



International Civil Aviation Organization

**Fourth Meeting of the ICAO Asia/Pacific Seamless ATM Planning Group
(APSAPG/4)**

Hong Kong, China, 3 – 7 June 2013

Agenda Item 4: Asia/Pacific Seamless ATM Status and Strategies

COMMENTS ON SEAMLESS ATM PLAN

(Presented by Cambodia, Lao PDR, Myanmar, Thailand and Viet Nam)

SUMMARY

This working paper, jointly prepared by Cambodia, Lao PDR, Myanmar, Thailand, and Viet Nam, presents comments on Seamless ATM Plan version 0.9 to ensure practical implementation of Seamless ATM in Asia-Pacific region.

This paper relates to –

Strategic Objectives:

- A: *Safety – Enhance global civil aviation safety*
- C: *Environmental Protection and Sustainable Development of Air Transport – Foster harmonized and economically viable development of international civil aviation that does not unduly harm the environment*

Global Plan Initiatives:

- GPI-1 Flexible use of airspace
- GPI-2 Reduced vertical separation minima
- GPI-3 Harmonization of level systems
- GPI-4 Alignment of upper airspace classifications
- GPI-5 RNAV and RNP (Performance-based navigation)
- GPI-6 Air traffic flow management
- GPI-7 Dynamic and flexible ATS route management
- GPI-8 Collaborative airspace design and management
- GPI-9 Situational awareness
- GPI-11 RNP and RNAV SIDs and STARs
- GPI-12 Functional integration of ground systems with airborne systems
- GPI-13 Aerodrome design and management
- GPI-14 Runway operations
- GPI-15 Match IMC and VMC operating capacity
- GPI-16 Decision support systems and alerting systems
- GPI-17 Data link applications
- GPI-18 Aeronautical information
- GPI-19 Meteorological Systems
- GPI-20 WGS-84
- GPI-21 Navigation systems
- GPI-22 Communication infrastructure

1. INTRODUCTION

1.1 The meeting would recall the ICAO Aviation System Block Upgrade (ASBU) concept endorsed at the 12th ICAO Air Navigation Conference in November 2012 (AN-Conf/12).

1.2 The Asia-Pacific Air Navigation Concept of Operations was approved at the APANPIRG/22 meeting in September 2011 as a plan to encourage implementation of Seamless ATM systems and procedures.

1.3 APANPIRG/22 also agreed to form the ICAO Asia-Pacific Seamless ATM Planning Group (APSAPG), three meetings of which were held from March 2012 – March 2013.

1.4 In preparation for the APSAPG/4, there are expectations that the Asia/Pacific Seamless ATM Plan were to be finalized for submission to APANPIRG/24 in June 2013. This Working Paper presents Thailand’s comments on the Asia/Pacific Seamless ATM Plan Version 0.9 as presented to the ICAO ATM/SG/1 in May 2013.

1.5 Prior to the APSAPG/4 meeting, the second Mekong ATM Coordination Group Meeting (MK-ATM/CG/2) was held in Bangkok, Thailand on 29 – 30 May 2013, attended by Cambodia, Lao PDR, Myanmar, Thailand, Viet Nam, and representatives from IATA. During the MK-ATM/CG/2 meeting, the Seamless ATM Plan version 0.9 was reviewed by Mekong States, namely Cambodia, Lao PDR, Myanmar, Thailand and Viet Nam.

2. DISCUSSION

2.1 During the weeks prior to the APSAPG/4, the latest version of Seamless ATM Plan was presented to other related ICAO Asia-Pacific forums. There were discussions and concerns on “mandatory” nature of the plan. On one hand, it may not be necessary for the plan to be “mandatory” allowing individual States to design their implementation program based on their individual requirements. On the other hand, shelved Seamless ATM Plan with no agreement and commitment from States due to various reasons including practicality of the plan poses serious risks to the Asia-Pacific region’s opportunity to implement seamless ATM operations as agreed to at the DGCA Conference in Kansai in 2009.

2.2 Therefore, the Seamless ATM Plan should be practical for States, and sub-regional agreement and commitment is required at the minimum. In order to enhance practicality of the plan and enable State agreements, the following changes to the Seamless ATM Plan are proposed.

