policies, to meet the appropriate RCP/RSP specifications.

2.2.1.2 Operations Requirements

2.2.1.2.1 For the PBCS application to be considered, an operator is to establish and document the following:

- a) Normal and abnormal procedures, including contingency procedures
- b) Flight crew qualification and proficiency requirements
- c) Appropriate maintenance programme to ensure all task and associated requirements for PBCS operations including CPDLC and ADS-C Systems
- d) Training programme for relevant personnel consistent with the intended operations
- e) A performance monitoring process
- f) A process to address substandard separation minima performance
- g) A problem reporting process
- h) Data link communication problem reporting procedures to the FANS-Central Reporting Agency (CRA) to ensure effective identification, tracking, and follow-up of data link-related events and permits record-keeping of various problems and solutions.
- i) A contract/service agreement with Communication Service Provider (CSP) that includes:
 - 1) Failure notifications (to operator and ANSPs)
 - 2) Recording data link messages
 - 3) CSP integrity
 - 4) Compliance with CSP allocations for RCP/RSP Adequate subnetwork coverage for the route flown

2.2.1.3 Training requirements

2.2.1.3.1 The operator is to ensure that flight crew and other personnel (flight dispatchers and maintenance engineers) are proficient with the PBCS operations. The areas to be covered by training are provided in Appendix 1.

2.2.2 Application submission and assessment

2.2.2.1 The operator is to submit the following to CAAM along with an application letter, for PBCS operational approval:

- a) a completed Application Form;
- b) Evidence of compliance with airworthiness requirements as specified in paragraphs 2.2.1.1;
- c) Equipment maintenance programme;
- d) Training of personnel including maintenance and operational personnel (including flight crew);
- e) Operating policy and procedures;
- f) Flight and dispatch crew training to include pilot knowledge of data link performance-based communication and surveillance concepts and system procedures;
- g) MELs;
- h) Other operational issues; and
- i) PBCS Global Charter membership, if any.

Note. – The operator may refer to the application form for a checklist regarding the application of the PBCS operational approval. The operator could also refer to the ICAO PBCS Operational Authorisation Information Guide for more information

2.2.2.2 CAAM' assessment for the PBCS operational approval will consider the following aspects:

- a) aircraft eligibility and airworthiness compliance (any limitations, assumptions or specific procedures considered in the framework of the airworthiness approval must be addressed);
- b) documentation and maintenance of operating procedures for the specific data link system(s) including use of message sets;
- c) means of ensuring compliance of contracted services, such as those with communication services providers (CSPs) with respect to PBCS operations;
- d) documentation and maintenance of procedures for participation in PBCS monitoring programmes including problem reporting;

- e) documentation and maintenance of policies and procedures to control configuration of aircraft system including software and communication subnetwork for managing media and routing;
- f) flight crew initial training/competency requirements and continuing qualification requirements;
- g) training requirements for other personnel (e.g. flight dispatchers and engineers).

2.2.2.3 CAAM may request to participate in the operator's training session or line operations to assess the operator's training competency.

2.3 Approval Criteria

2.3.1 Upon successful assessment of the PBCS application, CAAM may grant PBCS operational approval to the operator. The PBCS operational approval will be stated in the Operations Specifications.

2.3.2 After the operator has been granted PBCS operational approval, the operator with PBCS operational approval is to indicate its approval status for RCP/RSP capabilities in the ICAO flight plan as follows:

- a) Item 10a - CPDLC descriptors (J1-J7); RCP capability "P1" or "P2"; and
- b) Item 10b - ADS-C descriptors (D1 or G1); and (c) Item 18 - "SUR/RSP180" or "SUR/RSP400" to show RSP capability.

Note. – The operator is to note that when operating in FAA airspace, the FAA's oceanic automation system, Advanced Technologies & Oceanic Procedures (ATOP), will determine eligibility for use of performance-based separation minima based on detection of BOTH flight plan codes.

2.3.3 The operator, when planning to operate in airspace where RCP/RSP specifications are prescribed for certain services such as reduced separation, is to ensure that the planned use of communication and surveillance capabilities for the flight are in accordance with regulations, policies and procedures in control areas for the flight as published in the AIP or other State publications.



