CIVIL AVIATION PUBLICATION

CAP 28

PERFORMANCE BASED COMMUNICATIONS & SURVEILLANCE (PBCS)

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1. INTRODUCTION

1.1 General

This CAP explains the basic principles of PBCS and the way it relates to the flight planning and operations for both Commercial Air Transport (CAT) and General Aviation (GA) operators.

Performance-based communication (PBC) and performance-based surveillance (PBS) constitute performance-based communication and surveillance (PBCS) and are similar, and complementary, to performance-based navigation (PBN). PBC and PBS involve the establishment of required communication performance (RCP) and required surveillance performance (RSP) specifications and imposing them on aeronautical communication and surveillance systems respectively.

RCP and RSP specifications are composed of certain performance-related parameters. An RCP specification is identified by a designator (e.g. RCP 240) which shows the maximum transaction time in seconds. Similarly, the RSP designator (e.g. RSP 180) indicates maximum data delivery time in seconds.

The use of RCP and RSP is mainly intended for new and emerging technologies used in the provision of communication and surveillance services. To date only RCP 240 and RSP 180 have been operationally applied to controller-pilot data link communications (CPDLC) and automatic dependent surveillance - contract (ADS-C) considering their actual and achievable performance using FANS 1/A avionics and supporting communication infrastructure.

Together with RNP 10, 4 or 2, RCP 240 and RSP 180 are being used as criteria for reducing established longitudinal and lateral separation minima in oceanic airspace.

The basic concepts of the performance specifications are described in Section 3 (RCP) and Section 4 (RSP).

1.2 References

(a) RCP

(1) ICAO Doc 9869 Performance Based Communications and Surveillance Manual

(2) ICAO Doc 10037 Global Operational Data Link (GOLD) Manual

(3) CAR OPS 1/3.850 for CAT

(4) [CAR OPS 2A.501 for GA (Aeroplane) and CAR OPS 2H.501 (Helicopter)]

(b) RSP

(1) ICAO Doc 9869 Performance Based Communications and Surveillance Manual;

(2) ICAO Doc 10037 Global Operational Data Link (GOLD) Manual

(3) CAR OPS 1/3.867 for CAT

(4) [CAR OPS 2A.507 for GA (Aeroplane) and CAR OPS 2H.507 (Helicopter)]

2. ACRONYMS & DEFINITIONS

2.1 Acronyms

ACARS	Aircraft Communication Addressing and Reporting System
ADS-C	Automatic Dependent Surveillance - Contract
AMC	Acceptable Means Of Compliance
ANSP	Air Navigation Service Provider
ATM	Air Traffic Management
ATC	Air Traffic Control
ATS	Air Traffic Service
CPDLC	Controller-Pilot Data Link Communications
CSP	Communication Service Provider
MEL	Minimum Equipment List
PBCS	Performance-based Communication and Surveillance
PBC	Performance-based Communication
PBN	Performance-based Navigation
PBS	Performance-based Surveillance
RCP	Required Communication Performance
RNP	Required Navigation Performance
RSP	Required Surveillance Performance

2.2 Definitions

FANS 1/A — A data link system on an aircraft, the ATS unit's system, and communication service provision complying with certain standards enabling ATS communications over ACARS. It includes FANS 1/A+.

CSP — Any public or private entity providing communication services for general air traffic. The services would include those provided by a satellite service.

FOM — An indication of the aircraft navigation system's ability to maintain position accuracy.

PBC — Communication based on RCP specifications applied to the provision of air traffic services.

Note: An RCP specification includes communication performance requirements that are allocated to system components in terms of the communication to be provided and associated transaction time, continuity, availability, integrity, safety and functionality needed for the proposed operation in the context of a particular airspace concept.

PBN — Area navigation based on performance requirements for aircraft operating along an ATS route, on an instrument approach procedure or in a designated airspace.

PBS — Surveillance based on RSP specifications applied to the provision of air traffic services.

Note: An RSP specification includes surveillance performance requirements that are allocated to system components in terms of surveillance to be provided and associated data delivery time, continuity, availability, integrity, accuracy of the surveillance data, safety and functionality needed for the proposed operation in the context of a particular airspace concept.

RCP transaction time — An RCP parameter that specifies the maximum time for the completion of a proportion of operational communication transactions after which the initiator should revert to an alternative procedure. Two values are specified:

(a) RCP nominal time (TT). The maximum nominal time within which 95 per cent of operational communication transactions is required to be completed

(b) RCP expiration time (ET). The maximum time for the completion of the operational communication transaction after which the initiator is required to revert to an alternative procedure.