PBN Requirements in PARS/PASL

2.3 The meeting is invited to note summary of PBN Implementation as outlined in PARS/PASL in **Table 1**.

Table 1: Seamless ATM Plan PBN-Related Requirements

PARS/PASL Phase	PBN Requirement	PBN Requirement Summary
Phase 1 (Nov 2015)	PARS I (para 7.4): “All international high density aerodromes should have RNAV 1 (ATS surveillance environment) or RNP 1 (ATS surveillance and non-ATS surveillance environments) SID/STAR”	
	PARS I (para 7.5): “Where practicable, all high density aerodromes with instrument runways serving airplanes should have (ASBU Priority 2): a) precision approaches; or b) Approaches with Vertical Guidance (APV), either	

PARS/PASL Phase	PBN Requirement	PBN Requirement Summary
	RNP APCH with Barometric Vertical Navigation (Baro-VNAV) or augmented GNSS (SBAS or GBAS; or c) if an APV is not practical, straight-in RNP APCH with Lateral Navigation (LNAV).”	
	PARS I (para 7.8): “All Category R and S upper controlled airspace, and Category T airspace supporting high density aerodromes should be designated as non-exclusive or exclusive PBN airspace as appropriate. This is to allow operational priority for PBN approved aircraft, harmonized specifications and to take into account off track events such as weather deviations, with priority implementation for high-density FIRs.”	
	PARS I (para 7.9): “All ATS routes should be designated with a navigation performance specification to define the CNS/ATM operational environment. The ATS route navigation performance specification selected should be harmonized and utilize the least stringent requirement needed to support the intended operation. When obstacle clearance or ATC separation requirements demand, a more stringent navigation specification may be selected. ATS routes should be established in accordance with the following PBN specifications: - Category R airspace – RNP 4, RNP 10 (RNAV 10) (other acceptable navigation specifications – RNP 2 oceanic); and - Category S airspace – RNAV 2 or RNP 2 (other acceptable navigation specifications – RNAV 5).”	
Phase 2 (Nov 2018)	PARS II (para 7.14): “RNP 0.3 arrival/departure, approach and/or en-route transiting procedures should be considered at all high density aerodromes with rotary wing operations”	
	PARS II (para 7.15): “All international aerodromes should have RNAV 1 (ATS surveillance environment) or RNP 1 (ATS surveillance and non-ATS surveillance environments) SID/STAR”	
	PARS II (para 7.16): “Where practicable, all aerodromes with instrument runways serving airplanes should have (ASBU Priority 2) a) precision approaches; or b) APV, either RNP APCH with Barometric Vertical Navigation (Baro-VNAV) or augmented GNSS (SBAS or GBAS); or c) when an APV is not practical, straight-in RNP APCH with LNAV.”	
	PARS II (para 7.17): “When establishing the implementation of PBN approach procedures in accordance with Assembly Resolution A37-11, States should first conduct an analysis of the instrument runway eligibility for APV approaches. This analysis should include the feasibility of the APV at a particular location, the presence of regular commercial operations and current projected user fleet capacity for APV. The	

PARS/PASL Phase	PBN Requirement	PBN Requirement Summary
	introduction of landing capability using GNSS and its augmentations such as GNSS Landing System (GLS) is recommended where these systems were economically beneficial. Locations where APV approach were either not feasible or where regular operators could not realize the benefit of APV should implement RNP APCH with LNAV minima instead of APV, to provide the safety benefits of straight-in approach procedures.”	
	PARS II (para 7.18): “Where a short length or tailored runway designed to segregate low speed aircraft is established, the runway should be served by PBN procedures including SID and STAR that provided segregation from the procedures serving other aerodrome runways as far as practicable.”	
	PARS II (para 7.19): “PBN procedures that overlay visual arrival and departure procedures should be established where this provided an operational advantage.”	
	PARS II (para 7.22): “All en-route controlled airspace should be designated as being exclusive PBN airspace with mandatory carriage of GNSS utilizing RNP navigation specifications, except for State aircraft. Such implementation mandates should be harmonized with adjacent airspace. ATS Routes should be established in accordance with the following PBN specifications: - Category R airspace – RNP 2 oceanic ; and - Category S airspace – RNP 2 .”	

2.4 The meeting should note that PARS I (para 7.9) stipulates implementation of RNAV 2 / RNP 2 specification by November 2015, while no specific separation/spacing guidance material for such PBN specification is yet to be released.

