International Civil Aviation Organization

Sixth Meeting of the Bay of Bengal Traffic Flow Review Group (BOBTFRG/6)

Bangkok Thailand, 14 – 15 November 2024

Agenda Item 3: Review of the Existing Traffic Flow Route Structures in BOB Airspace and Identifying Priorities

REVIEW OF BOBTFRG PRIORITY AREAS IMPLEMENTATION TIMELINES

(Presented by the Secretariat)

SUMMARY

This paper presents the proposed implementation timelines for BOBTFRG Priority Areas for review and update to firm up the feasible implementation timelines of PBCS for the performance-based longitudinal separation over the Bay of Bengal airspace.

1. INTRODUCTION

1.1 The BOBTFRG Priority Areas 1 and 2 were developed and agreed upon at the Second Meeting of the Bay of Bengal Traffic Flow Review Group (BOBTFRG/2, Bangkok, Thailand, 08 – 10 October 2019). The BOBTFRG/3 (VTC, 14 -15 December 2021) agreed to update the implementation timeline for each priority area to reflect the changes in factors caused by COVID-19.

1.2 At BOBTFRG/5 (Bangkok Thailand, 6-8 December 2023), the group had agreed upon the trial implementation plan for the PBCS of the Bay of Bengal, which had developed a three-phased plan for PBCS implementation.

1.3 This paper aims to facilitate the discussion to firm up the feasible implementation timelines of Performance-Based Communications and Surveillance (PBCS) for performance-based longitudinal separation with the key enabler of ADS-C/CPDLC mandate over the Bay of Bengal area to optimise the airspace capacity. The suggested update of the implementation timeline for each priority area is contained in **Attachment A**.

2. DISCUSSION

Performance Expectations in the *Asia/Pacific Seamless ANS Plan*

2.1 Within Category R airspace, ADS-C surveillance and CPDLC should be enabled to support PBN-based separation in the concept of '*best equipped or capable, best served*' and '*most capable, best served*', which advocates that in each case where any aircraft that does not meet specified requirements, it should receive a lower priority, except where prescribed (such as for State aircraft). Transition to RNP 4 or RNP 2 oceanic specifications is recommended at the earliest opportunity.

2.2 All ATC units should authorise the use of horizontal separation minima stated in ICAO Doc 4444 (PANS-ATM), or as close to the separation minima as practicable, taking into account such factors as:

a) the automation of the ATM system, including automated hand-off between sectors;

b) the capability of the ATC communications systems;

c) the performance of the ATS surveillance system, including data-sharing or overlapping coverage at TOC points; and

d) ensuring the competency of air traffic controllers to apply the full tactical capability of ATS surveillance systems.

2.3 The delivery of ATC services should be based primarily on the CNS/ATM capability. When using Annx11 compliant ATS surveillance, 5NM (enroute) or 3NM (terminal) surveillance-based separations should be authorised within ATC sectors. At the TOC points in such an environment, 5-10NM should be authorised with auto hand-off and surveillance data-sharing or overlapping coverage at the TOC point, and 5-20NM without auto hand-off, as determined by an appropriate safety assessment.

2.4 The efficacy, continuity and availability of ATM services should be supported by adherence with regional planning and guidance material regarding ATM automation and ATM contingency systems (regarding ATM contingency operations, refer to the Regional ATM Contingency Plan).

2.5 As far as practicable, all new ATS Routes should be PBN Routes in accordance with the following specifications;

APAC Seamless ANS Plan	**Category R airspace**	**Category S airspace**
PARS Phase II with expected implementation by 07 Nov 2019	RNP 4, RNP 10 (RNAV 10) (other acceptable specifications – RNP 2 oceanic)	RNAV 2 or RNP 2
To support ASBU	APTA-B0/1 – 8, APTA-B1/1 – 5	
PARS Phase III with expected implementation by 03 Nov 2022	RNP 2 Oceanic (requires dual independent installations) (other acceptable specifications – RNP 4)	RNAV 2 or RNP 2
To support ASBU	COMS-B0/1 – 2, COMS-B1/1 – 3, APTA B0/1 – 8, APTA B1/1 – 5	

2.6 It is important to note that the selected ATS route navigation performance specification should be harmonised and utilise the least stringent requirement needed to support the intended operation unless obstacle clearance or ATC separation requirements demand.