Note: RCP 240 means that the expiration time (ET) is 240 Seconds. In other words, 99.9 per cent of ATC-flight crew transactions are expected to be completed in less than 240 Seconds.

RSP Data Delivery Time — An RSP parameter that specifies the maximum time for a proportion of surveillance data deliveries from the time at which the aircraft reported its position to when the ATS unit receives the report. Two values are specified:

(a) RSP nominal delivery time (DT). The maximum nominal time within which 95 per cent of surveillance data deliveries are required to be successfully delivered

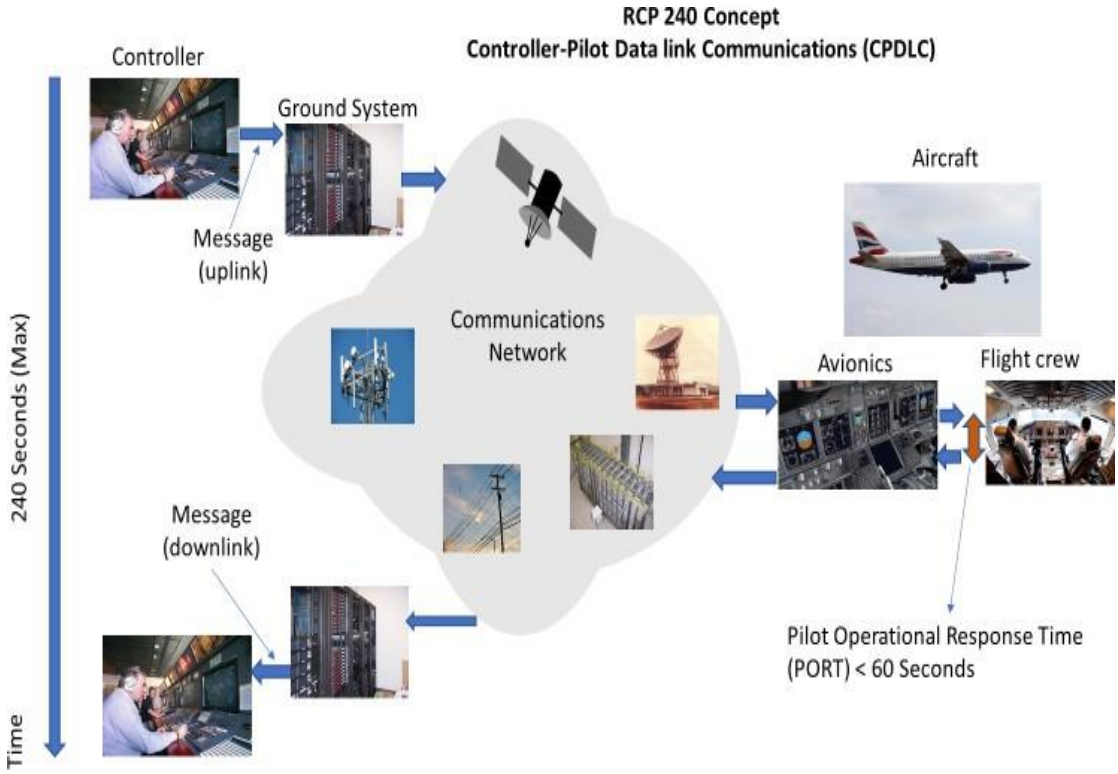
(b) RSP overdue delivery time (OT). The maximum time for the successful delivery of surveillance data after which time the initiator is required to revert to an alternative procedure.

Note: RSP 180 means that the overdue delivery time (OT) is 180 Seconds. In other words, 99.9% of aircraft position reports are expected to be delivered in less than 180 Seconds.