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3 Controller-Pilot Data Link Communication and Automatic Dependent Surveillance (CPDLC & ADS)

3.1 Controller-Pilot Data Link Communication and Automatic Dependent Surveillance – Contract (CPDLC and ADS-C)

3.1.1 General

3.1.1.1 CPDLC and ADS-C are widely implemented in the Pacific, Alaska and NAT HLA airspace as part of the ICAO CNS/ATM programme. CPDLC is also being implemented in the European ECAC as well as the Indian Oceanic region.

3.1.1.2 Together with ADS-B (broadcast) and other data link systems such as PDC (Pre-Departure Clearance), FIS (Flight Information Services), TIS (Traffic Information Services) and D-ATIS, to name a few, CPDLC / ADS-C and ADS-B would feature prominently in the NEXTGEN and/or SESAR airspace management

3.1.2 Application

3.1.2.1 Airworthiness Requirements

3.1.2.1.1 Installation of data link equipage requires airworthiness certification. The operator needs to furnish to the CAAM documents such as AFM entry or amendment to the aircraft TC or STC attesting to compliance with the standards.

3.1.2.2 Operational Approval

3.1.2.2.1 The operator has to develop his own operating policy / procedures based specifically on the requirements of the areas / regions of his intended operations.

3.1.2.2.2 The operational approval by the CAAM for CPDLC / ADS-C operation is worldwide and to ensure compliance with various regional requirements the operator should refer to the following publications for guidance:

- a) Operational Authorisation Information Package - Data Link Communications Controller/Pilot Datalink Communication (CPDLC) Automatic Dependant Surveillance Contract (ADS-C) dated June 15, 2012.
- b) FANS Operations Manual (FOM);
- c) FAA Oceanic NOTAMS;
- d) FAA Pacific/Alaska Chart Supplements and North Atlantic Doc 007;
- e) North Atlantic Operations and Airspace Manual;



- f) ICAO Regional Supplement Doc 7030; and
- g) State Aeronautical Information Publications (AIPs)

3.1.2.2.3 Submissions for Application

- a) The following items should be submitted with the application letter:
 - 1) a completed Application Form;
 - 2) Evidence of compliance with airworthiness requirements;
 - 3) Equipment maintenance programme including training of personnel;
 - 4) Operating policy and procedures;
 - 5) Flight and dispatch crew training;
 - 6) MELs; and
 - 7) Other operational issues.

3.1.2.2.4 Flight Crew Training

- a) The operator has to submit its training programme for CAAM's approval.
- b) Based on the operator's operational experience and the limitations of the equipment or area of operation, the training can be ground based, computer based, or in a suitably equipped flight simulator
- c) For flight crew with no previous data-link experience, training through LOFT exercises in a flight simulator is recommended.
- d) For the syllabus contents, the operator's training programme should be based on FANS-1/A Operations Manual (FOM) and should cover the following areas:
 - 1) Acronyms (FOM Part 2);
 - 2) General concept of digital and analogue communications;
 - 3) Expected flight crew response;
 - 4) ATS coordination;
 - 5) Aircraft Communication components, displays, alerts (OEM document);
 - 6) Interface with other aircraft;
 - 7) AFM information;
 - 8) MEL provisions;
 - 9) Data link event reports;



- 10) Data link malfunction or irregularity reports; and
- 11) Human factors – lessons learned.

3.1.3 Approval Criteria

- 3.1.3.1 The operator should take note of the Operational Authorisation Information Package - Data Link Communications Controller/Pilot Datalink Communication (CPDLC) Automatic Dependant Surveillance Contract (ADS-C) dated June 15, 2012.
- 3.1.3.2 At CAAM's discretion, the operator may have to demonstrate adequacy of his training through participation by CAAM officers in the operator's training sessions or line operations.