PBCS Implementation

2.7 Highlighting the expected implementation of PBCS provisions of ICAO Annexes 6 and 11, Doc 4444 PANS-ATM and Guidance Material by not later than 29 March 2018, the meeting is invited to note summarised information below:

- ***By Air Navigation Service Providers*** *applying the following commonly used performance-based separation minima[1] were supported by ADS-C/CPDLC:*
  - *23 NM lateral separation (RNP 4 or RNP 2);*
  - *50 NM longitudinal separation (RNAV 10/RNP 10 or RNP 4); and*
  - *30 NM longitudinal separation (RNP 4 or RNP 2).*

[1] ICAO Doc 4444 Procedures of Air Navigation Services – Air Traffic management (PANS-ATM) sections 5.4.1.2.1.6 and 5.4.2.9.2 detail the communications and surveillance performance requirements for tall performance-based separation minima that are supported by ADS-C/CPDLC. 50NM longitudinal separation minimum in 5.4.2.6.3 does not require the use of ADS-C, but does require direct controller pilot communications (DCPC) and distance reports at frequent intervals (at least every 24 seconds).

- ***By Regulatory Authorities****:*
  - *For safety oversight of ANSP PBCS operations; and*
  - *To approve, and monitor the performance of, PBCS operations by aircraft and aircraft operators of the State of Registry.*

2.8 In the BOB area, the majority of the ATS routes are specified as RNAV 10 (RNP 10), and so far, not so much progress has been made in terms of the implementation of RNP 2 (or RNP 4) routes and PBCS. More efficient application of performance-based separation should not be further deferred to cope with the traffic that is returning after a big halt by COVID-19.

Global Project 30/10 – Optimised implementation of longitudinal separation minima

2.9 The Fourteenth Air Navigation Conference (AN-CONF/14) was held at Montreal, Canada, from 26 August to 06 September 2024. The meeting noted that the air traffic management performance improvement is hampered by the application of different separation minima across flight information region (FIR) boundaries, or separation minima that are inconsistent with those typically applied across a region or sub-region. Many States make every effort to improve the efficiency of their service delivery and minimize the adverse environmental impacts of civil aviation activities. Nonetheless, these same States also contend with downstream bottlenecks due to the absence of seamless operations.

2.10 The Working Paper prepared by ICAO Air Navigation Bureau (AN-Conf/14-WP/10) presented an initiative to focus attention on this challenge and encourage the seamless implementation of longitudinal separations of 55.5 km (30 NM) or less in oceanic and remote airspace, and 19 km (10 NM) or less elsewhere, with the objective of enhanced operational efficiency of the global air navigation system.

2.11 As a result of the discussion, what is noteworthy is that the Committee approved the ***Recommendation 3.1/1: Project 30/10 – Optimised implementation of longitudinal separation minima***.

That States:

a) within the processes of the planning and implementation regional groups, actively collaborate with neighbouring States to implement Project 30/10 – implementation of longitudinal separations of 55.5 km (30 NM) or less in oceanic and remote airspace, and 19 km (10 NM) or less elsewhere;

that ICAO:

b) through the planning and implementation regional groups, develop regional action plans for the implementation of Project 30/10;
c) support inter-regional collaboration for a harmonized implementation of Project 30/10; and
d) consider other minimum service level procedures, via a framework, for implementation in oceanic and remote airspace.