2.5 It is viewed that such requirement in PARS I (para 7.9) on PBN specifications, separation standard of which is yet fully complete, should be deferred to PARS II (para 7.22). Meanwhile PARS I (para 7.9) should simply mention RNAV 5 with planned transition to RNAV 2 / RNP 2 as soon as practicable as summarized in **Table 2**. (Note: proposed additional words are highlighted)

Table 2: Summary of Proposed Changes to PARS/PASL PBN-Related Requirements

PARS/PASL Phase	Proposed PBN Requirement	Proposed PBN Requirement Summary
Phase 1 (Nov 2015)	PARS I (para 7.9): “All ATS routes should be designated with a navigation performance specification to define the CNS/ATM operational environment. The ATS route navigation performance specification selected should be harmonized and utilize the least stringent requirement needed to support the intended operation. When obstacle clearance or ATC separation requirements demand, a more stringent navigation specification may be selected. ATS routes should be established in accordance with the following PBN specifications:	RNAV 2 and RNP 2 separation standards are not yet finalized; specification adjusted so that RNP 2 should be implemented as soon as practicable while priority is given to existing finalized standards

PARS/PASL Phase	Proposed PBN Requirement	Proposed PBN Requirement Summary
	- Category R airspace – RNP 4, RNP 10 (RNAV 10) migrating to RNP2 Oceanic as soon as practicable (other acceptable navigation specifications—RNP 2 oceanic); and - Category S airspace – RNAV 2 or RNP 2 (other acceptable navigation specifications— RNAV 5 migrating to RNAV 2 or RNP 2 as soon as practicable);”	

Continuous Climb Operations (CCO) and Continuous Descent Operations (CDO)

2.6 The meeting is invited to note summary of CCO and CDO requirements as outlined in PARS/PASL in **Table 3**.

Table 3: Seamless ATM Plan CCO/CDO-Related Requirements

PARS/PASL Phase	CCO/CDO Requirement	CCO/CDO Requirement Summary
Phase 1 (Nov 2015)	PARS I (para 7.3): “CCO and CDO operations should be considered for implementation at all high density international aerodromes after analysis, based on a performance-based approach (ASBU Priority 2)”	CCO and CDO considered for all “high density international aerodromes”

2.7 While it is understood that ASBU module on CCO and CDO are include as Priority 2 to minimize environmental impact from aviation as well as enhance safety of operations, there were concerns raised at various forums that CCO and CDO implementation at congested aerodromes may be challenging.

2.8 Therefore, the Seamless ATM Plan should be adjusted that States should submit CCO/CDO Implementation Plan focusing on availability of CCO/CDO for flights for PARS Phase I, potentially leveraging low hanging fruits on CCO/CDO circumstances at aerodromes with suitable balance between traffic volume and aerodrome capacity, which could either be lower-density aerodromes or higher-density aerodromes during off peak hours.

2.9 It should also be recognized that the CCO/CDO Implementation Plan should be revised in PARS Phase II given expectations that ASBU Block 1 enhanced guidance material on CDO (B1-CDO) should also become available.

2.10 **Table 4** Outlines proposal on CCO/CDO Requirements in PARS/PASL. (Note: proposed additional words are highlighted)

Table 4: Summary of Proposed Changes to PARS/PASL CCO/CCO-Related Requirements

PARS/PASL Phase	Proposed CCO/CDO Requirement	Proposed CCO/CDO Requirement Summary
Phase 1 (Nov 2015)	PARS I (para 7.3): “CCO and CDO operations should be considered for implementation at all high density international aerodromes after analysis, based on a performance-based approach. States to submit CCO and CDO Implementation Plan leveraging available CCO and CDO where possible. (ASBU Priority 2)”	CCO and CDO considered for all “high density international aerodromes” Amended to remove reference to “high density international aerodrome” while adding that States should submit CCO/CDO

PARS/PASL Phase	Proposed CCO/CDO Requirement	Proposed CCO/CDO Requirement Summary
		Implementation Plan
Phase 2 (Nov 2018)	PARS II (new para): “States to update CCO and CDO Implementation Plan to reflect progress since PARS I and availability of newer technologies in ASBU Block 1. (ASBU Priority 2)”	Update of CCO/CDO Implementation Plan to include expectations on B1-CDO updated guidance

CDM/ATFM Requirements in PARS/PASL

2.11 Noting that the Seamless ATM Plan categorizes ASBU Block 0 Module on Collaborative Network ATFM (B0-NOPS) as “Critical Upgrade,” a thorough review of ATFM requirements in PARS/PASL Phase I and Phase II indicates the following CDM/ATFM requirements in **Table 5**.