3. RCP 240 CONCEPT

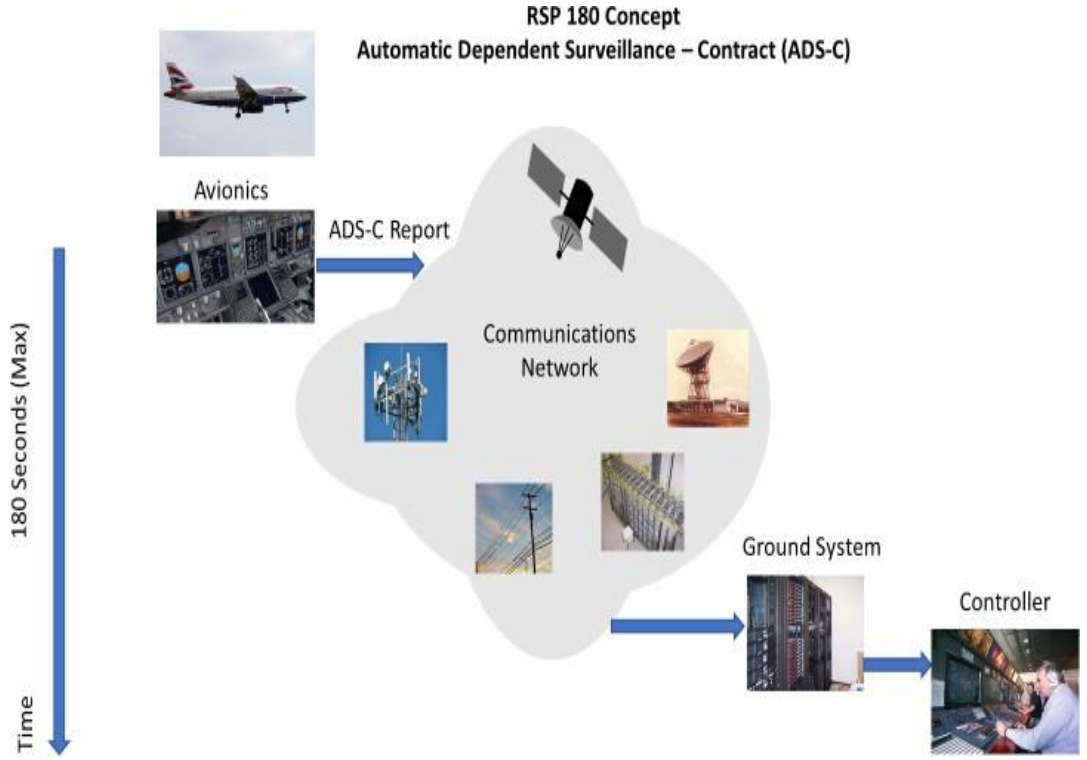
The concept of RCP 240, as applied to CPDLC, is shown below. A transaction starts with the controller beginning to send a message to the aircraft and ends with when he/she receives the response. To meet the maximum transaction time of 240 seconds, there is a time allocation for each component of the communication system (including ATC and flight crew).

For example, the pilot needs to read and respond to a message within 60 seconds.



4. RSP 180 CONCEPT

The concept of RSP 180, as applied to ADS-C, is shown below. Since ADS-C is an automatic data link application, it does not involve flight crew and the reports are automatically generated by avionics based on a contract with the ATS ground system. The process starts when a report is generated, and it finishes when it is displayed to the controller.



5. OPERATOR REQUIREMENTS

5.1 General

Aircraft flying in the part of airspace where PBCS has been prescribed need to declare their RNP, RCP and RSP capabilities in their flight plans. Non-equipped, non-compliant or non-declaring (e.g. those lacking an authorisation from the CAA) aircraft may not be permitted to operate in the PBCS part of the airspace which may be more favourable in term of flight efficiency.

San Marino operators conducting flight operations in some regional and oceanic airspace need to be aware of PBCS-related regulations that are gradually being developed and applied by National Aviation Authorities. When it is determined that a certain flight operation involves PBCS, the operator must ensure that they are authorised by the CAA to declare, in the flight plan, their RCP 240 and RSP 180 capabilities.

There may be a requirement for the operator to undertake a proper agreement with the relevant Communication Service Provider (CSP). This should be ascertained from that State's AIP.

5.2 Training

Each member of the flight crew must have appropriate knowledge of the following:

(a) the PBCS concept;

(b) the definitions of RCP and RSP specifications, and the timing expectations to which they give rise in terms of RCP pilot operational response times (i.e. reading and responding to an ATC message within 60 seconds);

(c) the entering of RCP and RSP descriptors in the flight plan;

(d) applicable ATC procedures for dealing with the following during flight;

(1) data link failures;

(2) non-compliance with prescribed RCP and RSP specifications.

(e) knowledge of the RCP and RSP specifications consistent with the intended operation.

6. APPLICATION BY COMMERCIAL AIR TRANSPORT OPERATOR

6.1 RCP

To obtain a CAA approval for RCP, an AOC holder shall;

(a) have an aeroplane equipped with communication equipment which will enable it to operate in accordance with the prescribed RCP specification(s); and

(b) have information relevant to the aeroplane RCP specification capabilities listed in the aeroplane flight manual or other acceptable aeroplane documentation;

(c) have information relevant to the aeroplane RCP specification capabilities included in the MEL.