Trial implementation plan for the PBCS of the Bay of Bengal

2.12 According to the *Project 30/10 – Optimised implementation of longitudinal separation minima* (AN-CONF/14), the trial implementation plan for the PBCS of the Bay of Bengal formulated by BOBTFRG/5 (Bangkok Thailand, 6-8 December 2023,) has been proven to be correct and in line with the development trend. The phased detailed action plans the group has agreed upon are listed as the following:

i. **Phase 1**– 50 NM longitudinal separation to be applied based on the current capability RNAV 10 (RNP 10) available as soon as possible;

ii. **Phase 2** – to start transitional period: trial implementation of 30 NM longitudinal / 23 NM lateral separation with harmonized ADS-C/CPDLC equipage mandate for RNP 4 or RNP 2, RCP 240, RSP 180 requirements.

iii. **Phase 3** – permanent implementation of 30 NM longitudinal / 23 NM lateral separation not later than **1 March 2026**, subject to post-op evaluation on Phase 2 and ANSP's readiness to give flexibility or earlier implementation.

Analysis of the Current Separation being applied in the BOB Area

2.13 The latest updates were provided by Malaysia via an Information Paper (ATM/SG/12 − IP/05) through the ATM/SG/12 (Bangkok, Thailand, 23–27 September 2024). The paper paper provides information on the Malaysia's implementation of default 50-NM longitudinal separation in the area of the Bay of Bengal (BOB) and the additional Flight Level Allocation Scheme (FLAS) of Flight Level (FL) 360. ATS routes involved in this implementation are L510, N571, P574 and P628. In collaboration with India, this initiative significantly enhanced flight capacity over the BOB area and optimised air traffic management efficiency in the Kuala Lumpur FIR.

2.14 The 50 NM longitudinal separation for ATS routes L510, N571, P574 and P628 was effectively implemented on 1 July 2024. Malaysia and India agreed to adopt this default separation standard to enhance traffic capacity over the BOB. This standard applies to flights departing from Kuala Lumpur, Singapore and other overflights that cruise along these ATS routes. Following coordination with Singapore, their implementation will commence on 28th August 2024.

2.15 For aircraft departing from Kuala Lumpur International Airport, a ground separation of seven (7) minutes between aircraft pairs on ATS routes L510, N571, P574, and P628 have been imposed to ensure the 50 NM longitudinal separation can be achieved. The same procedures are also followed for aircraft departing from Changi Airport.

2.16 The joint decision by Malaysia and India to incorporate FL 360 into the current FLAS has significantly enhanced the efficiency and capacity of air traffic management over the BOB. The total available FLAS for westbound flights has increased to six (6) flight levels: FL280, FL300, FL340, FL360, FL380 and FL400.

2.17 In the event of Large-Scale Weather Deviation (LSWD) in the BOB that necessitates suspending the seven (7) minutes of ground separation, KL ACC Oceanic Sector will notify Chennai OCC and Singapore ACC. During such events, ten (10) minutes of ground separation will be re-applied, and real-time coordination shall be maintained.

