International Civil Aviation Organization

Fourth Meeting of the Asia/Pacific Air Traffic Management Automation System Task Force (APAC ATMAS TF/4)

Bangkok, Thailand, 28 - 30 June 2023

Agenda Item 5: Review ATMAS Implementation Status in APAC

REPOSITORY OF THE ATMAS IN APAC

(Presented by the Secretariat)

SUMMARY

This paper presents the updated table of the ATMAS Status in APAC region, the preliminary analysis of current status, and invites States/Administrations to review and take necessary actions to make the regional repository.

1. INTRODUCTION

1.1 The ICAO Asia Pacific Regional ATM Automation System Symposium (APAC RATMS) was held in Nanjing, China, from *22 to 23 November 2018*. The symposium recognized a need for States/Administrations to take stock of fallback systems available for all of their ATM automation systems and for the ICAO to conduct a survey on States regarding their provisions of main and fallback ATM automation systems, their functionality/capability/capacity, and any future resilience improvement plan.

1.2 The First Meeting of the Asia/Pacific Air Traffic Management Automation System Task Force (ATMAS TF/1) was held from *27 to 30 October 2020*. In this meeting, Indonesia presented IP/03: *ATM Automation System in Indonesia* and introduced the phased approach in ATMAS implementation from System Plan and Design System, Installation and Commissioning to Operational Transition. The meeting recalled the proposal by ATM Automation System Symposium held in 2018 to establish a repository of the ATM automation systems implemented by States, which was adopted as **ACTION ITEM 1-1:** *Develop a table to list the current ATMAS status for all states* for this task force.

1.3 This paper presents the updated table of the ATMAS Status in APAC region, the preliminary analysis of current status, and invites States/Administrations to review and take necessary actions to make the regional repository.

2. DISCUSSION

ATMAS Repository in APAC region

2.1 In order to follow up the **ACTION ITEM 1-1** of ATMAS TF/1, Indonesia has worked on the table design and proposed a draft Table of Current ATMAS Status in ATMAS TF/2 meeting

held from *14-16 September 2021*, which is based on the Appendix A (Recommended Functions and Performances of Air Traffic Management Automation System) of the ATMAS TF/1 report. The ATMAS TF/2 meeting further discussed the draft table and agreed to create an ad-hoc group led by Indonesia, including China, Hong Kong China, the Republic of Korea, and Singapore with the support of the ICAO Secretariat to consider the States' suggestions and work out a revised version of the survey which resulted into Action Item 2-2 of ATMAS TF/2.

2.2 To follow up the Action Item 2-2 of ATMAS TF/2 to work out a revised repository of ATMAS implementation status in APAC, based on the draft table designed by Indonesia, the suggestions from ATMAS TF/2 and the latest version of the ATMAS IGD, the table of ATMAS status in APAC region re-designed and re-formatted by the ad-hoc group has been reviewed and adopted by the ATMAS TF/3 meeting *held from 8 to 10 June 2022*.

2.3 It was noted that the table can be easily filled in by selecting the choice from the drop-down list and the available options will support data statistics and analysis in the future. While filling the table, the Member States are recommended to refer to the explanation of the table, and the corresponding chapter of ATMAS IGD to get further information. The ICAO Secretariat is requested to issue a State Letter in due course to circulate the table to collect information in order to build the repository of the ATM automation systems for APAC Region as Action Item 3-1.

2.4 As a follow up on the Action Item 3-1 of ATMAS TF/3, the ATMAS repository has been circulated through State Letter **Ref.:** T 8/12.18: AP139/22 (CNS) with Subject – *Publication of ATM Automation System Implementation and Operations Guidance Document (ATMAS IGD Edition 1.0) and Establish the Air Traffic Management Automation System (ATMAS) Repository for APAC Region* on 21 October 2022, which is provided in **Appendix A** of this paper.

2.5 Total 11 updates have been received from States/Administrations, namely Hong Kong China, Fiji, Lao PDR, Malaysia, New Zealand, Pakistan, Philippines, Republic of Korea, Singapore, Sir Lanka, and Thailand. The updated ATMAS Repository is provided in **Appendix B** to this paper for reference and update by the meeting.

Preliminary Analysis of the Current Status

2.6 Based on the ATM automation systems statuses collected, the preliminary analysis of the key performance indicators on the ATMAS Repository has also been summarized by the Secretariat as follows for meeting review.

2.6.1 Surveillance Data Processing Function (SDP)

Refer to Chapters 3.1.1 & 3.2.1 of ATMAS IGD, Surveillance Data Processing (SDP) Function is one core function of ATMAS, which should be able to integrate multiple radars and process the received data to generate a unique system track. Except for PSR and mode A/C radar data, the system is encouraged to be able to process the extended surveillance data, including Mode S radar data, ADS-B data, Wide Area Multilateration (WAM), and other surveillance data, which contain more target information, such as DAP parameters and accuracy, etc., to provide higher quality tracks and supplementary data.

As introduced in the Global Air Navigation Plan (GANP), the implementation of ASUR-B0/1 - Automatic Dependent Surveillance – Broadcast (ADS-B) can support the provision of Air Traffic Services and operational applications at reduced cost and increased surveillance coverage, while the implementation of ASUR-B0/2 - Multilateration cooperative surveillance systems (MLAT) can provide an alternative to radar surveillance by using available aircraft transponders, both of which

have also been regarded as Priority 1 in ICAO APAC Seamless ANS Plan V3.0. The SDP capability in APAC is presented in Figure 1.

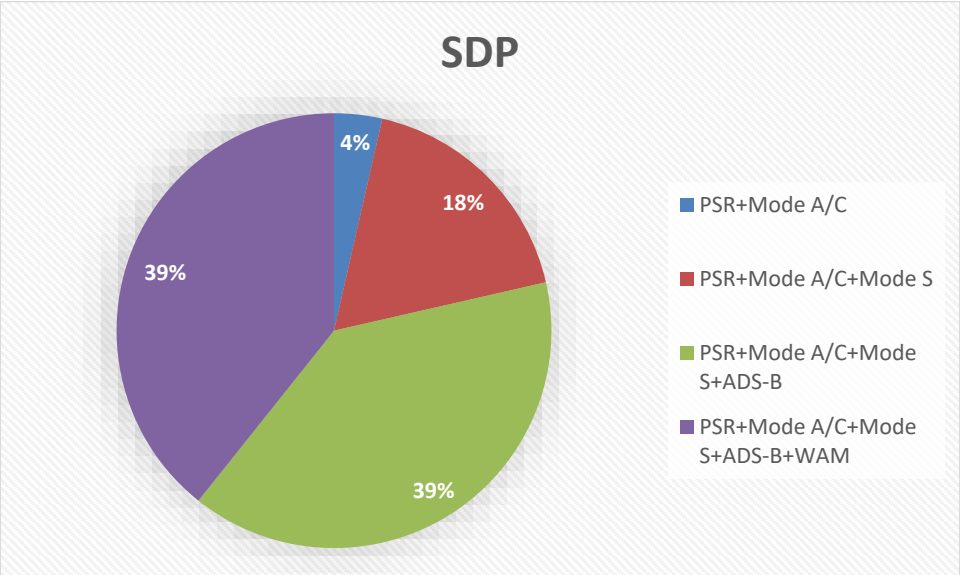

Figure 1 - Surveillance Data Processing Function (SDP)

It is noted that 96% of the ATM automation systems can process Mode S radar data, 78% of the systems are capable to process ADS-B data, which supports the implementation of ASUR-B0/1, 39 % of the systems can process the surveillance data from WAM to support ASUR-B0/2, while 4% of the systems can only process the surveillance data from PSR and mode A/C radar data.

2.6.2 Bypass Surveillance Data Processing (BSDP)

With reference to Chapter 3.1.3 of ATMAS IGD, to further enhance ATM automation systems resilience, Bypass Surveillance Data Processing (BSDP) could be implemented according to the operational need. BSDP is a redundancy module of SDP, which can independently receive, process and distribute surveillance data to SDP. When the SDPs fail, the system will switch to BSDP automatically. BSDP is recommended to be capable of directly accessing various surveillance sources, using a different tracking algorithm with SDP.

Based on the information provided by Member States/Administrations, 84% of the ATM automation systems are equipped with BSDP to enhance robustness and continuity, and avoid systems failures caused by the common software or algorithm of surveillance data processing.

2.6.3 Mode S conspicuity code Identification

The Sixth Meeting of the Air Traffic Management Sub-Group (ATM/SG/6) held from 30 July to 03 August 2018 adopted the **Conclusion ATM/SG/6-3**: Proposed Air Navigation Plan Volume II Amendment, which identified A1000 as the Mode S conspicuity code for the APAC Region. Furthermore, the Thirty-second Meeting of the Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG/32) held from 1 to 3 December 2021 adopted the **Conclusion APANPIRG/32/10** (CNS SG/25/09(SURICG/6/3 (DAPs WG/4/5))) - The APAC Regional Roadmap for Mode S Implementation, which also included the use of conspicuity code. Reserving Secondary Surveillance Radar (SSR) Mode A Code 1000 for use as the Conspicuity code for Mode S-equipped aircraft operating in airspace under Mode S surveillance has also been included in the Air Navigation Plan (ANP) Volume II and Asia/Pacific Seamless ANS Plan, where Aircraft

Identification (Flight ID) was used for unambiguous ATC identification of aircraft, and to enable coupling of the ATS surveillance system information with the flight plan.

According to Chapter 3.1.2.4 of ATMAS IGD, it is recommended that the system uses A1000 as Mode S conspicuity code. The flight plan with that code will use a 24-bit address or ACID to correlate with system tracks, and warnings/alerts should not be generated when SSR duplication occurs due to Mode S conspicuity code. While in Chapter 3.2.1 of ATMAS IGD, it also mentioned that the system should be able to process Mode S conspicuity code, which is a standard and non-discrete Mode 3/A code to tell the ATMAS that this is a Mode S equipped aircraft. ATMAS should make of the Mode S interrogated information, such as aircraft identification or ICAO 24-bit aircraft address, to identify the aircraft and correlate the flight plan.

