



International Civil Aviation Organization

WORKING PAPER

A42-WP/326

TE/127

29/7/25

(Information paper)

English only

ASSEMBLY — 42ND SESSION

TECHNICAL COMMISSION

Agenda Item 24: Aviation Safety and Air Navigation Priority Initiatives

USE OF ATS SURVEILLANCE SYSTEM IN PERFORMANCE BASED SEPARATIONS

(Presented by India)

EXECUTIVE SUMMARY

The growth of traffic in oceanic airspace demands capacity to be increased by reducing separation between aircraft as well as spacing between routes for which ANSPs are deploying satellite-based surveillance such as space-based automatic dependent surveillance — broadcast (ADS-B) and using performance-based communication and surveillance criteria. However, the *Procedures for Air Navigation Services — Air Traffic Management* (PANS-ATM, Doc 4444) provides separate use of air traffic services (ATS) surveillance systems and datalink surveillance where very high frequency (VHF) voice communications are not available, in PANS-ATM, Chapter 8 and Chapter 5, respectively. This paper proposes use of surveillance system such as space-based ADS-B in performance-based communication and surveillance (PBCS) based separations provided in chapter 5, thereby increasing the scope of technology deployment by air navigation services providers (ANSPs).

<i>Strategic Goals:</i>	This working paper relates to <i>Every Flight is Safe and Secure</i> .
<i>Financial implications:</i>	Justify spending of ANSP in technology deployment.
<i>References:</i>	10116, <i>Guidelines for the Implementation of Separation Minima Using ATS Surveillance Systems where Very High Frequency (VHF) Voice Communications are not Available (forthcoming)</i> Doc 10037, <i>Global Operational Data Link (GOLD) Manual</i> Doc 9869, <i>Performance-based Communication and Surveillance (PBCS) Manual</i> Doc 4444, <i>Procedures for Air Navigation Services — Air Traffic Management</i>

1. INTRODUCTION

1.1 The air traffic movements have reached or surpassed the pre pandemic level globally. There are forecast of steady growth by organisations such as International Air Transport Association (IATA) and Airports Council International (ACI). This will surely put pressure on the airspace and air route capacity in near future. Therefore, States are working towards improvement of capacity, taking leverage of surveillance and communication coverage, performance-based navigation, new air traffic management (ATM) Procedures, etc. to reduce separation standard. This is more challenging in oceanic airspace as there is little scope for ground-based surveillance and very high frequency (VHF). However, technological advancement has brought satellite-based surveillance into oceanic airspace. States are deploying this technology for reduction in separation. ICAO has made provisions for separation using air traffic services (ATS) surveillance systems where VHF communications are not available in the *Procedures for Air Navigation Services — Air Traffic Management* (PANS-ATM, Doc 4444) under Chapter 8, *ATS Surveillance Service*. However, since oceanic control is basically procedural and the controllers' ratings are also procedural, the utility of the surveillance system by the oceanic controller is thus restricted. The other provisions to reduce separation in oceanic airspace is by use of ADS-C/CPDLC and performance-based communication and surveillance (PBCS) criteria provided in PANS-ATM under Chapter 5, *Separation Methods and Minima*. The use ATS surveillance systems in Chapter 5 separations can bring flexibility of use bringing more efficiency in oceanic airspace.

2. DISCUSSION

2.1 Separation

2.1.1 The separation under PANS-ATM, Chapter 5, 5.4.2.9, *Performance based Longitudinal Separation Minima* are as follows:

2.1.2 Within designated airspace, or on designated routes, separation minima in accordance with the provisions of this section may be used. The following separation minima may be used for aircraft cruising, climbing or descending on (Ref: 5.4.2.9.2):

- a) the same track; or
- b) crossing tracks, provided that the relative angle between the tracks is less than 90 degrees.

<i>Separation minima</i>	<i>RNP</i>	<i>RCP</i>	<i>RSP</i>	<i>Maximum ADS-C periodic reporting interval</i>
93 km (50 NM)	10	240	180	27 minutes
	4	240	180	32 minutes
55.5 km (30 NM)	2 or 4	240	180	12 minutes
37 km (20 NM)	2 or 4	240	180	192 seconds (3.2 minutes)
5 minutes	2 or 4 or 10	240	180	14 minutes

Table is in English only.