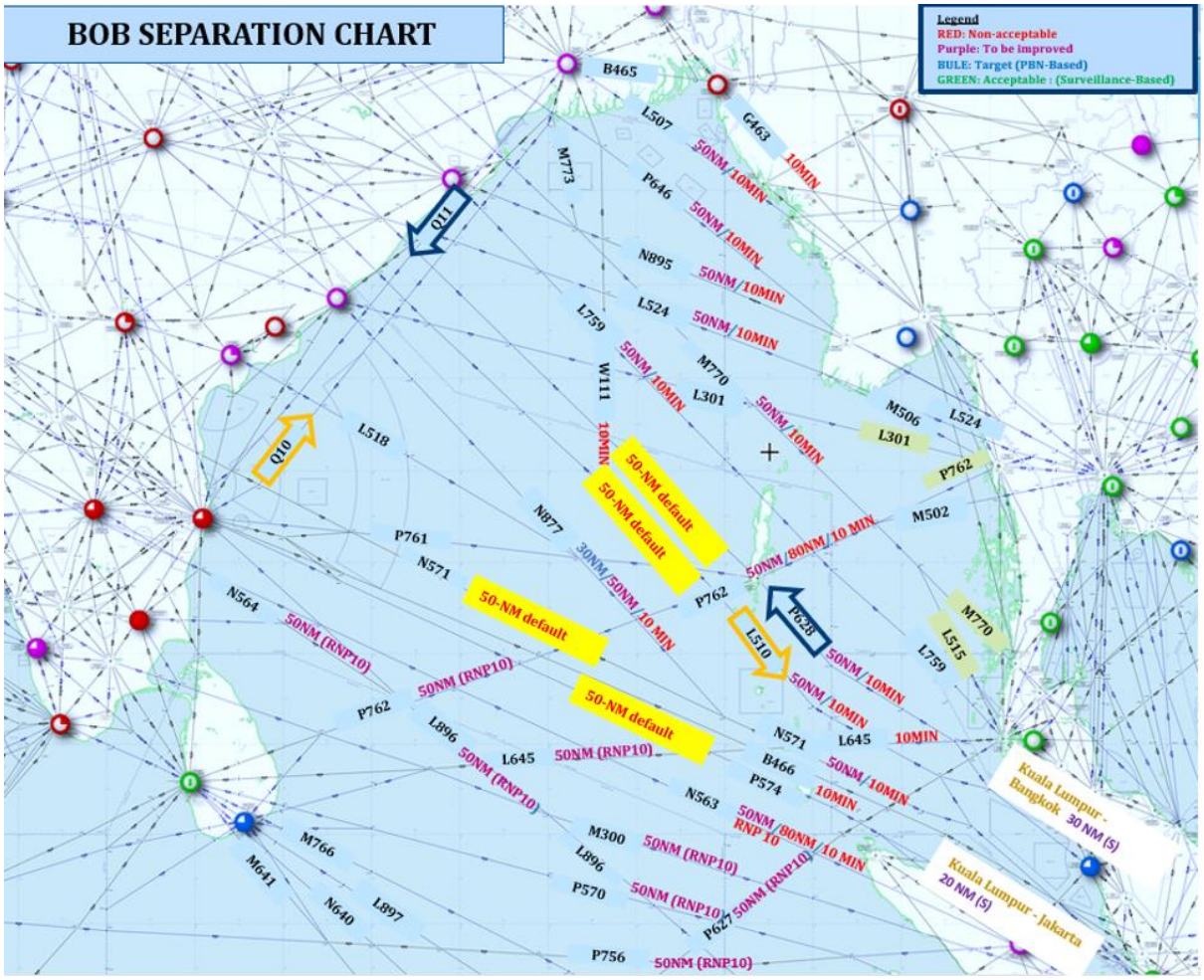

Figure 1: Horizontal Separation Minimus being applied in the BOB area (updated November 2024).

Readiness and Testing of ATM Automation System for PBCS for 30NM Longitudinal Separation.

2.18 Further efficiencies can be gained by applying a 30NM longitudinal separation standard under PBCS using RNP 2 or RNP 4 as described in para 5.4.2.9.2 of Doc 4444.

2.19 With the understanding of the requirements of applying 30 NM longitudinal separation with RNP 4 specification, **Table 1** collected the ATM/CNS system readiness among the BOB member States.

STATE	FIR	FPL PROCESSING FOR PBCS	ADS-C /CPDLC	RCP 240	RSP 180	POST IMPLEMENTATION MONITORING	REMARK
BANGLADESH	DHAKA						ATM automation system not implemented yet
INDIA	CHENNAI	YES	AVAILABLE	YES	YES	YES	System testing required
	KOLKATA	NO	AVAILABLE	YES	YES	YES	
	MUMBAI	YES	AVAILABLE	YES	YES	NO	System testing required
INDONESIA	JAKARTA	NO	TRIAL	NO	NO	NO	The system is being upgraded. PDC 2025
MALAYSIA	KUALA LUMPUR	NO	AVAILABLE	YES	YES	YES	monitoring only for ADS-C/CPDLC
MYANMAR	YANGON	NO	YES	NO	NO	NO	
SRILANKA	COLOMBO	NO	YES	TESTING	TESTING		System is being upgraded PDC by 2024.

THAILAND	BANGKOK	YES	NO	NO	NO	AVAILABLE	En-route airspace is fully covered with SSR. no plan to prescribe PDC.

Table 1: The readiness of ATM/CNS system of BOB States (Updated December 2023).