However, with the information collected, only 63% of the ATM automation systems in APAC region have the capability to identify the Mode S conspicuity code and perform relevant processes.

2.6.4 Correlation of Surveillance and Flight Data

With reference to Chapters 3.1.4 & 3.2.2 of ATMAS IGD, the objective of the surveillance and flight plan correlation function is to establish an association between a surveillance track and a flight plan based on identifying codes and position checks. The system would be able to perform an automatic correlation between the flight plan and the system track based on the SSR code, aircraft 24-bit address, or Aircraft Identification (ACID) provided by the aircraft downlink parameters. The status of Correlation of Surveillance and Flight Data is presented in Figure 2.

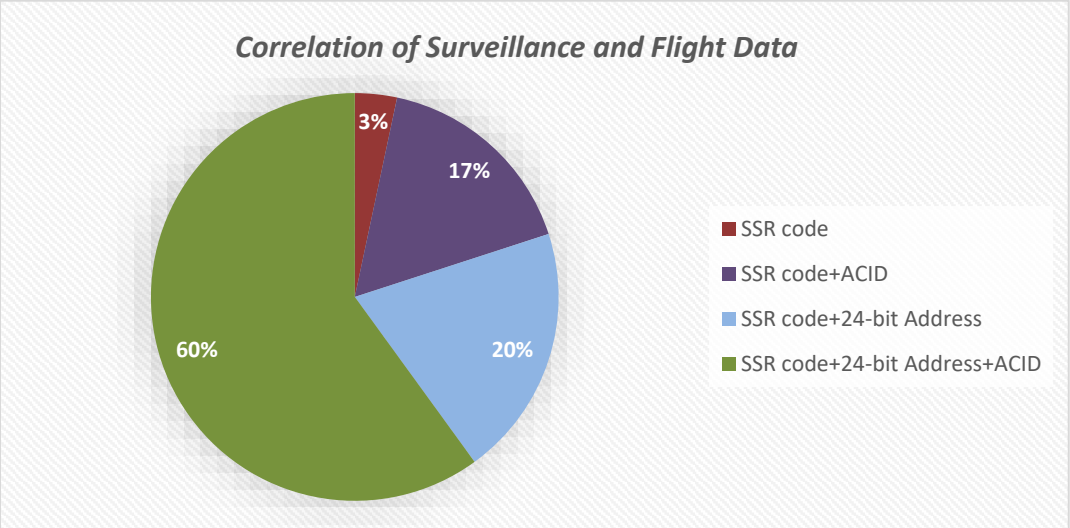

Figure 2 – Correlation of Surveillance and Flight Data

As per the data received about correlation, 60% of systems will consider the SSR code, ACID, and aircraft 24-bit address at the same time while doing correlation, 80% of systems have the capability to perform an automatic correlation between the flight plan and the system track based on the SSR code, and aircraft 24-bit address, 23% of systems will not consider ACID, 17% of the systems are only able to correlate between SSR code and ACID.

2.6.5 Safety Net Function

Safety Net Function serves to alert controllers of a potential, imminent or actual infringement of safety margins to prevent hazardous situations from developing into major incidents or even accidents. The Safety Net (Essential alerts or warnings) includes Emergency, SNET-B0/1 - Short Term Conflict Alert (STCA), SNET-B0/2 - Minimum Safe Altitude Warning (MSAW), SNET-B0/3 - Area Proximity Warning (APW), SNET-B0/4 - Approach Path Monitoring (APM), which are also regarded as Priority 1 elements in ICAO APAC Seamless ANS Plan V3.0. Additionally, Route Adherence Monitoring (RAM) should be utilised when monitoring PBN route separations, and Cleared Level Adherence Monitoring (CLAM) should be utilised to monitor RVSM airspace.

The ATMAS Repository shows that almost all systems are capable to provide timely alerts to air traffic controllers of potential risks to flight safety, and improving situational awareness. However, the few systems which can not perform relevant functions are kindly reminded to consider whether an upgradation is necessary.

2.6.6 Short Term Conflict Alert (STCA)

In Chapter 3.1.5.3 of ATMAS IGD, Short Term Conflict Alert (STCA) is an important safety net feature of ATMAS as a collision avoidance tool, or to provide a separation alert for a potential or actual infringement of separation minima between aircraft. The STCA function in ATMAS generates visual and/or aural alerts to controllers in air situation display if any aircraft is predicted to or is violating a pre-defined conflict or separation minimum in the STCA settings of the ATMAS.

In addition, the implementation of SNET-B0/1 - Short Term Conflict Alert (STCA) requires using position data from ground surveillance to assist the air traffic controller in preventing collision between aircraft, SNET-B1/1 - Enhanced STCA with aircraft parameters, using aircraft intent parameters reported from ADS-B or downlinked from Mode S transponders, allows STCA systems to reduce the number of unnecessary alerts, and SNET-B1/2 - Enhanced STCA in complex TMAs takes into account traffic patterns and ATC practices by using level-off prediction test and turn prediction test. The ICAO APAC Seamless ANS Plan V3.0 states that ATS surveillance systems should enable Enhanced STCA with aircraft parameters and in complex TMAs consistent with SNET-B1/1 – 2. The STCA capability of different ATM automation systems is presented in Figure 3.

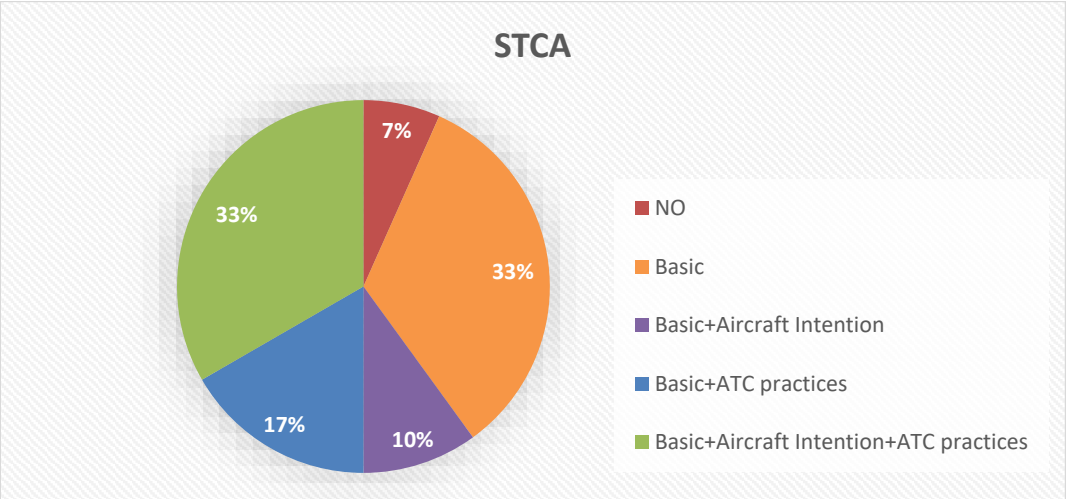

Figure 3 – Short Term Conflict Alert (STCA)

Except the 7% of the systems which do not have STCA functions, 33% of the systems have already supported SNET-B0/1 & SNET-B1/1-2, while the other 33% of the systems can only support the basic STCA - SNET-B0/1.

2.6.7 Recording and Playback Function

In Chapter 3.1.11 of ATMAS IGD, the Recording and Playback function enables the recording of operational data of ATMAS. It allows synchronized playback of the air traffic situation, controller-pilot communication, and controller actions in the air situation display for incident analysis and investigation. Furthermore, it also mentioned in Chapter 3.2.8 that considering the convenience to user, the system is recommended to extend the capability to integrally record the screenshots of the HMI by way of frames and replay the recording onto designated positions and mobile devices in the form of video.

The ATMAS Repository indicates that 77% of the systems are capable to provide Recording and Playback functionality in both basic and enhanced modes, and only 23% can only support basic mode.

2.6.8 GNSS Time Synchronization

In Chapter 3.1.13 of ATMAS IGD, the system is suggested to be able to access an accurate time source, synchronize external GNSS signals, and calibrate internal system time based on the NTP (Network Time Protocol), so that the system time is consistent with the UTC. The system is capable of receiving multiple external clock sources and switching among them automatically or manually. Unified time within the system is recommended to be shown on the HMI and provided for surveillance data processing, flight data processing, monitoring and controlling, recording and playback, etc.

It is noted that all the systems have been synchronized with the accurate time source.

2.6.9 Downlink Aircraft Parameters Processing and Display

According to Chapter 3.2.4 of ATMAS IGD, It is recommended that the system have the capability to process and display aircraft downlink aircraft parameters (DAPs) from Mode S radars, ADS-B and/or WAM in Track Fusion, Related Warnings, or Downlink Data Window to help controllers have a more integrated view of the aircraft's flight status in the air.

Additionally, according to GANP ASBU, the main purpose of ASUR-B0/3 - Cooperative Surveillance Radar Downlink of Aircraft Parameters (SSR-DAPS) is to obtain additional information from an aircraft transponder in support of the provision of Air Traffic Services. SSR-DAPS enables ATM systems to obtain additional information from an aircraft transponder, via interrogation by a cooperative surveillance system (Mode S radar or MLAT). This additional information can be used to increase controller awareness and reduce the volume of air-ground voice communications, and/or to improve the performance of tracking systems or safety net systems such as STCA and MSAW. Mode S cooperative surveillance system with DAPS capability interrogates aircraft transponders to retrieve data; this information is then provided to the ATC automation system.

Downlink of Aircraft Parameters (DAPS) includes both Controller Access Parameters (CAPs) and System Access Parameters (SAPs). Possible CAPs include Magnetic Heading, Indicated Airspeed / Mach Number, Barometric rate of climb/descent, and Selected Altitude (which can also be considered a SAP). SAPs include Roll Angle, Track Angle Rate, True Track Angle, and Barometric

Pressure Setting. HMI that supports controller awareness for CAPs and automation processing for SAPs.

