



ICAO

*International Civil Aviation Organization***THE THIRTIETH MEETING OF THE
COMMUNICATIONS / NAVIGATION AND
SURVEILLANCE SUB-GROUP (CNS SG/30)
OF APANPIRG***Bangkok, Thailand, 06 - 10 July 2026*

Agenda Item 2: Review outcomes of APANPIRG, APAC ANSP Committee, ATM Sub-group, MET Sub-group and other Meetings and global CNS updates

ANS SYSTEM PROCUREMENT GUIDELINE*(Presented by China and Singapore)***SUMMARY**

This paper presents the draft ANS System Procurement Guideline developed under the first Work Stream of the AAC, for consideration and endorsement by the meeting.

1. INTRODUCTION

1.1 In order to strengthen the communication and cooperation among Air Navigation Service Providers (ANSPs) in Asia and Pacific (APAC) region, and to accelerate the implementation of the ICAO APAC seamless ATM plan, the First Meeting of the APAC ANSP COMMITTEE (AAC/1) discussed and agreed to adopt a framework to organize the work of the Committee into four work streams based on areas of priority. The objective of the first Work Stream (WS1) is "Step up investments in ANS capacity and capabilities and share requirements and best practices in the procurement of ANS system".

1.2 Focusing on the areas of WS1 priority, members of the WS1 formulated 9 tasks, in which AAC approved on June 2023. The 8th task is to draft a common ANS system procurement guideline for ANSPs consideration in APAC region.

2. DISCUSSION

2.1 China and Singapore jointly proposed the "ANS System Procurement Guideline", which was presented at the AAC/3 WS1 meeting in July 2024.

2.2 During the WS1 online meeting held in 2025, Singapore recommended further improvements to the ANS System Procurement Guideline by incorporating references to the "Guidance for Procurement and Certification of CNS/ATM Services and Systems", which was previously presented by Singapore to CNS SG/23 and subsequently adopted as Edition 1.0 in 2019.

2.3 A comparison of the two documents indicated distinct but complementary approaches to ANS system procurement. The guidance adopted by CNS SG provided high-level guidance on the procurement and certification of CNS/ATM systems from a governance and regulatory perspective. It emphasizes performance-based planning, lifecycle cost considerations, safety assessment, compliance with ICAO SARPs, and the management of evolving standards. In contrast, the ANS System Procurement Guideline proposed by AAC focuses on practical implementation by structuring the ANS

system procurement process into six sequential stages: Planning, Site-selection (optional), Budgeting and approval, Tendering, Implementation, and Operation. For each stage, the document outlines key activities, technical considerations, and management practices applicable to ANS systems, including communication, navigation, surveillance, and ATM automation system.

2.4 The Planning stage serves as a foundation for determining the equipment procurement requirements and scales for communication, navigation, surveillance, and ATM automation systems. It is based on the development planning of airports, air routes, and airspace, combined with the current status of equipment and investment budget.

2.5 The Site-selection stage identifies and evaluates candidate locations for ANS facilities, if ANS system requires simultaneous construction of stations. Activities include on-site investigation, electromagnetic environment assessment, signal coverage analysis, infrastructure feasibility evaluation, and the completion of regulatory approvals related to site usage and frequency allocation.

2.6 The Budgeting and Approval stage develops the project investment estimate covering system procurement, auxiliary facilities, installation, services, and lifecycle operation and maintenance. The budget proposal is prepared in accordance with applicable regulatory requirements which is subjected to approval by the competent authorities prior to proceeding with procurement activities.

2.7 The Tendering phase of ANS system procurement is conducted through an open tender process in accordance with applicable State or Administration regulations and comprises four stages: Preparation of bidding documents, Tendering and bid evaluation, Contract negotiation and clarification, and Contract signing. The bidding documents are recommended to consist of two parts, namely commercial and technical components.

2.8 The implementation stage covers contract execution from system design review through factory acceptance, on-site installation, system integration, site acceptance testing, flight inspection, cybersecurity compliance, and personnel training. Effective project management is essential to control schedule, quality, and risk during this stage.