2.1.3 Opposite-direction aircraft on reciprocal tracks may be cleared to climb or descend to or through the levels occupied by another aircraft provided that automatic dependent surveillance — contract (ADS-C) reports show that the aircraft have passed each other by the applicable separation minimum in 5.4.2.9.2. (Ref: 5.4.2.9.3). The five-minute separation shall be calculated to a resolution of one second without rounding. (Ref: 5.4.2.9.4)

2.2 Applications of separation

2.2.1 Separation shall be applied so that the distance or time between the calculated positions of the aircraft is never less than the prescribed minimum. This distance or time shall be obtained by the methods prescribed in 5.4.2.9.5 for aircraft on same identical tracks, same or reciprocal non-parallel tracks and on parallel tracks. In all the cases The method involves measuring of distance or time between the aircraft or from a common point or between calculated position and abeam position for parallel tracks. This method will remain unchanged irrespective of ADS-C or space-based ADS-B.

2.3 Conditions

2.3.1 For application of above performance based longitudinal separation, there are some conditions to be fulfilled as defined in section 5.4.2.9 which are enumerated below:

2.3.2 The basic conditions are

- a) the navigation performance of aircraft shall be RNP2 or RNP4;
- b) the aircraft shall be equipped with functional ADS-C/CPDLC;
- c) the aircraft shall have RCP240 operational approval;
- d) the aircraft shall have RSP180 operational approval; and
- e) maximum ADS-C periodic reporting interval shall be from 32 minutes to 192 seconds depending on separation minimum.

2.4 Additional conditions

2.4.1 The communication system (CPDLC) shall allow the controller to resolve a potential conflict within 4 minutes. Alternate communication means shall be available to intervene and resolve a potential conflict within 10.5 minutes should normal means of communication fails. (Ref: 5.4.2.9.6)

2.4.2 When an ADS-C periodic or waypoint change event report is overdue by more than 3 minutes, the controller shall take action to obtain the report as quickly as possible, normally by ADS-C or CPDLC. If a report is overdue by more than 6 minutes, and there is a possibility of loss of separation with other aircraft, the controller shall take action to resolve any potential conflict(s) as soon as possible. The communication means provided shall be such that the conflict is resolved within a further 7.5 minutes. (Ref: 5.4.2.9.7).

2.4.3 When information is received indicating ground or aircraft equipment failure or deterioration below the communication, navigation and surveillance performance requirements, ATC shall then, as required, apply alternative separation minima. (Ref: 5.4.2.9.8).

2.5 **Proposal**

2.5.1 All conditions remaining unchanged the surveillance data from ATS surveillance systems including that from space-based ADS-B may be used in place of ADS-C and RSP 180.

2.6 **Argument**

2.6.1 *Update rate*

2.6.1.1 The maximum ADS-C reporting interval for separation defined in 5.4.2.9 varies from 32 minutes to 3.2 minutes (192 seconds for 20NM longitudinal separation) which are far more than update rate of ATS surveillance systems. Even Space Based ADS-B update rates are 8 seconds which is far less than the minimum reporting interval. The updates are more real time using ATS Surveillance system than through ADS-C combined with RSP 180 criteria.

2.6.2 *Identification*

2.6.2.1 The ADS-C/CPDLC system identifies aircraft through validation of registration of aircraft during an AFN Log On procedure. Same shall be the basis of identification which will be correlated with the Mode-S call sign of the aircraft in ADS-B label by the controller.

2.6.3 *Application of separation*

2.6.3.1 The controller, while using separation in 5.4.2.9 shall measure the distance or time between aircraft or from a common point as defined in para 2.2 which is achieved through measuring tool such as Range Bearing Line (RBL) available in ATM Automation Systems between the ADS-C position symbol and the common way point on the Situational Display of the Controller. In case of use of ATS surveillance, the position symbol only changes but the method of measurement through RBL remains the same. Therefore, there is no change in Human Machine Interface.

2.6.4 *Safety*

2.6.4.1 The separation minima and the conditions provided in 5.4.2.9 as well as separations provided in 8.7.4 have been incorporated in PANS-ATM after thorough safety case analysis by the Separation and Air Safety Panel of ICAO.

2.7 **Benefits**

2.7.1 The following benefits are envisaged through the proposal:

- a) safety in application of performance based longitudinal separation shall improve through real time surveillance as compared to surveillance through of ADS-C & RSP 180;

- b) oceanic (Procedural) Controller can use the benefits of ATS Surveillance system without having to change rating criteria;
- c) seamless transition between oceanic and surveilled continental airspace;
- d) use of ATS surveillance data along with ADS-C will provide redundancy; and
- e) ANSPs can better justify investment in deployment of technologies.

— END —