Relevant requirements regarding the use of Mode S Downlinked Aircraft Parameters (DAPS) are also introduced in the ICAO APAC Seamless ANS Plan V3.0 as Priority 1 element. ATM automation system specifications should include the processing and presentation in ATC human-machine interfaces and decision support and alerting tools, the communications, navigation and approach aid indicators received in items 10 and 18 of FPL and ATS messages, where applicable, and the following Mode S or ADS-B downlinked aircraft parameters as a minimum, such as Aircraft Identification, Aircraft magnetic heading, Aircraft indicated airspeed or Mach Number; and Pilot selected altitude. The DAPs capability is presented in Figure 4.

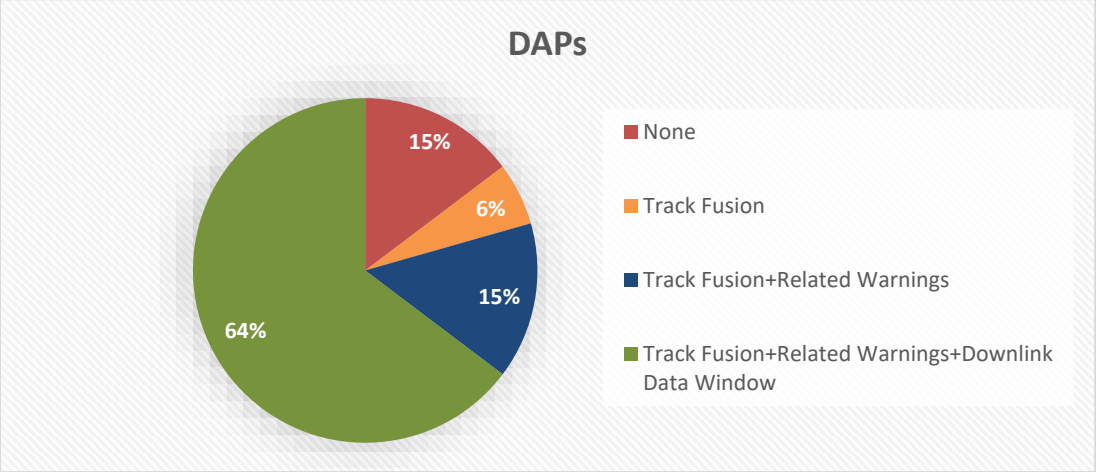

Figure 4 - Downlink Aircraft Parameters Processing and Display

The ATMAS Repository shows that only 15% of the systems still can not process the DAPs data, while 64% of the systems are capable to handle and display the DAPs information in Track Fusion, Related Warnings, and Downlink Data Window.

2.6.10 Operational Data Synchronization

In Chapter 3.2.10 of ATMAS IGD, in order to provide continuous ATM service in case of the ATMAS suffers from technical problems, system failures, or other critical anomalies, some ATM centers are configured with two types of ATM automation systems, which work in main and backup mode.

The Operational Data Synchronization Function serves for both master and backup ATM automation systems deployed in the same ATM center. This function enables the system to synchronize operational data (flight data and/or operational setting data.) to the backup system when in master mode. This function also synchronizes the system when in backup mode with operational data from other master systems.

In view of the continuous operation in case of system failures, the functionality of Operational Data Synchronization may need to be considered. It shows that there are still 32% of the systems cannot output operational data for synchronization, 7% of the systems can only provide flight data for synchronization, while the other 61% of the systems are capable to provide flight data and operational setting data at the same time.

Summary

The ATM automation system is a bridge which connects the new technologies with the controllers and it is expected that at some point most ATM tasks will be done by automated systems with controller interventions being an exception. Full automation of en-route ATM can be achieved with a combination of automated planning in a look-ahead time horizon of up to several hours complemented with automated tactic conflict resolution functions to improve overall system capacity and safety. As such, the ATM automation systems may need to be upgraded continuously to follow the guidance and requirements listed in the GANP ASBU and ICAO APAC Seamless ANS Plan to keep abreast of the latest developments, provide integrated information to air traffic controllers, and enhance the safety, harmonized, and continuous ATM operation. Member States/Administrations are encouraged to update the ATM automation systems information to ICAO Secretariat to further refine the ATMAS Repository.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper;

b) review and update the information contained in the ATMAS Repository in **Appendix B**;

c) note the outcomes of the preliminary analysis of the current ATMAS Repository; and

d) discuss any relevant matter as appropriate.

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Ref.: T 8/12.18: AP139/22 (CNS) 21 October 2022

Subject: Publication of ATM Automation System Implementation and Operations Guidance Document (ATMAS IGD Edition 1.0) and Establish the Air Traffic Management Automation System (ATMAS) Repository for APAC Region

Action Required:

a) To note the availability of ATMAS IGD Edition 1.0; and
b) To complete and return the table of ATMAS Status in APAC Region to ICAO APAC Regional Office by **28 February 2023**.

Sir/Madam,

I wish to inform you that the Twenty Sixth Meeting of the Communications, Navigation and Surveillance Sub-group (CNS SG/26) held from *5-9 September 2022* adopted ATMAS Implementation and Operations Guidance Document (ATMAS IGD) Edition 1.0 as regional guidance material through **Conclusion CNS SG/26/13**, which is provided in **Attachment A** for your reference and also available on the ICAO APAC website at https://www.icao.int/APAC/Pages/eDocs.aspx under CNS section.

As one of the key deliverables of ATM Automation System Task Force (ATMAS TF) according to its Terms of Reference, the ATMAS IGD provides guidance for the planning, design, testing, and implementation of ATM automation systems in the APAC region, with the view of facilitating the provision of robust, safe, efficient, and orderly ATM services by the use of existing and/or new procedures, facilities and technologies, realizing ATM automation systems interoperability, and ensuring continuous and coherent development of the ATM automation systems.

The ATMAS TF designed and agreed on the table of ATMAS status in APAC region in its third meeting to establish a repository of the ATM automation systems implemented by States/Administrations. The table is provided in **Attachment B**, which can be easily filled in by selecting the choices from the drop-down list, States/Administrations may refer to the explanation page of the table and the corresponding chapters of ATMAS IGD for further information, and the filled data will support statistics and analysis in the future. I would be grateful if you could complete the table and return it to ICAO APAC Regional Office at apac@icao.int with cc to yluo@icao.int and wzhong@icao.int by **28 February 2023**.

Yours sincerely,

Tao Ma
Regional Director

Enclosures:
Attachment A - ATMAS Implementation and Operations Guidance Document Edition 1.0
Attachment B - Table of ATMAS Status in APAC Region

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Explanation of the Table of ATMAS Status in APAC Region

Note: If the ATM Automation System has the capability on certain function listed below but not implement yet, please marked in red ; if the ATM Automation System has already implemented certain function listed below, please keep it in black.

Column	Element	Explanation	Reference Chapter in ATMAS IGD	Relevant ASBU Block
1.	State/Administration	Name of the State/Administration		
2.	FIR	Name of the Flight Information Region (FIR)		
3.	ATS Unit / Location	Location of the ATM Automation System		
4.	Number of ATS positions	Number of ATS positions in this ATM Automation System (to evaluate the system workload)		
5.	Manufacturer / Brand / Version	Manufacturer / Brand / Version of the system		
6.	System Status	the system is used as Main, Backup, or Emergency		
7.	Surveillance Data Processing Function (SDP)	Surveillance data can be processed by the system, including PSR, Mode A/C, Mode S, ADS-B, WAM, or others	Chapter 3.1.1 & 3.2.1	ASUR B0/1, ASUR B0/2
8.	Bypass Surveillance Data Processing（BSDP）	BSDP is a redundancy module of SDP, which can independently receive, process and distribute surveillance data independently to SDP. When the SDPs fail, the system will switch to BSDP automatically. When the system switches to bypass mode, the HMI should clearly indicate if controller is working in BSDP mode.	Chapter 3.1.3	
9.	Flight Data Communication Network	Type of Flight Data Communication Network used by the system (AFTN, AMHS, or both)		COMI B0/7
10.	Flight Data Processing Function (FDP)	The system can support flight data processing, including Flight Message Processing, Life Cycle Management, 4D Profile Trajectory Caculation, SSR Code Management, Sector Management and Posting Computation	Chapter 3.1.2	
11.	Flight Strip	The system can support print Paper Flight Progress Strip, display Electronic Flight Strip, or both		
12.	Mode S conspicuity code Identification	The flight plan with A1000 will use a 24-bit address or ACID to correlate with system tracks, and warnings/alerts should not be generated when SSR duplication occurs due to Mode S conspicuity code.	Chapter 3.1.2.4	
13.	Correlation of surveillance and flight data	The system can perform an automatic correlation between the flight plan and the system track based on the SSR code, aircraft 24-bit address, or Aircraft Identification (ACID)	Chapter 3.1.4 & 3.2.2	ASUR-B0/3
	Safety Net Function	Essential alerts or warnings can be generated automatically		
14.	Emergency code warning (7500,7600,7700)	Once the emergency codes were received, the system is suggested to process it and display the Emergency on the concerned positions.	Chapter 3.1.5.2	
15.	Short Term Conflict Alert (STCA)	The system will provide a separation alert for a potential or actual infringement of separation minima between aircraft as basic STCA, using aircraft intent parameters (Selected Flight Level), considering ATC practices (level-off prediction test and turn prediction test).	Chapter 3.1.5.3	SNET-B0/1 & SNET-B1/1 & SNET-B1/2
16.	Minimum Safe Altitude Warning (MSAW)	The system will assist controllers with alerts of the potential risk of an aircraft infringing a defined minimum safe altitude over a concerned region.	Chapter 3.1.5.4	SNET-B0/2
17.	Area Proximity Warning (APW)	The system will alert controllers of any potential or actual unauthorized penetration of aircraft into Special Use Airspaces (SUA).	Chapter 3.1.5.5	SNET-B0/3
18.	Approach Path Monitoring (APM) Warning	The system will monitor the aircraft’s vertical and lateral deviation from the final approach profile in ATMAS, and generate visual and/or aural alerts when an aircraft exceeds or is predicted to exceed the defined tolerance of deviation.	Chapter 3.1.5.6	SNET-B0/4
19.	Route Adherence Monitoring (RAM)	The system will monitor if an aircraft (i.e., surveillance track) is following the planned route, as stated in the associate flight plan.	Chapter 3.2.3.4	FRTO B0/4
20.	Cleared Level Adherence Monitoring (CLAM)	The system will monitor the conformance of the Actual Flight Level (AFL) of an aircraft to the Cleared Flight Level (CFL) issued by the air traffic controller and provide warnings if the deviation between the two levels (i.e. Level Bust) was found after the aircraft has been level-off.	Chapter 3.2.3.5	FRTO B0/4
21.	Meteorological Information Processing	The system is capable of receiving, processing, and displaying meteorological information, including GRIB, QNH, and weather data derived from mono-radar, or other	Chapter 3.1.6	AMET
22.	Air Ground Data Link Function (AGDL)	The AGDL function mainly processes the information based on the data link communication, including ADS-C (Automatic Dependent Surveillance-Contract), CPDLC (Controller-Pilot Data Link Communication), and DCL (Departure Clearance).	Chapter 3.1.7	COMS