3.2 Automatic Dependent Surveillance - Broadcast (ADS-B)

3.2.1 General

- 3.2.1.1 **ADS-B or Automatic Dependent Surveillance – Broadcast** is a surveillance application that periodically transmits aircraft parameters, such as identification, pressure altitude and position integrity, via a broadcast data link protocol to any airborne or ground-based receivers within its range.
- 3.2.1.2 The operation of ADS-B is automatic requiring no flight crew or controller action. This surveillance-type information broadcast is dependent on the aircraft's navigation system and the broadcast capability of the source transmitter.
- 3.2.1.3 While **ADS-B-RAD (radar)** is for use with integrated radar data in high traffic density airspace, **ADS-B-NRA (non-radar airspace)**, is currently being, or already has been, implemented in North America, Europe and other areas worldwide including the Asia/Pacific region.

3.2.2 Application

- 3.2.2.1 As part of his application for the operational approval, the operator should include information of the various equipment on each aircraft type.
- 3.2.2.2 ADS-B equipment should be of an approved type complying as a minimum to the following specifications:
 - a) European Aviation Safety Agency (EASA) - Certification Considerations for the Enhanced ATS in Non-Radar Areas using ADS-B Surveillance (ADS-B-NRA) Application via 1090 MHz Extended Squitter (AMC 20- 24);
 - b) European Aviation Safety Agency (EASA) - Certification Specifications and Acceptable Means of Compliance for Airborne Communications, Navigation and Surveillance Subpart D — Surveillance (SUR) (CS-ACNS.D.ADS-B);



- c) Federal Aviation Administration (FAA) – Advisory Circular No: 20-165A (or later versions) Airworthiness Approval of Automatic Dependent Surveillance – Broadcast (ADS-B) Out Systems; or
- d) the equipment configuration standards in Appendix XI of Civil Aviation Order 20.18 of the Civil Aviation Safety Authority of Australia (CASA).

3.2.3 Continuing airworthiness

- 3.2.3.1 The aircraft configuration must comply with its Type Certificate as reflected in the AFM, AFM supplement or other appropriate airworthiness documentation acceptable by the CAAM
- 3.2.3.2 Maintenance programme has to contain sufficient maintenance procedures to ensure continued airworthiness, in accordance with applicable ADS-B system.
- 3.2.3.3 The MEL must reflect the functional requirements of the ADS-B system. The MEL must be revised to indicate the possibility to dispatch aircraft with the ADS-B system unserviceable or partially unserviceable.
- 3.2.3.4 The operator has to ensure that the configuration and equipment list detailing the pertinent hardware and software components for the specific ADS-B OUT / ADS-B IN operations are documented and managed appropriately.
- 3.2.3.5 The operator has to ensure that engineering / maintenance personnel (flight dispatchers and maintenance engineers) are trained and familiar with the ADS-B operations.

4 North Atlantic High-Level Airspace (NAT HLA)

4.1 General

4.1.1 As per CAD 6 part 1, For flights in defined portions of the North Atlantic (NAT) airspace where, based on Regional Air Navigation Agreement, High Level Airspace Approval (HLA) is required.

Note. – North Atlantic HLA was previously known as an area with minimum navigation performance specification (MNPS).

4.1.2 Before making enquiry about NAT HLA operational approval application, an operator has to ensure that:

- a) Both the operator and aeroplane are authorised for RVSM operations by the CAAM; and
- b) The aircraft navigation equipment complies with ICAO NAT DOC 007.
- c) That the aeroplane is able to maintain constant two-way communication, the aeroplane is required to be equipped with HF radio for contact with ATS when outside of VHF range.

4.1.3 To apply for the grant of operational approval to operate in NAT HLA, the operator has to address the following:

- a) Crew training and operating drills as described in the North Atlantic Operations and Airspace Manual (NAT Doc 007);
- b) Equipment installation and procedures;
- c) Assurance that equipment redundancy satisfies CAAM requirement; and
- d) Suitable use of equipment.

4.1.4 For NAT RVSM operations, both the operator and the aeroplane must be approved by CAAM for RVSM operation in accordance with CAD 6, part 1, para 7.2. The operator may refer to CAGM 6008 (I) RVSM.