3. CONCLUSION

3.1 The BOBTFRG should adhere to the *trial implementation plan for the PBCS of the Bay of Bengal*, and continue to consolidate the achievements of the **Phase 1** and carry out the implementation of the **Phase 2** as soon as possible. ICAO urges all BOB States and IATA to step forward to firm up a timeline for mandating ADS-C/CPDLC including the affordable transitional period for non-equipped aircraft.

Phase 1– 50 NM longitudinal separation to be applied based on the current capability RNAV 10 (RNP 10) available as soon as possible;

Phase 2 – to start transitional period: trial implementation of 30 NM longitudinal / 23 NM lateral separation with harmonized ADS-C/CPDLC equipage mandate for RNP 4 or RNP 2, RCP 240, RSP 180 requirements.

Phase 3 – permanent implementation of 30 NM longitudinal / 23 NM lateral separation not later than **1 March 2026**, subject to post-op evaluation on Phase 2 and ANSP's readiness to give flexibility or earlier implementation.

4. ACTION BY THE MEETING

4.1 The meeting is invited to:

a) note the information contained in this paper;

b) review and provide feedback on Figure 1: *Horizontal Separation Minimus being applied in the BOB area;*

c) review and provide feedback on Table 1: *The readiness of ATM/CNS system of BOB States*

d) review and provide feedback on the *Implementation Timelines for BOBTFRG Priority Areas* in **Attachment A**; and

e) discuss any relevant matters as appropriate.

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IMPLEMENTATION TIMELINES FOR BOBTFRG PRIORITY AREAS V3.0

BOBTFRG Priority Area 1: Conduct a review of the air traffic flows in **Category S airspace** through Thailand, Myanmar, Bangladesh, India, Pakistan and Afghanistan. The objective is to develop a plan to implement improved and harmonised longitudinal spacing on affected ATS route(s) (targeting **20 NM longitudinal spacing**, or as close to the separation minima as practicable).

		Activity	Completion Date	Remarks
Phase 1	1	Identify current spacing implemented by States.	~~BOBTFRG/4~~ Completed	States to fill and submit the Attachment D to BOBTFRG/2 State Letter by 31 October 2019. Updated at BOBTFRG/3: Bangladesh, India, Indonesia, Malaysia, Myanmar, Pakistan and Thailand had submitted data to ICAO. Re: ATM/SG/9 WP/7, ICAO APAC Regional Office would circulate a new survey form, requesting APAC Administrations to provide information about the authorised ATC separation minimums and separation minimums at each FIR TOC point.
	2	Identify impediments to implementation of improved spacing (staffing and ATC sectorisation constraints).	Completed at BOBTFRG/3	States to fill and submit the Attachment D to BOBTFRG/2 State Letter by 31 October 2019. Updated at BOBTFRG/3: Reasons provided by States: communication and surveillance coverage limitations; ATM system capability related to PBCS; and low level of ADS-C/CPDLC equipage.
	3	Identify the ATS surveillance and communication gaps and actions taken to fill the gaps.	Closed at BOBTFRG/3	Ref CNS SG/23 WP/22. Updated at BOBTFRG/3: ATS Surveillance and DCPC VHF Coverage Charts was included in the *Asia/Pacific Seamless ANS Plan V3.0*.