23.	System Parameter Management Function	The system is capable of managing the variable system parameters through a user/ops orientated adaptation interface used by trained adaptors.	Chapter 3.1.8	
24.	ATS Inter-facility Data Communication Function (AIDC)	The system can support ATS-related information exchanges within the ATMAS of adjacent Control Units and Flight Information Regions adopted in the Asia-Pacific region, including Handover and Coordination	Chapter 3.1.9	FICE B0/1
25.	Human Machine Interface Function (HMI)	Operational users can monitor air traffic situations and modify flight plans and other relevant information through physical peripherals and/or onscreen control interfaces.	Chapter 3.1.10	
26.	Recording and Playback Function	The system has the basic, enhancement, none, or both recording and playback function.	Chapter 3.1.11 & 3.2.8	
27.	System Monitoring and Control Function	The system can provide the monitoring and controlling function, and the failure of the monitoring and controlling function should not affect the operation of other modules.	Chapter 3.1.12	
28.	GNSS Time Synchronization	The system can synchronize with the external GNSS signals or not	Chapter 3.1.13	
	Extended Alerts and Warning			
29.	Departure No Transgression Zone (DTZ)	The DTZ function informs the controller if a track is predicted to infringe a Departure No Transgression Zone area within a predefined time interval, or has already infringed a Departure No Transgression Zone area. The DTZ function also may suppress improper STCA generate between two normal flights in DMA (Departure Monitoring Area).	Chapter 3.2.3.1	
30.	No Transgression Zone (NTZ)	The system will warn controllers of a predicted or actual unauthorized penetration of NTZ by aircraft during final approach.	Chapter 3.2.3.2	
31.	Medium Term Conflict Detection Warning (MTCD)	The system will provide warnings to controllers for potential conflict for “aircraft-to aircraft” or “aircraft-to-airspace” encounters up to a looking ahead time.	Chapter 3.2.3.3	FRTO B0/4
32.	Similar Callsign Advisory (SCA)	The system will provide advisory to alert controllers when an aircraft carries a similar callsign with another one in the same jurisdiction controlled by a controller.	Chapter 3.2.3.6	
33.	Reduce Vertical Separation Minimum (RVSM) Warning	The system will provide alerts to controllers when a non-RVSM approved/compliant aircraft is within or is predicted to enter RVSM airspace.	Chapter 3.2.3.7	
34.	Position Report Monitoring (PMON)	The system will monitor ATO/ETO and provide warnings to controllers accordingly.	Chapter 3.2.3.8	
35.	Last Known Position Display	Last Known Position Display occurs when correlated tracks, uncorrelated, or ADS-C tracks with critical alerts are lost.	Chapter 3.2.3.9	
36.	SSR Inconsistency Warning	For correlated flight plan tracks, when the Mode 3/A code in the surveillance data is inconsistent with the SSR code in the flight plan, the system is suggested to raise ASSR Inconsistency Warning.	Chapter 3.2.3.10	
37	PBN Capability Indication	The system will provide PBN indicator and/or PBN route mismatch indication for controllers in order to indicate whether the aircraft match the RNAV/RNP Route or Arrival.	Chapter 3.2.3.11	APTA
38	Downlink Aircraft Parameters Processing and Display	The system have the capability to process and display aircraft downlink aircraft parameters (DAPs) in Track Fusion, Related Warnings, or Downlink Data Window	Chapter 3.2.4	ASUR-B0/3
39	Integrated Technology	the system has integrated some new technologies, including Arrival Manager (AMAN), Departure Manager (DMAN), or Enhanced Wake Turbulence Separation and Pairwise Separation Tools, or None	Chapter 3.2.5 & 3.2.6 & 3.2.9	RSEQ, WAKE
40	System Log Management	The system is able to collect and manage operational logs and error messages.	Chapter 3.2.7	
41	Interoperability	The system supports exchange messages with other external systems, including Integrated Tower System, A-SMGCS, Tower Electronic Strip System, Others, or None, to implement information sharing		SURF, SWIM
42	Operational Data Synchronization	The system can synchronize operational data to the backup system when in master mode, including flight data, operational setting data.	Chapter 3.2.10	
43	Statistics and Analysis Function	The system can generate reports on the surveillance data, flight plan, alarm information and traffic flow data.	Chapter 3.2.11	
44	Remarks	Any other need to be mentioned		

ATM Automation System Repository in APAC Region

													Safety Net Function															Extended Alerts and Warning																
State/Administration	FIR	ATS Unit / Location	Number of ATS positions	Manufacturer / Brand / Version	System Status	Surveillance Data Processing Function (SDP)	Bypass Surveillance Data Processing (BSDP)	Flight Data Communication Network	Flight Data Processing Function (FDP)	Flight Strip	Mode S conspicuity code Identification	Correlation of surveillance and flight data	Emergency code warning (7500,7600,7700)	Short Term Conflict Alert (STCA)	Minimum Safe Altitude Warning (MSAW)	Area Proximity Warning (APW)	Approach Path Monitoring (APM) Warning	Route Adherence Monitoring (RAM)	Cleared Level Adherence Monitoring (CLAM)	Meteorological Information Processing	Air Ground Data Link Function (AGDL)	System Parameter Management Function	ATS Inter-facility Data Communication Function (AIDC)	Human Machine Interface Function (HMI)	Recording and Playback Function	System Monitoring and Control Function	GNSS Time Synchronization	Departure No TRANSGRESSION Zone (DTZ)	No Transgression Zone (NTZ)	Medium Term Conflict Detection Warning (MTCD)	Similar Callsign Advisory (SCA)	Reduce Vertical Separation Minimum (RVSM) Warning	Position Report Monitoring (PMON) Warning	Last Known Position Display	SSR Inconsistency Warning	PBN Capability Indication	Downlink Aircraft Parameters Processing and Display	Integrated Technology	System Log Management	Interoperability	Operational Data Synchronization Function	Statistics and Analysis Function	Remarks
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44
State 1	FIR 1	ACC1/City1	40	INDRA Aircon 2100	Main	PSR+Mode A/C+Mode S+ADS-B+WAM	Yes	AFTN+AMHS	Flight Message Processing+ Life Cycle Management+ 4D Profile Trajectory+ SSR Code Management+Sec Manage&Posting Comput	Paper+ Electronic	Yes	SSR code+24-bit Address+ACID	Yes	Basic+Aircraft Intention+ATC practices	Yes	Yes	Yes	Yes	Yes	QNH+mono-radar+GRIB	ADS-C+CPDLC+DLC	Online+Offline	Basic	Yes	Basic+ Enhancement	Monitor +Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Track Fusion+Related Warnings+Downlink Data Window	AMAN+DMAN+PST	Yes	Integated Tower System+A-SMGCS+ Tower Electronic Strip System	flight data+ operational setting data	Yes	

Explanation of the Table of ATMAS Status in APAC Region

Note: If the ATM Automation System has the capability on certain function listed below but not implement yet, please marked in red ; if the ATM Automation System has already implemented certain function listed below, please keep it in black.