Table 5: Seamless ATM Plan CDM/ATFM Requirements

PARS/PASL Phase	CDM/ATFM Requirement	CDM/ATFM Requirement Summary
Phase 1 (Nov 2015)	PASL I (Para 7.29): “High density FIRs (refer Figure 59) supporting the busiest Asia/Pacific traffic flows and high density aerodromes should implement ATFM incorporating CDM to enhance capacity, using bi- lateral and multi-lateral agreements (ASBU Priority 1).”	CDM/ATFM Process for “high density FIRs”
	PASL I (Para 7.2): “All high density aerodromes should operate an A-CDM system serving the MTF and busiest city pairs, with priority implementation for the busiest Asia/Pacific aerodromes (ASBU Priority 2)”	Airport CDM implementation for “high density aerodromes”
Phase 2 (Nov 2018)	PARS II (Para 7.13): “All high density aerodromes should have a declared airport terminal and runway capacity based on a capacity and efficiency analysis, to ensure the maximum possible efficiency of aircraft and passenger movement.”	Capacity Assessments for “high density aerodromes,” terminal ATC sectors and en route ATC sectors
	PASL II (Para 7.45): “All terminal ATC Sectors should have a nominal aircraft capacity figure based on a scientific study and safety assessment, to ensure safe and efficient aircraft operations. <i>Note: A Study of the terminal ATC Sector airspace capacity every 15 minutes is provided in Appendix G.”</i>	
	PASL II (Para 7.52) “To ensure the safety and efficiency of aircraft operations, a nominal aircraft capacity figure based on a scientific capacity study and safety assessment should be available for all enroute ATC sectors <i>Note: A Study of the terminal ATC Sector airspace capacity every 15 minutes is provided in Appendix G”</i>	
	PASL II (Para 7.49) “All FIRs supporting Major Traffic Flows should implement ATFM incorporating CDM to enhance capacity, using bi-lateral and multi-lateral agreements (ASBU Priority 1)”	CDM/ATFM Process for “all FIRs supporting Major Traffic Flows”

2.12 Thorough review of CDM/ATFM-related requirements in **Table 5** indicates that CDM/ATFM processes for “high-density FIRs” and Airport-CDM processes for “high-density aerodromes” need to be operational by November 2015. Meanwhile, Capacity Assessment for “high

density aerodromes,” terminal ATC sectors and en route ATC sectors need to be completed by November 2018 along with CDM/ATFM processes for all FIRs supporting Major Traffic Flows.

2.13 Major concern related to implementation of CDM/ATFM process as well as Airport CDM implementation depends heavily on assessment and regular update of capacity in airports, terminal ATC sectors and en route ATC sectors.

2.14 Therefore, the statement requiring CDM/ATFM process to be implemented for “high-density FIRs” carries implicit requirement that capacity assessment for aerodromes, terminal ATC sectors and en route ATC sectors need to be carried out with capacity update process in place for events such as weather phenomena.

2.15 While it may be reasonably assumed that “high-density FIRs” should have sufficient resources at disposal to carry out such capacity assessments. However, such processes can be extremely time-consuming. CDM/ATFM requirement in PASL Phase I could pose so much resource requirement on “high-density FIRs” that there may be reports of “CDM/ATFM implementation” on simple sector of the FIR to satisfy the requirement while such reporting defeats the intent of the Seamless ATM Plan.

2.16 Therefore, follow success of Asia-Pacific PBN Implementation Plan, PASL Phase I requirement should be adjusted so that CDM/ATFM Implementation Plan for “high-density FIRs” should be submitted.

2.17 Moreover, there is no mention of capacity assessment in PARS/PASL Phase I (2015). It is a major concern that by simply including series of requirement for capacity assessment in PASL Phase II for high-density aerodromes, terminal ATC sectors and en route ATC sectors poses risk of harmonized networked capacity assessment.