4.1.5 Only those operators that satisfy the requirements of RCP 240 and RSP 180 will be eligible for the reduced separation minima in the NAT HLA. Minimum Navigation Performance Specification (MNPS) approval (issued prior to 1 January 2015) or NAT HLA approval remain a requirement. Operators will be eligible to indicate compliance with RCP 240 and RSP 180 provided that the aircraft are:

- a) Required Navigation Performance (RNP-4) capable;
- b) Automatic Dependent Surveillance – Contract (ADS-C) equipped; and
- c) Controller-Pilot Data Link Communications (CPDLC) equipped.



- 4.1.6 The operator’s NAT HLA operations policy/procedures must be consistent with ICAO documents “NAT Doc 007 North Atlantic Operations and Airspace Manual”

4.2 Application

- 4.2.1 The operator should notify and engage CAAM as early as possible of their NAT HLA plan. Subject to completeness and timeliness of the submission, the approval process is expected to take 60 working days.
- 4.2.2 The standard 5-step application process (as described in Chapter 1) comprising pre-application meeting, formal submission of allocation package, evaluation / assessment of documents, proving flight/validation and final approval / rejection of application, applies.

4.3 Approval Criteria and Continuous Monitoring

- 4.3.1 Upon successful assessment of the NAT-HLA application, CAAM may grant NAT-HLA operational approval to the operator. The NAT HLA operational approval will be stated in the Operations Specifications.
- 4.3.2 The operator is to continuously monitor the navigational performance and should commence investigation whenever gross navigational error is greater than 10 NM.
- 4.3.3 A report should be made to the CAAM as soon as possible, preferably within 48 hours of occurrence, with initial results of the investigation and the corrective action taken or to be taken.

5 Appendices

5.1 Appendix 1 – Training on Data Link and PBCS Operations

Note. – A separate training program is not required if data link communication is integrated in the current training program. However, the operator should ensure that the existing training programme incorporates a basic PBCS concept and requirements for flight crew and other personnel that have direct impact on overall data link performance required for the provisions of air traffic services (e.g. reduced separation).

5.1.1 Flight Crew

- a) Data link communications system theory (relevant to operational use)
- b) AFM and AFM Supplement limitations
- c) Normal pilot response to data link communication messages
- d) Message elements in the message set used in each environment
- e) Required Communication Performance (RCP)/Required Surveillance Performance (RSP) specifications and their performance requirements
- f) Implementation of performance-based reduced separation with associated RCP/RSP specifications or other possible performance requirements associated with their routes
- g) Other ATM operations involving data link communication services
- h) Both normal and non-normal (contingency) procedures
- i) Data link communication failure/problem and reporting

Note 1. – If flight crew has already trained on data link operations, additional training only on PBCS is required, addressing a basic concept and requirements that have direct impact on overall data link performance required for provisions of air traffic services (e.g. reduced separation).

Note 2. – Training may be provided through training material and other means that simulate the functionality.

5.1.2 Dispatchers/Flight Operations Officers

- a) Proper use of data link and PBCS flight plan designators;
- b) air traffic service provider's separation criteria and procedures relevant to RCP/RSP specifications;
- c) MEL remarks or exceptions based on data link communications;
- d) Procedures for transitioning to voice communication and other contingency procedures related to the operation in the event of abnormal behaviour of the data link communication;



- e) Coordination with the ATS unit related to or following a special data link communication exceptional event (e.g. log-on or connection failures); and
- f) Contingency procedures to transition to a different separation standard when data link communication fails.

5.1.3 Engineering and maintenance personnel

- a) Data link communication equipment including its installation, maintenance and modification
- b) MEL relief and Procedures for return to service authorisations
- c) Correction of reported non-performance of data link system

Note. – Operators unsure of required maintenance procedures for data link communication-related equipment should contact field service representatives of their aircraft manufacturer.



6 Attachments

6.1 Attachment A – Application Form

- 6.1.1 The Latest Application form (CAAM/BOP/SPA/PBCS, ADS, CPDLC & NAT HLA) may be obtained from the CAAM Website. <https://www.caam.gov.my/e-services-forms/air-operations/>