Column	Element	Explanation	Reference Chapter in ATMAS IGD	Relevant ASBU Block
1.	State/Administration	Name of the State/Administration		
2.	FIR	Name of the Flight Information Region (FIR)		
3.	ATS Unit / Location	Location of the ATM Automation System		
4.	Number of ATS positions	Number of ATS positions in this ATM Automation System (to evaluate the system workload)		
5.	Manufacturer / Brand / Version	Manufacturer / Brand / Version of the system		
6.	System Status	the system is used as Main, Backup, or Emergency		
7.	Surveillance Data Processing Function (SDP)	Surveillance data can be processed by the system, including PSR, Mode A/C, Mode S, ADS-B, WAM, or others	Chapter 3.1.1 & 3.2.1	ASUR B0/1, ASUR B0/2
8.	Bypass Surveillance Data Processing（BSDP）	BSDP is a redundancy module of SDP, which can independently receive, process and distribute surveillance data independently to SDP. When the SDPs fail, the system will switch to BSDP automatically. When the system switches to bypass mode, the HMI should clearly indicate if controller is working in BSDP mode.	Chapter 3.1.3	
9.	Flight Data Communication Network	Type of Flight Data Communication Network used by the system (AFTN, AMHS, or both)		COMI B0/7
10.	Flight Data Processing Function (FDP)	The system can support flight data processing, including Flight Message Processing, Life Cycle Management, 4D Profile Trajectory Caculation, SSR Code Management, Sector Management and Posting Computation	Chapter 3.1.2	
11.	Flight Strip	The system can support print Paper Flight Progress Strip, display Electronic Flight Strip, or both		
12.	Mode S conspicuity code Identification	The flight plan with A1000 will use a 24-bit address or ACID to correlate with system tracks, and warnings/alerts should not be generated when SSR duplication occurs due to Mode S conspicuity code.	Chapter 3.1.2.4	
13.	Correlation of surveillance and flight data	The system can perform an automatic correlation between the flight plan and the system track based on the SSR code, aircraft 24-bit address, or Aircraft Identification (ACID)	Chapter 3.1.4 & 3.2.2	ASUR-B0/3
	Safety Net Function	Essential alerts or warnings can be generated automatically		
14.	Emergency code warning (7500,7600,7700)	Once the emergency codes were received, the system is suggested to process it and display the Emergency on the concerned positions.	Chapter 3.1.5.2	
15.	Short Term Conflict Alert (STCA)	The system will provide a separation alert for a potential or actual infringement of separation minima between aircraft as basic STCA, using aircraft intent parameters (Selected Flight Level), considering ATC practices (level-off prediction test and turn prediction test).	Chapter 3.1.5.3	SNET-B0/1 & SNET-B1/1 & SNET-B1/2
16.	Minimum Safe Altitude Warning (MSAW)	The system will assist controllers with alerts of the potential risk of an aircraft infringing a defined minimum safe altitude over a concerned region.	Chapter 3.1.5.4	SNET-B0/2
17.	Area Proximity Warning (APW)	The system will alert controllers of any potential or actual unauthorized penetration of aircraft into Special Use Airspaces (SUA).	Chapter 3.1.5.5	SNET-B0/3
18.	Approach Path Monitoring (APM) Warning	The system will monitor the aircraft’s vertical and lateral deviation from the final approach profile in ATMAS, and generate visual and/or aural alerts when an aircraft exceeds or is predicted to exceed the defined tolerance of deviation.	Chapter 3.1.5.6	SNET-B0/4
19.	Route Adherence Monitoring (RAM)	The system will monitor if an aircraft (i.e., surveillance track) is following the planned route, as stated in the associate flight plan.	Chapter 3.2.3.4	FRTO B0/4
20.	Cleared Level Adherence Monitoring (CLAM)	The system will monitor the conformance of the Actual Flight Level (AFL) of an aircraft to the Cleared Flight Level (CFL) issued by the air traffic controller and provide warnings if the deviation between the two levels (i.e. Level Bust) was found after the aircraft has been level-off.	Chapter 3.2.3.5	FRTO B0/4
21.	Meteorological Information Processing	The system is capable of receiving, processing, and displaying meteorological information, including GRIB, QNH, and weather data derived from mono-radar, or other	Chapter 3.1.6	AMET
22.	Air Ground Data Link Function (AGDL)	The AGDL function mainly processes the information based on the data link communication, including ADS-C (Automatic Dependent Surveillance-Contract), CPDLC (Controller-Pilot Data Link Communication), and DCL (Departure Clearance).	Chapter 3.1.7	COMS

23.	System Parameter Management Function	The system is capable of managing the variable system parameters through a user/ops orientated adaptation interface used by trained adaptors.	Chapter 3.1.8	
24.	ATS Inter-facility Data Communication Function (AIDC)	The system can support ATS-related information exchanges within the ATMAS of adjacent Control Units and Flight Information Regions adopted in the Asia-Pacific region, including Handover and Coordination	Chapter 3.1.9	FICE B0/1
25.	Human Machine Interface Function (HMI)	Operational users can monitor air traffic situations and modify flight plans and other relevant information through physical peripherals and/or onscreen control interfaces.	Chapter 3.1.10	
26.	Recording and Playback Function	The system has the basic, enhancement, none, or both recording and playback function.	Chapter 3.1.11 & 3.2.8	
27.	System Monitoring and Control Function	The system can provide the monitoring and controlling function, and the failure of the monitoring and controlling function should not affect the operation of other modules.	Chapter 3.1.12	
28.	GNSS Time Synchronization	The system can synchronize with the external GNSS signals or not	Chapter 3.1.13	
	Extended Alerts and Warning			
29.	Departure No Transgression Zone (DTZ)	The DTZ function informs the controller if a track is predicted to infringe a Departure No Transgression Zone area within a predefined time interval, or has already infringed a Departure No Transgression Zone area. The DTZ function also may suppress improper STCA generate between two normal flights in DMA (Departure Monitoring Area).	Chapter 3.2.3.1	
30.	No Transgression Zone (NTZ)	The system will warn controllers of a predicted or actual unauthorized penetration of NTZ by aircraft during final approach.	Chapter 3.2.3.2	
31.	Medium Term Conflict Detection Warning (MTCD)	The system will provide warnings to controllers for potential conflict for “aircraft-to aircraft” or “aircraft-to-airspace” encounters up to a looking ahead time.	Chapter 3.2.3.3	FRTO B0/4
32.	Similar Callsign Advisory (SCA)	The system will provide advisory to alert controllers when an aircraft carries a similar callsign with another one in the same jurisdiction controlled by a controller.	Chapter 3.2.3.6	
33.	Reduce Vertical Separation Minimum (RVSM) Warning	The system will provide alerts to controllers when a non-RVSM approved/compliant aircraft is within or is predicted to enter RVSM airspace.	Chapter 3.2.3.7	
34.	Position Report Monitoring (PMON)	The system will monitor ATO/ETO and provide warnings to controllers accordingly.	Chapter 3.2.3.8	
35.	Last Known Position Display	Last Known Position Display occurs when correlated tracks, uncorrelated, or ADS-C tracks with critical alerts are lost.	Chapter 3.2.3.9	
36.	SSR Inconsistency Warning	For correlated flight plan tracks, when the Mode 3/A code in the surveillance data is inconsistent with the SSR code in the flight plan, the system is suggested to raise ASSR Inconsistency Warning.	Chapter 3.2.3.10	
37	PBN Capability Indication	The system will provide PBN indicator and/or PBN route mismatch indication for controllers in order to indicate whether the aircraft match the RNAV/RNP Route or Arrival.	Chapter 3.2.3.11	APTA
38	Downlink Aircraft Parameters Processing and Display	The system have the capability to process and display aircraft downlink aircraft parameters (DAPs) in Track Fusion, Related Warnings, or Downlink Data Window	Chapter 3.2.4	ASUR-B0/3
39	Integrated Technology	the system has integrated some new technologies, including Arrival Manager (AMAN), Departure Manager (DMAN), or Enhanced Wake Turbulence Separation and Pairwise Separation Tools, or None	Chapter 3.2.5 & 3.2.6 & 3.2.9	RSEQ, WAKE
40	System Log Management	The system is able to collect and manage operational logs and error messages.	Chapter 3.2.7	
41	Interoperability	The system supports exchange messages with other external systems, including Integrated Tower System, A-SMGCS, Tower Electronic Strip System, Others, or None, to implement information sharing		SURF, SWIM
42	Operational Data Synchronization	The system can synchronize operational data to the backup system when in master mode, including flight data, operational setting data.	Chapter 3.2.10	
43	Statistics and Analysis Function	The system can generate reports on the surveillance data, flight plan, alarm information and traffic flow data.	Chapter 3.2.11	
44	Remarks	Any other need to be mentioned		