2.9 The operation stage addresses the transition of ANS system into operational service and their continued operation. It encompasses documentation handover, safety assessments, system transition activities, where applicable, and the establishment of long-term operation and maintenance arrangements in accordance with applicable regulatory and operational requirements.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

- a) Review and endorse the proposed draft of the ANS System Procurement Guideline.
- b) Discuss any relevant matter as appropriate.

APPENDIX [A]

ANS SYSTEM PROCUREMENT GUIDELINE

1. Introduction

In order to strengthen the communication and cooperation among Air Navigation Service Providers (ANSPs) in Asia and Pacific (APAC) region, and to accelerate the implementation of the ICAO APAC seamless ATM plan, the First Meeting of the APAC ANSP COMMITTEE (AAC/1) discussed and agreed to adopt a framework to organize the work of the Committee into four work streams based on areas of priority. The objective of the first Work Stream (WS1) is "Step up investments in ANS capacity and capabilities and share requirements and best practices in the procurement of ANS system".

Focusing on the areas of WS1 priority, members of the WS1 formulated 9 tasks, in which AAC approved on June 2023. The 8th task is to draft a common ANS system procurement guideline for ANSPs consideration in APAC region.

This guideline primarily focuses on the detailed implementation procedures of ANS system procurement, elaborating on the specific workflows and key tasks at each stage to guide the smooth progress of ANS system procurement practices for ANSPs in the APAC region. For more in-depth strategic recommendations on ANS system procurement, including compliance with national regulations and procedures, procurement strategy, contract execution, as well as provisions on liability and Intellectual Property Rights, ANSPs may refer to the Guidance for Procurement and Certification of CNS/ATM Services and Systems (Edition 1.0, September 2019) issued by the ICAO Asia and Pacific Office.

2. Main tasks of ANS system procurement

The ANS system procurement procedures might be divided into six stages: planning, Site-selection (optional), budgeting and approval, tendering, implementation, operation. According to different equipment classifications, subsequent chapters will introduce the main work at each stage of ANS system procurement respectively.

2.1 Planning

The construction or expansion of ANS system should be based on the development planning of airports, air routes and airspace, combined with the current status of equipment and investment budget, to determine the equipment procurement requirements and scopes.

Communication equipment procurement requirements and scopes are mainly based on the control sector planning scheme, including information such as the number of sectors, latitude and longitude boundaries of sectors, sector altitude ranges, sector opening and closing times, as well as the time when the sector is scheduled to be established, etc.

Navigation equipment procurement requirements and scopes are mainly based on the civil airport construction plan and air routes modification, which is prepared at the beginning of civil aviation airports construction and air routes modification approved by relevant authorities, usually revised periodically in accordance with the operational development of airports and air routes.

Surveillance equipment procurement requirements and scopes are mainly based on air routes adjustment planning schemes, containing information such as addition or adjustment of air routes, the latitude and longitude of air routes, altitude ranges of air routes, as well as air routes planned opening time, etc.

ATM Automation System (ATMAS) procurement requirements and scopes are mainly based on the construction planning and operations of the related Air Traffic Control Center.

2.2 Site-selection (optional)

If the procurement of ANS system requires simultaneous construction of stations, it is necessary to determine the site-selection scheme, submit siting report and obtain approval for equipment frequency assignment. Additionally, it is also required to clarify the ancillary facilities of the associated station.

1. Siting procedures could refer to the following steps:
 - (1) Preliminarily determine the station site location based on the planning of airports, air routes and airspace, etc.
 - (2) Conduct on-site investigations of the selected site, assess the terrain for station construction, existing infrastructure, road traffic, power supply and communication facilities, perform electromagnetic environment testing, map the building shielding angles, as well as record the latitude, longitude and altitude information of the selected site.
 - (3) Based on the on-site investigation results, use radio electromagnetic simulation software to evaluate communication, navigation and surveillance signal coverage for the selected site. If the simulation results satisfy the signal coverage requirements, the site is basically determined for the proposed station construction project.
2. Submitting siting report in accordance with the relevant State/Administration civil aviation requirements.
3. Submitting applications of frequency assignment in accordance with the relevant State/Administration civil aviation requirements, and obtaining the approval.
4. Clarifying the construction demands of station ancillary facilities.