		Activity	Completion Date	Remarks
	4	Identify ATS Inter-Facility Data Communication (AIDC) and/or direct speech circuits' capabilities.	Closed at BOBTFRG/3	States to provide update to the Secretariat latest by 30 November 2019. Updated at BOBTFRG/3: Updated AIDC implementation status in the APAC Region was provided in Appendix B to the APA TF/7 Report.
	5	Investigate whether appropriate handoff procedures are implemented between controllers providing ATS surveillance in adjacent airspace – review ATS Letter of Agreement (LOA).	~~31 January 2022~~ Completed at BOBTFRG/4	Updated at BOBTFRG/3: Bangkok – Kuala Lumpur ACCs: Yes Bangkok – Yangon ACCs: Yes Jakarta – Kuala Lumpur ACCs: Yes Dhaka – Kolkata ACCs: expected in 2025. Dhaka – Yangon ACCs: expected in 2025. Yangon – Kolkata ACCs (ATS route A201)? Delhi – Lahore ACCs? Delhi – Karachi ACCs? Mumbai – Karachi ACCs? Lahore – Kabul ACCs? Karachi – Kabul ACCs? Colombo ACC – Chennai OCC?
	6	~~Review the existing Flight Level Allocation Scheme (FLAS) operating within the concerned airspace, with a view to improve efficiencies.~~ Review and plan improved and efficient FLAS operating within the BOB airspace.	~~31 January 2022~~ BOBTFRG/5	States to fill and submit the Attachment D to BOBTFRG/2 State Letter by 31 October 2019. Updated at BOBTFRG/3: Reason for FLAS: multiple crossing of higher density routes over Category R airspace. States to confirm the accuracy of the information in the Bay of Bengal FLAS Chart (BOBTFRG/3 Report re: WP/07).

		Activity	Completion Date	Remarks
	7	~~States to identify routes along which reliable surveillance and communication are available to look at the possibility of reduced longitudinal spacing.~~ Confirm the coverage of Surveillance and Communication over the BOB airspace (to be tasked to TF to draft the Plan of the BOB Route Network)	~~31 January 2022~~ States (TF) report to SAIOSEACG/2	Updated at BOBTFRG/3: India and Pakistan: 50 NM longitudinal spacing implemented at the TOC points of following FIR boundaries: Delhi – Karachi FIRs; Delhi – Lahore FIRs; and Mumbai – Karachi FIRs. Indonesia and Malaysia: 20 NM longitudinal spacing implemented at the following TOC points: GOTLA, PUGER and SALAX. Malaysia and Thailand: 30 NM longitudinal spacing implemented at the TOC points between Bangkok and Kuala Lumpur FIRs. Myanmar and Thailand? India and Myanmar (ATS route A201)? India and Sri Lanka?
Phase 2	8	Complete the agreement between States to implement 20 NM longitudinal spacing (or as close to the separation minima as practicable) in Category S airspace through Thailand, Myanmar, Bangladesh, India, Pakistan and Afghanistan. Bangladesh regularly keeps the meeting updated the progress of CNS-ATM Modernization Project.	2025	Updated at BOBTFRG/3: Traffic operating north of Bay of Bengal airspace will traverse through Dhaka FIR, and currently no en-route ATS surveillance service provided in Dhaka FIR. To be reviewed in tandem with the Modernization Project of CNS-ATM System of Bangladesh.

BOBTFRG Priority Area 2: Conduct a review of the air traffic flows in **Category R airspace** within Bay of Bengal. The objective is to develop a plan to implement improved and harmonised **30 NM longitudinal spacing** on affected ATS routes.

		Activity	Completion Date	Remarks
Phase 1	1	Agreement between States to implement 50 NM longitudinal spacing between applicable aircraft on affected ATS routes. The application of performance-based separation minima and distance-based separation minima (RNP 10, with procedural position reports not less than 24 minutes apart) in airspace over the high seas requires supporting procedures in ICAO Doc 7030 – *Regional Supplementary Procedures*.	~~SAIOSEACG/1~~ States (TF) report to SAIOSEACG/2	Chennai and Kuala Lumpur ACC to signed revised LoA by 31 January 2020. Jakarta and Colombo had implemented 50 NM longitudinal spacing. Yangon and Kolkata, and Chennai had implemented 50 NM longitudinal spacing. Updated at BOBTFRG/3: Chennai OCC and Kuala Lumpur ACC had signed a new LoA, effected on 01 June 2021. 50 NM longitudinal spacing implemented. No update at the SAIOSEACG/1
	2	Facilitate potential modernization of Bangladesh CNS/ATM system (meeting tentatively planned for 23 October 2019).	Closed	ICAO RO to provide feedback during SAIOACG/10. Updated at BOBTFRG/3: The Modernization Project of CNS-ATM System of Bangladesh expected to be completed in 2024.
	3	Research and development project conducted by India, Singapore and any other interested States to look at technology capability and benefits, including the business case for enhanced surveillance and communication.	Closed	Subject to the approval from the competent agencies of each State. India and Singapore (ATMRI) would examine the proposal and submit their comments at the BOBTFRG/3. Updated at BOBTFRG/3: On 25 November 2019, Airport Authority of India had an informal meeting with ATMRI Singapore on the ICAO request in BOBTFRG/2 for a joint research and development. In the meeting, ATMRI informed that communications and surveillance was not in their domain of research, and they would not be able to