ATM Automation System Repository in APAC Region

State/Administration	FIR	ATS Unit / Location	Number of ATS positions	Manufacturer / Brand / Version	System Status	Surveillance Data Processing Function (SDP)	Bypass Surveillance Data Processing (BSDP)	Flight Data Communication Network	Flight Data Processing Function (FDP)	Flight Strip	Mode S conspicuity code Identification	Correlation of surveillance and flight data	Safety Net Function: Emergency code warning (7500,7600,7700)	Safety Net Function: Short Term Conflict Alert (STCA)	Safety Net Function: Minimum Safe Altitude Warning (MSAW)	Safety Net Function: Area Proximity Warning (APW)	Safety Net Function: Approach Path Monitoring (APM) Warning	Safety Net Function: Route Adherence Monitoring (RAM)	Safety Net Function: Cleared Level Adherence Monitoring (CLAM)	Meteorological Information Processing	Air Ground Data Link Function (AGDL)	System Parameter Management Function	ATS Inter-facility Data Communication Function (AIDC)	Human Machine Interface Function (HMI)	Recording and Playback Function	System Monitoring and Control Function	GNSS Time Synchronization	Extended Alerts and Warning: Departure No TRANSGRESSION Zone (DTZ)	Extended Alerts and Warning: No Transgression Zone (NTZ)	Extended Alerts and Warning: Medium Term Conflict Detection Warning (MTCD)	Extended Alerts and Warning: Similar Callsign Advisory (SCA)	Extended Alerts and Warning: Reduce Vertical Separation Minimum (RVSM) Warning	Extended Alerts and Warning: Position Report Monitoring (PMON) Warning	Extended Alerts and Warning: Last Known Position Display	Extended Alerts and Warning: SSR Inconsistency Warning	Extended Alerts and Warning: PBN Capability Indication	Downlink Aircraft Parameters Processing and Display	Integrated Technology	System Log Management	Interoperability	Operational Data Synchronization Function	Statistics and Analysis Function	Remarks
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44
AFGHANISTAN																																										
AUSTRALIA																																										
BANGLADESH																																										
BHUTAN																																										
BRUNEI DARUSSALAM																																										
CAMBODIA																																										
CHINA																																										
HONG KONG, CHINA	Hong Kong FIR	Hong Kong	113	Raytheon	Main+ Backup + Ultimate backup	PSR+Mode A/C+Mode S+ADS-B+WAM	Yes	AFTN+AMHS	Flight Message Processing+ Life Cycle Management+ 4D Profile Trajectory+ SSR Code Management+Sec Manage&Posting Comput	Electronic	Yes	SSR code+24-bit Address+ACID	Yes	Basic+ATC practices	Yes	Yes	Yes	Yes	Yes	QNH+mono-radar	ADS-C+CPDLC+DCL	Online+Offline	Basic+Handover+Coordination	Yes	Basic+ Enhancement	Monitor +Control	Yes	No	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Track Fusion+Related Warnings+Downlink Data Window	AMAN	Yes	Tower Electronic Strip System	flight data	Yes	
MACAO, CHINA																																										
COOK ISLANDS																																										
DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA																																										
FIJI	NFFF	ACC/NADI	8	ADACEL Aurora Alpha	Main	PSR+Mode A/C+Mode S+ADS-B	Yes	AFTN+AMHS	Flight Message Processing+ Life Cycle Management+ 4D Profile Trajectory+ SSR Code Management+Sec Manage&Posting Comput	Paper+ Electronic	Yes	SSR code+24-bit Address+ACID	Yes	Basic+Aircraft Intention+ATC practices	Yes	Yes	No	Yes	Yes	QNH+mono-radar+GRIB	ADS-C+CPDLC	Online+Offline	Basic+Handover+Coordination	Yes	Basic+ Enhancement	Monitor +Control	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Track Fusion+Related Warnings+Downlink Data Window	None	Yes	Tower Electronic Strip System	flight data+ operational setting data	No	
FRENCH POLYNESIA NEW CALEDONIA																																										
INDIA																																										
INDONESIA																																										
JAPAN																																										
KIRIBATI																																										
LAO PEOPLE'S DEMOCRATIC REPUBLIC	Vientiane FIR	Vientiane ACC	25	Thales Topsky (EUROCAT-C)	Main	PSR+Mode A/C+Mode S+ADS-B	No	AFTN+AMHS	SSR Code Management	Paper	Yes	SSR code+24-bit Address	Yes	Basic	Yes	Yes	Yes	Yes	Yes	QNH+mono-radar+GRIB	ADS-C+CPDLC	Offline	Basic+Handover+Coordination	Yes	Basic+ Enhancement	Monitor +Control	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Track Fusion+Related Warnings	None	Yes	Integated Tower System	flight data+ operational setting data	Yes	
	Vientiane FIR	Vientiane ACC	25	Thales Topsky (EUROCAT-C)	Backup	PSR+Mode A/C+Mode S+ADS-B	No	AFTN+AMHS	SSR Code Management	Paper	Yes	SSR code+24-bit Address	Yes	Basic	Yes	Yes	Yes	Yes	Yes	QNH+mono-radar+GRIB	ADS-C+CPDLC	Offline	Basic+Handover+Coordination	Yes	Basic+ Enhancement	Monitor +Control	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Track Fusion+Related Warnings	None	Yes	Integated Tower System	flight data+ operational setting data	Yes	
MALAYSIA	KLFIR	KL ACC/Kuala Lumpur	50	Leonardo SpA	Main	PSR+Mode A/C+Mode S+ADS-B+WAM	Yes	AFTN+AMHS	Flight Message Processing+ Life Cycle Management+ 4D Profile Trajectory+ SSR Code Management+Sec Manage&Posting Comput	Paper+ Electronic	Yes	SSR code+24-bit Address+ACID	Yes	Basic+Aircraft Intention+ATC practices	Yes	Yes	Yes	Yes	Yes	QNH+mono-radar+GRIB	ADS-C+CPDLC+DCL	Online+Offline	Basic+Handover+Coordination	Yes	Basic+ Enhancement	Monitor +Control	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Track Fusion+Related Warnings+Downlink Data Window	AMAN+DMAN	Yes	Integated Tower System+A-SMGCS+ Tower Electronic Strip System	flight data+ operational setting data	Yes	
	KLFIR	KL ACC/Kuala Lumpur	34	Leonardo SpA	Backup	PSR+Mode A/C+Mode S+ADS-B+WAM	Yes	AFTN+AMHS	Flight Message Processing+ Life Cycle Management+ 4D Profile Trajectory+ SSR Code Management+Sec Manage&Posting Comput	Paper+ Electronic	Yes	SSR code+24-bit Address+ACID	Yes	Basic+Aircraft Intention+ATC practices	Yes	Yes	Yes	Yes	Yes	QNH+mono-radar+GRIB	ADS-C+CPDLC+DCL	Online+Offline	Basic+Handover+Coordination	Yes	Basic+ Enhancement	Monitor +Control	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Track Fusion+Related Warnings+Downlink Data Window	AMAN+DMAN	Yes	Integated Tower System+A-SMGCS+ Tower Electronic Strip System	flight data+ operational setting data	Yes	
	KLFIR	KL ACC/Kuala Lumpur	29	Leonardo SpA	Emergency	PSR+Mode A/C+Mode S+ADS-B+WAM	Yes	None	None	Paper+ Electronic	No	SSR code+24-bit Address+ACID	Yes	NO	No	No	No	No	No	mono-radar	None	Online+Offline	None	Yes	Basic+ Enhancement	Monitor +Control	Yes	No	No	No	No	No	No	No	No	No	None	None	Yes	Integated Tower System	flight data+ operational setting data	Yes	
	KKFIR	KK ACC/ Kota Kinabalu	63	THALES	Main	PSR+Mode A/C+Mode S+ADS-B	Yes	AFTN+AMHS	Flight Message Processing+ Life Cycle Management+ 4D Profile Trajectory+ SSR Code Management+Sec Manage&Posting Comput	Paper+ Electronic	Yes	SSR Code+24-bit Address+ACID	Yes	Basic+Aircraft Intention+ATC practices	Yes	Yes	Yes	Yes	Yes	QNH+mono-radar+GRIB	ADS-C+CPDLC+DCL	Online + Offline	Basic+Handover+Coordination	Yes	Basic+ Enhancement	Monitor + Control	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Track Fusion+Related Warnings+Downlink Data Window	AMAN+DMAN	Yes	Integated Tower System+A-SMGCS+ Tower Electronic Strip System	flight data+ operational setting data	Yes	
	KKFIR	KCH ACC/ Kuching	47	THALES	Backup	PSR+Mode A/C+Mode S+ADS-B	Yes	AFTN+AMHS	Flight Message Processing+ Life Cycle Management+ 4D Profile Trajectory+ SSR Code Management+Sec Manage&Posting Comput	Paper+ Electronic	Yes	SSR Code+24-bit Address+ACID	Yes	Basic+Aircraft Intention+ATC practices	Yes	Yes	Yes	Yes	Yes	QNH+mono-radar+GRIB	ADS-C+CPDLC+DCL	Online + Offline	Basic+Handover+Coordination	Yes	Basic+ Enhancement	Monitor + Control	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Track Fusion+Related Warnings+Downlink Data Window	AMAN+DMAN	Yes	Integated Tower System+A-SMGCS+ Tower Electronic Strip System	flight data+ operational setting data	Yes	
MALDIVES																																										
MARSHALL ISLANDS																																										
MICRONESIA (FEDERATED STATE OF)																																										
MONGOLIA																																										
MYANMAR																																										
NAURU																																										
NEPAL																																										
NEW ZEALAND	NZZC	Auckland/Christchurch+ Auckland	78	Leidos Skyline	Main	PSR+Mode A/C+Mode S+ADS-B+WAM	Yes	AFTN+AMHS	Flight Message Processing+ Life Cycle Management+ 4D Profile Trajectory+ SSR Code Management+Sec Manage&Posting Comput	Paper+ Electronic	Yes	SSR code+24-bit Address+ACID	Yes	Basic+ATC practices	Yes	Yes	Yes	Yes	Yes	QNH+mono-radar+GRIB	CPDLC+DCL	Online+Offline	Basic+Handover+Coordination	Yes	Basic+ Enhancement	Monitor +Control	Yes	No	Yes	No	No	Yes	Yes	No	Yes	Yes	Track Fusion+Related Warnings	AMAN	Yes	Tower Electronic Strip System	flight data+ operational setting data	Yes	Current ATMS
	NZZC	Auckland/Christchurch+ Auckland	132	Leidos Sky-X	Main	PSR+Mode A/C+Mode S+ADS-B+WAM	Yes	AFTN+AMHS	Flight Message Processing+ Life Cycle Management+ 4D Profile Trajectory+ SSR Code Management+Sec Manage&Posting Comput	Paper+ Electronic	Yes	SSR code+24-bit Address+ACID	Yes	Basic+ATC practices	Yes	Yes	Yes	Yes	Yes	QNH+mono-radar+GRIB	CPDLC+DCL	Online+Offline	Basic+Handover+Coordination	Yes	Basic+ Enhancement	Monitor +Control	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	Track Fusion+Related Warnings	AMAN + AN+PST	Yes	Tower Electronic Strip System	flight data+ operational setting data	Yes	New ATMS go-live 2023
	NZZO	AKL Oceanic ACC/ Auckland	2	Adacel OCS	Main		No	AFTN+AMHS	Flight Message Processing+ Life Cycle Management+ 4D Profile Trajectory+ SSR Code Management+Sec Manage&Posting Comput	Electronic	No	Yes	Yes	No	No	No	No	No	No	GRIB	FANS1/A CPDLC + ADS-C		Yes	Yes	Yes	Yes	Yes	No	No	No	Yes	Yes	Yes	No	No	Yes	None	None	Yes	None	Yes	Yes	OCS is an automated procedural Oceanic system with appropriate functionality for this function. Functionality includes: Long Term Conflict Detection (LTCD), Procedural Conformance Monitoring (Route, Level, and time), display and correlation of pre-processed PSR,SSR, ADS-B, WAM track data, 4D profile calculation appropriate to a procedural environment including upper lower level, and lateral deviation protection. The new Asia/Pac ATMAS IGD and this document does not adequately cover the requirements for procedural based oceanic control ATM.