2.18 Therefore, it is proposed that addition of statement in PASL Phase I (2015) that States submit Capacity Assessment, Review and Enhancement Plans prioritizing capacity assessment on congested airport and airspace sectors.

2.19 Similar concerns exist to PASL Phase I requirement that all “high density aerodromes” implement Airport CDM by November 2015. Such requirement poses significant practicality timing concerns. Assuming that the Seamless ATM Plan is approved by APANPIRG in July 2013, it may take States one fiscal year to carry out business case analysis for such implementation, which puts starting time of Airport CDM projects at approximately early 2015, implying eleven-month project implementation time. Such requirement may not be practical.

2.20 In response, it is proposed that Airport CDM requirement in PASL Phase I to be adjusted so that Airport CDM Implementation Plan should be submitted by PASL Phase I with implementation preferred by Phase I, but required before Phase II (2018).

2.21 In respect to PARS/PASL Phase II requirement on capacity assessment, wording of such capacity assessment may mislead States to assume that capacity of aerodromes, terminal ATC sectors and en route ATC sectors may be static and satisfied by declaration of simple static capacity. The meeting is reminded that ICAO Manual on Collaborative ATFM (Doc 9971) stresses that capacity assessments need to be adjusted based on prevailing conditions when applied tactically. Therefore, Thailand proposes amendment of requirements in PARS/PASL Phase II to reflect dynamic nature of capacity, namely through submission and updating of Capacity Assessment, Review and Enhancement Plans.

2.22 In addition, the current version of Seamless ATM Plan does not mention any aerodromes apart from high-density aerodromes (100,000 scheduled movements per annum or more).

2.23 Nevertheless, the meeting should note existence of other aerodromes in certain cases of which may already be congested with scheduled movements approaching available capacity. The current version of Seamless ATM Plan would not be able to address congestion at those aerodromes, which would also have network effect on other aerodromes or airspace.

2.24 Therefore, it is suggested that the Seamless ATM Plan be adjusted to include Capacity Analysis, Review and Enhancement Plan for these aerodromes including Airport CDM implementation given sufficient supportive business case.

2.25 Proposed changes to CDM/ATFM Requirements in the Seamless ATM Plan are summarized in **Table 6**. (Note: proposed additional words are highlighted)

Table 6: Summary of Proposed Changes to PARS/PASL CDM/ATFM Requirements

PARS/PASL Phase	Proposed CDM/ATFM Requirement	Proposed CDM/ATFM Requirement Summary
Phase 1 (Nov 2015)	PASL I (para 7.29): “High density FIRs (refer Figure 59) supporting the busiest Asia/Pacific traffic flows and high density aerodromes should implement CDM/ATFM ATFM incorporating CDM to enhance capacity, using bi-lateral and multi-lateral agreements and submit CDM/ATFM Implementation Plan (ASBU Priority 1).”	CDM/ATFM Process for “high density FIRs” amended with CDM/ATFM Implementation Plan
	PARS I / PASL I (new para): “States to submit Capacity Assessment, Review and Enhancement Plan prioritizing on congested or expected to be congested aerodromes and airspace sectors with planned assessment for congested aerodromes and airspace sectors by PASL II. The Plan should include implementation of regular capacity review, tactical capacity adjustment process as well as capacity enhancement process to support seamless ATM operations (ASBU Priority 1).”	Capacity Assessment, Review and Enhancement Plan for all States
	PASL I (para 7.2): “All high density aerodromes should implement operate an A-CDM system serving the MTF Major Traffic Flow and busiest city pairs, with priority implementation for the busiest Asia/Pacific aerodromes and submit Airport CDM Implementation plan for relevant airports with the goal of complete implementation by PASL II supported by business case analysis as necessary. The Airport CDM Implementation Plan may be integrated as a part of CDM/ATFM Implementation Plan . (ASBU Priority 2)”	Airport CDM implementation for “high density aerodromes” amended with Airport CDM Implementation Plan and suggestion of integration with CDM/ATFM Implementation Plan
	PARS II (para 7.13): “All high density aerodromes should have a declared airport terminal and runway capacity based on a capacity and efficiency analysis, to ensure the maximum possible efficiency of aircraft and passenger movement. Appropriate regular capacity review, tactical adjustment as well as capacity enhancement process should also be implemented and documented in Capacity Analysis, Review and Enhancement Plan. ”	Capacity Assessments for “high density aerodromes,” terminal ATC sectors and en route ATC sectors amended to include capacity review and tactical adjustment process in accordance to Capacity Analysis, Review and Enhancement Plan

