



International Civil Aviation Organization

ICAO

**Tenth Meeting of the FANS Interoperability Team –
Asia (FIT-Asia/10)**

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Agenda Item 3: PBCS Developments and Implementation

PERFORMANCE-BASED COMMUNICATION AND SURVEILLANCE (PBCS) IMPLEMENTATION AND READINESS STATUS IN SINGAPORE FLIGHT INFORMATION REGION (FIR)

(Presented by SINGAPORE)

SUMMARY

This paper presents an update on Singapore's Performance-Based Communication and Surveillance (PBCS) implementation and readiness status in supporting the application of the performance-based reduced horizontal separation minima using Automatic Dependent Surveillance-Contract (ADS-C) and Controller Pilot Data-link Communications (CPDLC) in accordance with globally accepted specifications of Required Communication Performance (RCP) and Required Surveillance Performance (RSP).

1. INTRODUCTION

1.1 Under the Asia Pacific Seamless ATM Plan, the implementation of ADS-C and CPDLC was identified as one of the ten regional priorities and targets to support the ASBU initiative.

1.2 To ensure that data link operations are being carried out safely and efficiently, a PBCS framework consisting of performance monitoring programs would be required to facilitate the assessment of the data link actual communication and surveillance performance against globally accepted RCP and RSP specifications. In the event where deficiencies in data link performance are detected, corrective actions to report, analyse and resolve problems would be needed to maintain the data link service integrity, reliability and continuity.

1.3 Recognizing the importance and benefits of PBCS implementation, especially in enhancing the data link communication and surveillance capabilities for flight operations in remote and oceanic areas and in reducing data link connectivity and communication errors between aircraft and ATS facilities, Singapore has fostered close cooperation and collaboration among the key stakeholders with a common objective towards the eventual implementation of PBCS in supporting the application of performance-based reduced horizontal separation minima.

2. DISCUSSION

2.1 PBCS has been implemented within the Singapore FIR with effect from 29 March 2018. Singapore took guidance from the PBCS implementation plan prescribed under the Performance-Based Communication and Surveillance (PBCS) Manual (Doc 9869 2nd Edition). The PBCS implementation plan entails specific tasks listed in the implementation checklist of PBCS manual and may include tasks of other aspects which can be taken into consideration during the development of the plan. These defined tasks were subsequently translated into local action items which the PBCS implementation team will undertake and implement within a realistic timeframe.

2.2 Singapore has completed most of the tasks defined in the PBCS implementation plan. An overview of our PBCS implementation status is listed in the following table: -

Checklist for PBCS implementation plan in Singapore			
Group A tasks		State/region preparation	
Task ID	TASK descriptor	Implementation Status	Action Plan
A-1	Aeronautical Information Publication (AIP) – Prescription of a required communication performance (RCP)/required surveillance performance (RSP) specification	Completed	Aeronautical Information Publication (AIP) Supplement was published on 1 February 2018 to inform aircraft operators on the plan to implement PBCS on 29 March 2018 in accordance with ICAO provisions to support Performance-based reduced horizontal separation minima application using data link.
A-2	ANSP – PBCS policies, objectives supporting safety oversight	Completed	The State regulator reviewed the policies, regulations and safety oversight on PBCS operations.
A-3	Operator and aircraft system – PBCS policies, objectives supporting safety oversight	Completed	The relevant Annex 6 amendments were incorporated to our technical requirements for Singapore air operators relating to PBCS, as per effective dates of the relevant SARP amendments.
A-4	Proposal for Amendment to ICAO Doc 7030 - <i>Regional Supplementary Procedures</i> for PBCS operations, if applicable	Completed	Proposal for Amendment (PfA) to the ICAO Doc 7030 - <i>Regional Supplementary Procedures</i> was approved by the Council on 13 March 2018 and implemented on 29 March 2018.
Group B tasks		ANSP general project development and management	
Task ID	TASK descriptor	Implementation Status	Action Plan
B-1	PBCS Implementation Plan	Completed	Singapore formed a PBCS implementation team and prepared a plan outlining the tasks for PBCS implementation among the stakeholders.