ATM Automation System Repository in APAC Region

State/Administration	FIR	ATS Unit / Location	Number of ATS positions	Manufacturer / Brand / Version	System Status	Surveillance Data Processing Function (SDP)	Bypass Surveillance Data Processing (BSDP)	Flight Data Communication Network	Flight Data Processing Function (FDP)	Flight Strip	Mode S conspicuity code Identification	Correlation of surveillance and flight data	Safety Net Function						Meteorological Information Processing	Air Ground Data Link Function (AGDL)	System Parameter Management Function	ATS Inter-facility Data Communication Function (AIDC)	Human Machine Interface Function (HMI)	Recording and Playback Function	System Monitoring and Control Function	GNSS Time Synchronization	Extended Alerts and Warning									Downlink Aircraft Parameters Processing and Display	Integrated Technology	System Log Management	Interoperability	Operational Data Synchronization Function	Statistics and Analysis Function	Remarks
													Emergency code warning (7500,7600,7700)	Short Term Conflict Alert (STCA)	Minimum Safe Altitude Warning (MSAW)	Area Proximity Warning (APW)	Approach Path Monitoring (APM) Warning	Route Adherence Monitoring (RAM)	Cleared Level Adherence Monitoring (CLAM)									Departure No TRANSGRESSION Zone (DTZ)	No Transgression Zone (NTZ)	Medium Term Conflict Detection Warning (MTCD)	Similar Callsign Advisory (SCA)	Reduce Vertical Separation Minimum (RVSM) Warning	Position Report Monitoring (PMON) Warning	Last Known Position Display	SSR Inconsistency Warning	PBN Capability Indication							
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44
PAKISTAN	OPKR	ACC/KARACHI	18	SDD INDRA Aircon 2100	Main	PSR+Mode A/C+Mode S	Yes	AFTN+AMHS	Flight Message Processing+ Life Cycle Management+ 4D Profile Trajectory+ SSR Code Management+Sec Manage&Posting Comput	Paper+Electronic	No	SSR code+ACID	Yes	Basic+ATC practices	Yes	Yes	No	Yes	Yes	QNH+mono-radar	None	Online+Offline	Basic+Handover+Coordination	Yes	Basic	Monitor+Control	Yes	No	No	Yes	Yes	Yes	No	No	Yes	No	Track Fusion+Related Warnings+Downlink Data Window	None	Yes	None	None	No	7 - ADS-B data could not be integrated with ATM in Asterix Category-21. MLAT is not available at ACC JIAP. 8 - No safety alerts in Bypass SDP 21 - Auto GRIB support n/a 22- ADS-C and CPDLC are not available at ACC JIAP 26 - Synchoronized Replay of multiple CWP is not available. Screen capture file format is not supported by non-proprietary softwares. The video recording data is NOT available common video formats. Synchronized replay mode does not support change in replay speed, forward, etc. 27 - Export of logs by time on USB or on any other media is not available , however, print option is available. 38 - Resolution Advisory (RA) alert indication NOT AVAILABLE
	OPLR	ACC Lahore	21	INDRA Aircon 2100	Main	PSR+Mode A/C+Mode S	Yes	AFTN+AMHS	Flight Message Processing+ Life Cycle Management+ 4D Profile Trajectory+ SSR Code Management+Sec Manage&Posting Comput	Paper+Electronic	No	SSR code+ACID	Yes	Basic+ATC practices	Yes	Yes	No	Yes	Yes	QNH+mono-radar	None	Online+Offline	Basic+Handover+Coordination	Yes	Basic	Monitor+Control	Yes	No	No	Yes	No	Yes	No	No	Yes	No	Track Fusion+Related Warnings+Downlink Data Window	None	Yes	None	None	No	For Downlink Aircraft Parameters Processing and Display Limited DAP Related Warnings capability exist i.e. 24 Bit Code and Call Sign Mismatch Warnings
		ACC IIAP	21	SIATM	Main	PSR+Mode A/C+Mode S+ADS-B	Yes	AFTN+AMHS	Flight Message Processing+ Life Cycle Management+ 4D Profile Trajectory+ SSR Code Management+Sec Manage&Posting Comput	Paper+Electronic	Yes	SSR code+ACID	Yes	Basic+Aircraft Intention+ATC practices	Yes	Yes	Yes	Yes	Yes	QNH+mono-radar	CPDLC	Online+Offline	Basic+Handover+Coordination	Yes	Basic+Enhancement	Monitor+Control	Yes	No	No	Yes	No	Yes	No	Yes	Yes	Yes	Track Fusion+Related Warnings+Downlink Data Window	AODB / ACDM	Yes	Integated Tower System+Tower Electronic Strip System	None	No	MSAW is not implemented due operational limitation.
PALAU																																										
PAPUA NEW GUINEA																																										
PHILIPPINES	9	ACC/APP/Manila	38	Thales/TopSky ATC	Main	PSR+Mode A/C+Mode S+ADS-B+WAM	Yes	AFTN	Flight Message Processing+ Life Cycle Management+ 4D Profile Trajectory+ SSR Code Management+Sec Manage&Posting Comput	None	Yes	SSR code+24-bit Address+ACID	Yes	Basic+Aircraft Intention	Yes	Yes	Yes	Yes	Yes	QNH+mono-radar+GRIB	ADS-C+CPDLC	Online+Offline	Basic+Handover+Coordination	Yes	Basic	Monitor+Control	Yes			No	Yes	Yes				No	Track Fusion+Related Warnings	AMAN	Yes	Integated Tower System	flight data	Yes	
REPUBLIC OF KOREA	INCHEON FIR	Seoul APP/Incheon Incheon TWR/Incheon Gimpo TWR/Gimpo	41	INDRA Aircon 2100	Main	PSR+Mode A/C+Mode S+ADS-B	Yes	AFTN	Flight Message Processing+ Life Cycle Management+ 4D Profile Trajectory+ SSR Code Management+Sec Manage&Posting Comput	Electronic	No	SSR code+ACID	Yes	Basic+Aircraft Intention	Yes	Yes	Yes	Yes	Yes	QNH+mono-radar+GRIB	None	Online+Offline	Basic+Handover	Yes	Basic+Enhancement	Monitor+Control	Yes	No	Yes	No	No	No	Yes	Yes	Yes	Yes	Track Fusion+Related Warnings+Downlink Data Window	AMAN+DMAN	Yes	Tower Electronic Strip System	flight data+operational setting data	Yes	
	INCHEON FIR	Seoul APP/Incheon Incheon TWR/Incheon Gimpo TWR/Gimpo	41	INDRA Aircon 2100	Backup	PSR+Mode A/C+Mode S+ADS-B	No	AFTN	Flight Message Processing+ Life Cycle Management+ 4D Profile Trajectory+ SSR Code Management+Sec Manage&Posting Comput	Electronic	No	SSR code+ACID	Yes	Basic+Aircraft Intention	Yes	Yes	Yes	Yes	Yes	QNH+mono-radar+GRIB	None	Online+Offline	None	Yes	Basic+Enhancement	Monitor+Control	Yes	No	Yes	No	No	No	Yes	Yes	Yes	Yes	Track Fusion+Related Warnings+Downlink Data Window	AMAN+DMAN	Yes	Tower Electronic Strip System	flight data+operational setting data	Yes	
	INCHEON FIR	DAEGU ACC/ DAEGU	70	Leidos/SKYLINE/V 6.0	Main	PSR+Mode A/C+Mode S+ADS-B	Yes	AFTN+AMHS	Flight Message Processing+ Life Cycle Management+ 4D Profile Trajectory+ SSR Code Management+Sec Manage&Posting Comput	Paper+Electronic	Yes	SSR code+24-bit Address	Yes	Basic	Yes	No	No	Yes	Yes	QNH+mono-radar+GRIB	ADS-C+CPDLC+DCL	Online+Offline	Basic+Handover+Coordination	Yes	Basic+Enhancement	Monitor+Control	Yes	No	No	Yes	No	Yes	No	Yes	Yes	No	Track Fusion	None	Yes	None	flight data+operational setting data	Yes	
	INCHEON FIR	INCHEON ACC/INCHEON	70	Leidos/SKYLINE/V 6.0	Main	PSR+Mode A/C+Mode S+ADS-B	Yes	AFTN+AMHS	Flight Message Processing+ Life Cycle Management+ 4D Profile Trajectory+ SSR Code Management+Sec Manage&Posting	Paper+Electronic	Yes	SSR code+24-bit Address	Yes	Basic	Yes	No	No	Yes	Yes	QNH+mono-radar+GRIB	ADS-C+CPDLC+DCL	Online+Offline	Basic+Handover+Coordination	Yes	Enhancement	Monitor+Control	Yes	No	No	Yes	No	Yes	No	Yes	Yes	No	Track Fusion	None	Yes	None	flight data+operational setting data	Yes	
	INCHEON FIR	BUSAN	18	SKYCONTOL ATM	Main	PSR+Mode A/C+Mode S	Yes	AFTN+AMHS	Flight Message Processing+ Life Cycle Management+ 4D Profile Trajectory+ SSR Code	Paper+Electronic	Yes	SSR code+24-bit Address+ACID	Yes	Basic+Aircraft Intention+ATC practices	Yes	Yes	Yes	Yes	Yes	QNH+mono-radar	None	Offline	None	Yes	Basic+Enhancement	Monitor+Control	Yes	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Track Fusion+Related Warnings+Downlink Data Window	None	Yes	Integated Tower System+A-SMGCS+ Tower Electronic Strip System	flight data+operational setting data	Yes	
	INCHEON FIR	JEJU	4	TERN TAATAS-2010	Main	PSR+Mode A/C+Mode S	Yes	AFTN+AMHS	Flight Message Processing	Paper	Yes	SSR code+24-bit Address	Yes	Basic	Yes	Yes	Yes	Yes	Yes	QNH+mono-radar	None	Online+Offline	None	Yes	Basic	Monitor+Control	Yes	No	No	No	No	No	No	No	No	No	None	None	Yes	None	None	No	
	INCHEON FIR	JEJU	3	TERN MTAATAS-2010	Backup	PSR+Mode A/C+Mode S	Yes	AFTN+AMHS	Flight Message Processing	Paper	Yes	SSR code+24-bit Address	Yes	Basic	Yes	Yes	Yes	Yes	Yes	QNH+mono-radar	None	Online+Offline	None	Yes	Basic	Monitor+Control	Yes	No	No	No	No	No	No	No	No	No	None	None	Yes	None	None	No	
SAMOA																																										
SINGAPORE	WSJC	Singapore	60	THALES LORADS III	Main+Backup	PSR+Mode A/C+Mode S+ADS-B+WAM	Yes	AFTN+AMHS	Flight Message Processing+ Life Cycle Management+ 4D Profile Trajectory+ SSR Code Management+Sec Manage&Posting Comput	Paper+Electronic	Yes	SSR code+24-bit Address+ACID	Yes	Basic+Aircraft Intention+ATC practices	Yes	Yes	No	Yes	Yes	QNH+mono-radar	ADS-C+CPDLC+DCL	Online+Offline	Basic+Handover+Coordination	Yes	Basic+Enhancement	Monitor+Control	Yes	Yes	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Track Fusion+Related Warnings+Downlink Data Window	AMAN+DMAN+AST	Yes	Integated Tower System+A-SMGCS+ Tower Electronic Strip System	flight data+operational setting data	Yes	
SOLOMON ISLANDS																																										
SRI LANKA	VCCF	ACC/Colombo	17	INTELCAN SKYCONTROL	Main	PSR+Mode A/C+Mode S+ADS-B	No	AFTN+AMHS	Flight Message Processing+ Life Cycle Management+ 4D Profile Trajectory+ SSR Code Management+Sec Manage&Posting Comput	Paper+Electronic	Yes	SSR code+24-bit Address+ACID	Yes	Basic+Aircraft Intention+ATC practices	Yes	Yes	Yes	Yes	Yes	QNH	ADS-C+CPDLC	Online+Offline	Basic	Yes	Basic+Enhancement	Monitor+Control	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Track Fusion+Related Warnings+Downlink Data Window	AMAN	Yes	Integated Tower System	flight data+operational setting data	Yes	
	VCCF	Approach Control Center / BIA	14	Thales Topsky	Backup	PSR+Mode A/C+Mode S+ADS-B+WAM	Yes	AFTN+AMHS	Flight Message Processing+ Life Cycle Management+ 4D Profile Trajectory+ SSR Code Management+Sec Manage&Posting Comput	Paper+Electronic	Yes	SSR code+24-bit Address+ACID	Yes	Basic+Aircraft Intention+ATC practices	Yes	Yes	Yes	Yes	Yes	QNH+mono-radar+GRIB	ADS-C+CPDLC+DCL	Online+Offline	Basic+Handover+Coordination	Yes	Basic+Enhancement	Monitor+Control	Yes	Yes	No	No	Yes	No	Yes	No	Yes	Yes	Yes	Track Fusion+Related Warnings+Downlink Data Window	AMAN+DMAN	Yes	Tower Electronic Strip System	flight data+operational setting data	Yes	This ATM system is currently available under Trial Operations.
	VCCF	Approach Control Center / BIA	6	Selex TRDP	Main	PSR+Mode A/C	Yes	AFTN	Flight Message Processing	Paper+Electronic	No	SSR code	Yes	Basic	Yes	Yes	Yes	No	No	QNH	None	Online+Offline	None	Yes	Basic	Monitor+Control	Yes	No	No	No	No	Yes	No	Yes	Yes	No	None	None	Yes	Integated Tower System	flight data+operational setting data	No	This system is to be decommissioned in 3 months, after completing trial operations of Thales Topsky system.
THAILAND	BANGKOK	BACC / Bangkok		Thales / TopSky-ATC / V 20.2.9.0	Main	PSR+Mode A/C+Mode S+ADS-B+WAM	Yes	AMHS	Flight Message Processing+ Life Cycle Management+ 4D Profile Trajectory+ SSR Code Management+Sec Manage&Posting Comput	None	No	SSR code+24-bit Address+ACID	Yes	Basic	Yes	Yes	Yes	Yes	Yes	QNH	None	Online+Offline	Basic	Yes	Enhancement	Monitor+Control	Yes	Yes		No	Yes		Yes	Yes	Yes	Yes		Track Fusion+Related Warnings+Downlink Data Window	AMAN	Yes	None	None	Yes	Mode A/C+Mode S+ADS-B
	BANGKOK	BACC / Bangkok		Thales / TopSky-ATC / V 20.2.9.0	Emergency	PSR+Mode A/C+Mode S+ADS-B+WAM	Yes	AMHS	Flight Message Processing+ Life Cycle Management+ 4D Profile Trajectory+ SSR Code Management+Sec Manage&Posting Comput	Electronic	No	SSR code+24-bit Address+ACID	Yes	Basic	Yes	Yes	Yes	Yes	Yes	QNH	None	Online+Offline	Basic	Yes	Enhancement	Monitor+Control	Yes	Yes		No	Yes		Yes	Yes	Yes	Yes	Yes	Track Fusion+Related Warnings+Downlink Data Window	AMAN	Yes	None	None	No	Mode A/C+Mode S+ADS-B
	BANGKOK	BAPP / Suvarnabhumi		Thales / TopSky-ATC / V 20.2.9.0	Main		Yes	AMHS	Flight Message Processing+ Life Cycle Management+ 4D Profile Trajectory+ SSR Code Management+Sec Manage&Posting Comput	None	No	SSR code+24-bit Address+ACID	Yes		Yes	Yes		Yes		QNH		Online+Offline	Basic	Yes	Enhancement	Monitor+Control	Yes	Yes		No	Yes		Yes	Yes	Yes	Yes	Yes	Track Fusion+Related Warnings+Downlink Data Window	AMAN+DMAN+PST	Yes	Integated Tower System	None	Yes	PSR+Mode A/C+Mode S+ADS-B
	BANGKOK	BAPP / Suvarnabhumi		Thales / TopSky-ATC / V 20.2.9.0	Main		Yes	AMHS	Flight Message Processing+ Life Cycle Management+ 4D Profile Trajectory+ SSR Code Management+Sec Manage&Posting Comput	None	No	SSR code+24-bit Address+ACID	Yes							QNH		Online+Offline	Basic	Yes	Enhancement	Monitor+Control	Yes	Yes		No	Yes		Yes	Yes	Yes	Yes	Yes	Track Fusion+Related Warnings+Downlink Data Window	AMAN+DMAN+PST	Yes	Integated Tower System	None	Yes	PSR+Mode A/C+Mode S+ADS-B
	BANGKOK	CMAP / Chiangmai		Thales / TopSky-Tower	Main					Electronic				Basic									Basic	Yes						Yes				Yes				Tower Electronic Strip System					
	BANGKOK	CMAP / Chiangmai		Thales / TopSky-Tower	Emergency					Electronic													Basic	Yes						Yes				Yes			None		Tower Electronic Strip System					
	BANGKOK	PUAP / Phuket		Thales / TopSky-Tower	Main					Electronic													Basic	Yes						Yes				Yes			None		Tower Electronic Strip System					
	BANGKOK	PUAP / Phuket		Thales / TopSky-Tower	Emergency					Electronic													Basic	Yes						Yes				Yes			None		Tower Electronic Strip System					