		Activity	Completion Date	Remarks
				participate.
	4	Implementation of 50 NM longitudinal separation (RNAV 10/ RNP 10) with PBCS in the BOB airspace, at or above a level to be determined.	~~To be discussed at SAIOSEACG/1~~ States (TF) report to SAIOSEACG/2	ADS-C/CPDLC non-exclusive mandate? PfA to ICAO Doc 7030 – *Regional Supplementary Procedures*. Current fleet equipage is less than 70%. Most of the non-equip aircraft are narrow-body aircraft and low cost airlines. Updated at BOBTFRG/3: ~~States to issue AIC after SAIOACG/10.~~ For better clarity, the ADS-C/CPDLC non-exclusive mandate should be referred to as *"designation as non-exclusive PBN and PBCS airspace to allow operational priority for PBN and PBCS approved aircraft"*. Due to the COVID-19 pandemic, which has caused severe impact on airlines and ANSPs resources and revenue, the discussion on the plan designation as non-exclusive PBN and PBCS airspace to allow operational priority for PBN and PBCS approved aircraft.has been postponed.
		a. States ~~and IATA~~ to conduct analysis on fleet equipage in ADS-C/CPDLC, RNP 10, RNP 4 and RNP 2 (continental and oceanic).	~~SAIOSEACG/1~~ States (TF) report to SAIOSEACG/2	BOBTFRG/3 Report re: WP/08. IATA presented its analysis results at the SAIOSEACG/1 and ATM SG/10.
		b. States requiring PBCS support to implement performance-based separation to develop its PBCS implementation plan, including expected date of implementation.	~~SAIOSEACG/1~~ States (TF) report to SAIOSEACG/2	BOBTFRG/3 Report re: WP/08. No update at the SIOSEACG/1

		Activity	Completion Date	Remarks
	5	Develop Performance-based Communication and Surveillance (PBCS) Implementation Plan to support 30 NM longitudinal spacing on RNP 4 (or RNP 2) routes within Category R airspace.	~~To be determined~~ States (TF) report to SAIOSEACG/2	States that require PBCS to support 30 NM longitudinal spacing: Bangladesh: To be determined. Sri Lanka: No information. India: Expected to be implemented in Chennai FIR in 2020; Mumbai FIR in 2023; and Kolkata FIR to be determined. Indonesia: Expected in 2023 as part of the new Jakarta ACC ATM system project. Malaysia: Expected in second quarter of 2022. Myanmar: To be determined.
	6	Implementation of RNP 4 (or RNP 2) routes within BOB airspace.	~~To be determined~~ States (TF) report to SAIOSEACG/2	Subject to the implementation of PBCS.
	7	Agreement between States to implement 30 NM longitudinal spacing (or as close to the separation minima as practicable) on trial basis.	~~To be determined~~ **1 March 2024**	Updated at BOBTFRG/3: Subject to the implementation of PBCS.
Phase 2	8	Review the demand and capacity on the affected ATS routes.	~~To be determined~~ 2025 (SAIOSEACG/4)	Subject to the trial implementation of PBCS.
	9	Identify solutions to integrate departing traffic from New Delhi with the BOBCAT traffic.	~~To be determined~~ 2025 (SAIOSEACG/4)	
	10	Review the requirement to retain BOBCAT tool based on the increase in capacity utilising improved longitudinal spacing, taking into account forecast growth in air traffic.	~~To be determined~~ 2025 (SAIOSEACG/4)	
	11	Make recommendations to SAIOACG on the future status of the BOBCAT tool.	~~To be determined~~ 2025 (SAIOSEACG/4)	