B-2	Target dates for PBCS and relevant ATM operations	Completed	<p>Singapore had harmonized the implementation of PBCS and relevant ATM operations on 29 March 2018, which in accordance with the following conclusions of the relevant ICAO bodies:</p> <p>(i) <i>Conclusion APANPIRG/27-7: PBCS Operator Requirements</i></p> <p>(ii) <i>Conclusion APANPIRG/27-8: State Implementation of ICAO Provisions for PBCS</i></p> <p>(iii) <i>Conclusion APANPIRG/27-9: Asia/Pacific Region PBCS Transition Strategy</i></p>
B-3	RCP/RSP specifications	Completed	<p>The AIP Supplement indicates the RCP240 and RSP180 performance specifications which are required for the application of the Performance-Based Longitudinal Separation minima in accordance with PANS-ATM (Doc 4444) paragraph 5.4.2.9.2.</p> <p>A Performance-Based Longitudinal Separation minima of 50NM may be applied between RNP10 approved aircraft on ATS routes which either LOGON to CPDLC or are within VHF radio range as the primary means of communication. Such direct controller-pilot communication (DCPC) shall be maintained at all times when applying these separation minima.</p>
B-4	PBCS awareness	Completed	<p>The published AIP Supplement promotes PBCS awareness among the aviation community and specified flight planning requirements. Singapore registered air operators were communicated internally through promulgation of the requirements. An Advisory Circular (AC) was published in March 2018 to provide guidance to the Singapore Air Operator Certificate (AOC) Holder in applying for an operational approval for the conduct of PBCS operations.</p>
Group C tasks		ANSP implementation activities – ATS service provision	
Task ID	TASK descriptor	Implementation Status	Action Plan
C-1	Operational concepts and procedures for PBCS operations	Completed	Concepts of Operations with necessary policies and procedures were developed, including the training to Air Traffic Control Officers (ATCOs) in PBCS application.
C-2	ATC automation system changes to use flight plan RCP/RSP indicators	Completed	Air Traffic Management System's (LORADS III) Flight Data Processor (FDP) is able to handle the RCP/RSP flight plan designators as well as defining the reduced horizontal separation standards for conflict detection.
C-3	ATM automation changes for PBCS monitoring	Completed	Air Traffic Management System (LORADS III) has the capability to retrieve archive data

			to ascertain the actual communication and surveillance performance required for PBCS monitoring.
C-4	Confirm initial ANSP compliance with RCP/RSP specifications	Completed	A regular performance monitoring framework is in place through the Automatic Dependent Surveillance-Contract and Controller Pilot Data-Link Communications (ADS-C/CPDLC) GOLD performance reporting in annual FANS Interoperability Team-Asia (FIT-ASIA) meeting.
Group D tasks		Aircraft operator, Aircraft type/system (airworthiness) eligibility	
Task ID	TASK descriptor	Implementation Status	Action Plan
D-1	Aircraft operator readiness	Completed	Locally registered air operators (9V) are expected to be ready for PBCS operations where operational approval would be obtained for communication and/or surveillance capability including aircraft equipage for operations where RCP and/or RSP specifications have been prescribed. As of 1 July 2020, 75.00% of all the locally registered fleets were granted with PBCS operational approval.
D-2	Confirm initial operator and/or aircraft type/system compliance with RCP/RSP	Completed	Compliance checks were conducted on Singapore air operators after promulgation of the regulations. ADS-C/CPDLC aircraft equipment and operator capabilities' compliance with RCP/RSP specifications were confirmed through the monitoring of the datalink performance, to support the initial approval of the operator. Statistic was collected after the PBCS implementation and as of 31 December 2019, it showed that about 71.5% of flights using data link services on RNP10 ATS routes within Singapore FIR had PBCS indicators filed in their flight plan, a noticeable increase of 7.2% as compared to 28 February 2019 (64.3%). Statistics till 31 December 2019 was utilised as there was a large number of reductions in flights from January 2020 onwards due to COVID-19.
Group E tasks		All stakeholders – post-implementation monitoring	
Task ID	TASK descriptor	Implementation Status	Action Plan
E-1	PBCS monitoring, analysis and reporting - post implementation	Local PBCS Monitoring Programme Completed	South East Asia Safety Monitoring Agency (SEASMA) which includes the conduct of annual airspace risk assessment, collect LLE & LLD data and monitoring of PBCS approvals vs PBCS operations. Boeing Central Reporting Agency (CRA) will continue to provide analysis for data link problem reports.