(d) an approved Operations Manual which includes;

(1) normal and abnormal procedures, including contingency procedures;

(2) flight crew qualification and proficiency requirements, in accordance with appropriate RCP specifications;

(3) a training programme for relevant personnel consistent with the intended operations; and

(4) appropriate maintenance procedures to ensure continued airworthiness, in accordance with appropriate RCP specifications.

(e) a monitoring programme for non-compliance with RCP specifications as well as a reporting system to notify the CAA of observed communication performance issued by monitoring programmes.

6.2 RSP

To obtain a CAA approval for RSP, an AOC holder shall;

(a) have an aeroplane equipped with surveillance equipment which will enable it to operate in accordance with the prescribed RSP specification(s); and

(b) have information relevant to the aeroplane RSP specification capabilities listed in the aeroplane flight manual or other acceptable aeroplane documentation;

(c) have information relevant to the aeroplane RSP specification capabilities included in the MEL.

(d) an approved Operations Manual which includes;

(1) normal and abnormal procedures, including contingency procedures;

(2) flight crew qualification and proficiency requirements, in accordance with appropriate RSP specifications;

(3) a training programme for relevant personnel consistent with the intended operations; and

(4) appropriate maintenance procedures to ensure continued airworthiness, in accordance with appropriate RSP specifications.

(e) a monitoring programme for non-compliance with RSP specifications as well as a reporting system to notify the CAA of observed surveillance performance issued by monitoring programmes.

6.3 Application Form

Commercial Air Transport operators shall submit documentary evidence of the required information with the application form. (refer Form SM 138A). The documentation must be for the aircraft type and specific serial number. The applicant must identify the particular reference in any document submitted either by highlight or paragraph numbering. Without this documentary evidence the application cannot be processed.

7. APPLICATION BY GENERAL AVIATION OPERATOR

7.1 RCP

To obtain a CAA approval for RCP, a General Aviation operator shall;

(a) have an aeroplane equipped with communication equipment which will enable it to operate in accordance with the prescribed RCP specification(s); and

(b) have information relevant to the aeroplane RCP specification capabilities listed in the aeroplane flight manual or other acceptable aeroplane documentation;

(c) have information relevant to the aeroplane RCP specification capabilities included in the MEL.

(d) an Operations Manual which includes;

(1) normal and abnormal procedures, including contingency procedures;

(2) flight crew qualification and proficiency requirements, in accordance with appropriate RCP specifications;

(3) a training programme for relevant personnel consistent with the intended operations; and

(4) appropriate maintenance procedures to ensure continued airworthiness, in accordance with appropriate RCP specifications.

(e) a monitoring programme for non-compliance with RCP specifications as well as a reporting system to notify the CAA of observed communication performance issued by monitoring programmes.

7.2 RSP

To obtain a CAA approval for RSP, a General Aviation operator shall;

(a) have an aeroplane equipped with surveillance equipment which will enable it to operate in accordance with the prescribed RSP specification(s); and

(b) have information relevant to the aeroplane RSP specification capabilities listed in the aeroplane flight manual or other acceptable aeroplane documentation;

(c) have information relevant to the aeroplane RSP specification capabilities included in the MEL.

(d) an Operations Manual which includes;

(1) normal and abnormal procedures, including contingency procedures;

(2) flight crew qualification and proficiency requirements, in accordance with appropriate RSP specifications;

(3) a training programme for relevant personnel consistent with the intended operations; and

(4) appropriate maintenance procedures to ensure continued airworthiness, in accordance with appropriate RSP specifications.

(e) a monitoring programme for non-compliance with RSP specifications as well as a reporting system to notify the CAA of observed surveillance performance issued by monitoring programmes.

7.3 Application Form

In the application Form SM 138, General Aviation operators must include the required supporting documentation and shall sign the "Declaration of Compliance" indicating all equipment, operational requirements, documentation and training meet the requirements for RCP and/or RSP.

The documentation must be for the aircraft type and specific serial number. The applicant must identify the particular reference in any document submitted either by highlight or paragraph numbering. Without this documentary evidence the application cannot be processed.

8. CERTIFICATION

The RCP and/or RSP approval will be issued on Specific Approval Certificate for General Aviation operators, a copy of which must be carried in the aircraft for all flights.

The RCP and/or RSP approval will be granted by inclusion in the Operations Specifications of the AOC holder.