ATM Automation System Repository in APAC Region

State/Administration	FIR	ATS Unit / Location	Number of ATS positions	Manufacturer / Brand / Version	System Status	Surveillance Data Processing Function (SDP)	Bypass Surveillance Data Processing (BSDP)	Flight Data Communication Network	Flight Data Processing Function (FDP)	Flight Strip	Safety Net Function							Meteorological Information Processing	Air Ground Data Link Function (AGDL)	System Parameter Management Function	ATS Inter-facility Data Communication Function (AIDC)	Human Machine Interface Function (HMI)	Recording and Playback Function	System Monitoring and Control Function	GNSS Time Synchronization	Extended Alerts and Warning									Downlink Aircraft Parameters Processing and Display	Integrated Technology	System Log Management	Interoperability	Operational Data Synchronization Function	Statistics and Analysis Function	Remarks
											Mode S conspicuity code Identification	Correlation of surveillance and flight data	Emergency code warning (7500,7600,7700)	Short Term Conflict Alert (STCA)	Minimum Safe Altitude Warning (MSAW)	Area Proximity Warning (APW)	Approach Path Monitoring (APM) Warning	Route Adherence Monitoring (RAM)	Cleared Level Adherence Monitoring (CLAM)									Departure No TRANSGRESSION Zone (DTZ)	No Transgression Zone (NTZ)	Medium Term Conflict Detection Warning (MTCD)	Similar Callsign Advisory (SCA)	Reduce Vertical Separation Minimum (RVSM) Warning	Position Report Monitoring (PMON) Warning	Last Known Position Display	SSR Inconsistency Warning	PBN Capability Indication							
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44
	BANGKOK	HYAP / HatYai		Thales / TopSky-Tower	Emergency					Electronic												Basic																					
	BANGKOK	HYAP / HatYai		Thales / TopSky-Tower	Emergency					Electronic												Basic	Yes																				
	BANGKOK	STRT / Suratthanee		Thales / TopSky-Tower	Main					Electronic												Basic	Yes																				
	BANGKOK	KSRT / Koh Samui		Thales / TopSky-Tower	Main					Electronic												Basic	Yes																				
	BANGKOK	UDRT / Udonrathanee		Thales / TopSky-Tower	Main					Electronic	No											Basic	Yes	Enhancement																			
	BANGKOK	DMRT / Donmuang		Thales / TopSky-Tower	Main					Electronic												Basic	Yes		Monitor+Control	Yes		No	Yes		Yes	Yes	Yes	Yes		Track Fusion+Related Warnings+Downlink Data Window		Yes	Integated Tower System+A-SMGCS	None	Yes	Mode A/C+Mode S+ADS-B
	BANGKOK	BAPP / Suvarnabhumi		Thales / TopSky-Tower	Main					Electronic												Basic	Yes					No	Yes		Yes	Yes	Yes	Yes	Yes	Track Fusion+Related Warnings+Downlink Data Window	AMAN+DMAN+PST	Yes	Integated Tower System			
	BANGKOK	BAPP / Suvarnabhumi		Thales / TopSky-Tower	Emergency					Electronic												Basic	Yes					No	Yes		Yes	Yes	Yes	Yes		Track Fusion+Related Warnings+Downlink Data Window		Yes	Integated Tower System+A-SMGCS+ Tower Electronic Strip System			
TIMOR LESTE																																									
TONGA																																									
TUVALU																																									
VANUATU																																									
UNITED STATES																																									
VIET NAM																																									