			<p>Regional PBCS monitoring programme including the development of a new reporting template for the reporting of communications and surveillance performance in ongoing and task will be undertaken by the newly formed FIT-Asia Small Working Group (FIT-Asia SWG). Singapore has been monitoring the data link performance for CPDLC and ADS-C and working closely with CSP and aircraft operators to resolve data link issues.</p>
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2.3 Singapore provided interim updates on the PBCS implementation status by responding to ICAO survey of the status of current and planned implementation of performance-based horizontal separation minima (**Attachment A**) and will continue to do so annually at a date not later than 30th April each year. The survey allows us to assess and review our current PBCS implementation plan while keeping our PBCS implementation readiness and preparedness status in check.

2.4 Recognizing the need to make data link performance information available to States, Regional Monitoring Agencies (RMA), and Operators in multiple ICAO Regions, and the consequent need to standardize the presentation format of information, Singapore has facilitated by providing the data link performance reports in the new templates available for their collation into Aggregated Regional Data for reporting to FIT-Asia and the Regional Airspace Safety Monitoring Agency (RASMAG).

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

- a) note the information contained in this paper;
- b) urge States, ANSPs and air operators to adopt the PBCS implementation plan as prescribed under the PBCS Manual (Doc 9869 2nd Edition);
- c) provide data link performance reports to FIT-Asia using the new templates at the earliest opportunity; and
- d) discuss any relevant matters as appropriate.

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ATTACHMENT A: SINGAPORE RESPONSE - SURVEY OF THE STATUS OF CURRENT AND PLANNED IMPLEMENTATION OF PERFORMANCE-BASED HORIZONTAL SEPARATION MINIMA

Instructions: Complete the Survey and return by email to the ICAO APAC Regional Office (apac@icao.int) by 30 th April 2020				Y/N	If NO, Planned Date
1. Has your State completed any of the following preparations for PBCS implementation?					
PBCS Implementation Task List	Task Group	Task ID	TASK descriptor		
	Group A	A-1	AIP (Prescription of an RCP/RSP specification. Also see B-3 below)	Y	
		A-2	PBCS policies, objectives supporting safety oversight of ANSP PBCS operations	Y	
		A-3	PBCS policies, objectives supporting safety oversight of Aircraft Operator and Aircraft System PBCS operations	Y	
		A-4	Proposal for Amendment to ICAO Doc 7030 - <i>Regional Supplementary Procedures</i> for PBCS operations , if applicable	Y	
	Group B	B-1	PBCS Implementation Plan	Y	
		B-2	Target dates for PBCS and relevant ATM operations	Y	
		B-3	RCP/RSP specifications	Y	
		B-4	PBCS awareness	Y	
	Group C	C-1	Operational concepts and procedures for PBCS operations	Y	
		C-2	ATM automation system changes to use flight plan RCP/RSP indicators	Y	
		C-3	ATM automation changes for PBCS monitoring	Y	
		C-4	Confirm initial ANSP compliance with RCP/RSP specifications	Y	
	Group D	D-1	Aircraft operator readiness	Y	
		D-2	Confirm initial operator and/or aircraft type/system compliance with RCP/RSP	Y	
	Group E	E-1	PBCS monitoring, analysis and reporting - post implementation	Y	

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