PARS/PASL Phase	Proposed CDM/ATFM Requirement	Proposed CDM/ATFM Requirement Summary
Phase 2 (Nov 2018)	<p>PASL II (para 7.45): “All terminal ATC Sectors should have a nominal aircraft capacity figure based on a scientific study and safety assessment, to ensure safe and efficient aircraft operations. Appropriate regular capacity review, tactical adjustment as well as capacity enhancement process should also be implemented with priority implementation on congested or expected to be congested sectors outlined in Capacity Assessment, Review and Enhancement Plan.</p> <p><i>Note: A Study of the terminal ATC Sector airspace capacity every 15 minutes is provided in Appendix G.”</i></p>	<p>Capacity Assessments for “high density aerodromes,” terminal ATC sectors and en route ATC sectors</p> <p>Amended to include capacity review and tactical adjustment process in accordance to Capacity Analysis, Review and Enhancement Plan</p>
	<p>PASL II (para 7.52) “To ensure the safety and efficiency of aircraft operations, a nominal aircraft capacity figure based on a scientific capacity study and safety assessment should be available for all enroute ATC sectors. Appropriate regular capacity review, tactical adjustment as well as capacity enhancement process should also be implemented with priority implementation on congested or expected to be congested sectors outlined in Capacity Assessment, Review and Enhancement Plan.</p> <p><i>Note: A Study of the terminal ATC Sector airspace capacity every 15 minutes is provided in Appendix G.”</i></p>	<p>CDM/ATFM Process for “all FIRs supporting Major Traffic Flows” amended with CDM/ATFM Implementation Plan</p>
	<p>PASL II (para 7.49) “All FIRs supporting Major Traffic Flows should implement CDM/ATFM ATFM incorporating CDM to enhance capacity, using bi-lateral and multi-lateral agreements and update implementation progress in CDM/ATFM Implementation Plan submitted in PASL I (ASBU Priority 1)”</p>	
	<p>PASL II (new para): “States to submit CDM/ATFM Implementation Plan with priority implementation on congested or expected to be congested aerodromes and airspace sectors completed and implementation on remaining aerodromes and sectors planned (ASBU Priority 1).”</p>	<p>Submission of CDM/ATFM Implementation Plan for all States</p>
	<p>PARS II / PASL II (new para): “States to update Capacity Assessment, Review and Enhancement Plan with initial assessment completed, regular review and tactical update implemented for congested or expected to be congested aerodromes and airspace sectors and implementation planned for remaining aerodromes and sectors (ASBU Priority 1).”</p>	<p>Update of Capacity Assessment, Review and Enhancement Plan for all States</p>
	<p>PASL II (new para): “States to update progress of Airport CDM Implementation Plan as submitted in PASL I with implementation at congested or expected to be congested either completed or planned based on business case analysis, which may be integrated as a part of CDM/ATFM Implementation Plan (ASBU Priority 2).”</p>	<p>Update of Airport CDM Implementation Plan submitted in PASL I and integration with CDM/ATFM Implementation Plan</p>

2.26 With proposed changes on CDM/ATFM requirement in the Seamless ATM Plan, it is expected that the upcoming ICAO ATFM Steering Group Meeting in September 2013 should be tasked to harmonize CDM/ATFM implementation planning in the Asia-Pacific region based on CDM/ATFM Implementation Plans combined with Capacity Assessment, Review and Enhancement Plans in a holistic and collaborative networked approach.

2.27 It is expected that such harmonized plan should provide suitable roadmap for implementation of regional CDM/ATFM supported by the Asia-Pacific Regional Sub Office in support of ASBU module B0-NOPS as well as longer term support in ASBU Block 1 and beyond.

3. ACTIONS BY THE MEETING

3.1 The meeting are invited to:

- a) note information presented in this WP;
- b) discuss amendment to Seamless ATM Plan as proposed; and,
- c) discuss any relevant matters as appropriate.

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