Determining the construction needs and scale of station ancillary facilities based on the scale of ANS system construction, including station buildings, equipment rooms, antenna towers, power loads, commercial electricity importing, UPS power supply equipment, generator power supply configuration, communication transmission equipment and other auxiliary supporting facilities.

2.3 Budgeting and Approval

Budget is the basis of ANS system procurement. After clarifying ANS system procurement demands and requirements, a budget proposal should be carried out in accordance with relevant State/Administration regulations, and the budget proposal should be submitted to budget management authorities for approval. The ANS system procurement can only be carried out after the approval is obtained.

1. When making the procurement budgeting, it is recommended to refer to multiple quotations and take into consideration the following aspects:
 - (1) Procurement costs for the ANS system, including hardware, software, system integration and interfaces, simulator & debugging services, cybersecurity equipment, system training services, system warranty services, technical documentation, Intellectual Property Rights for modifications (where applicable), relevant instruments, equipment, etc..
 - (2) Procurement and construction costs of auxiliary facilities, including expenses for the construction of station buildings, equipment rooms, antenna towers, etc. Also, considering the procurement costs for supporting facilities such as air conditioning, UPS, and emergency generators, as well as costs for supporting transmission and interfaces.

- (3) Costs for services such as consultancy, design, tendering and supervision.
 - (4) Installation costs for equipment and supporting facilities.
 - (5) Operation & maintenance cost, including cost for upgrades and modifications.
 - (6) Costs for services such as flight checks, electromagnetic environment testing, shielding angle mapping, geophysical exploration, etc.
2. According to different design phases, progressively refine the project investment budget (optional).

The project is divided into different phases according to the depth of design, such as project initiation reporting, feasibility study reporting, preliminary designing and construction drawing designing. Gradually, the project's necessity, feasibility, implementation plan and procurement methods are determined. Eventually, confirmation of the project's budget proposal can be achieved with the approval of relevant authority.

2.4 Tendering

ANS system procurement typically follows a process of open tendering. Installation projects and services procurement might be carried out in the same way, which will not be repeated in this document.

1. Bidding document

The tender document for ANS system procurement is recommended to consist of two parts: commercial and technical. The specific contents are suggested as follows:

(1) Commercial part

The business part of the tender documents should specify bidder qualifications, evaluation methods, contract terms, etc. Bidder qualifications should be determined based on State/Administration regulations. Evaluation methods should outline the method for determining the order of shortlisted candidates. Contract terms should clearly define payment methods, construction period, scope of work, pricing methods, etc.

(2) Technical part

The technical part of the tender documents should specify equipment performance indicators, hardware scale, software configuration, debugging, acceptance, cybersecurity, flight checks, training, technical support, maintenance, etc., which is based on the scale of construction and procurement requirements.

Note: Before compiling the technical part of the tender documents, technical exchange meetings with system maintainer, system expert are helpful with determining the system final technical proposal. The proposal discussion aims to address the requirements for more frequent system upgrades and specify system with modularity and interoperability, allowing less cost and effort to deploy and modify. The system interoperability could be improved with the use of common data exchange standards, e.g., FIXM, AIXM, iWXXM based on Service Oriented Architecture (SOA).

2. Tendering process

The tendering process should be carried out strictly in accordance with the relevant State/Administration regulations.

3. Contract negotiation and clarifications

After determining the winning bidder through the tendering process, the ANSP and the winning bidder may engage in contract negotiations/clarifications to negotiate/clarify on unclear contents in the bidding documents and reach a consensus on the contract text.

4. Contract signing

After reaching a consensus on the ANS system procurement contract between the tenderer and the winning bidder, it is recommended to promptly sign the procurement contract. Generally, the procurement contract should be signed within a specified period after the issuance of bid-winning notice, in accordance with the relevant regulations of each State/Administration.

2.5 Implementation

After the signing of ANS system procurement contract, the contract implementation phase begins. The main tasks of the contract implementation phase include system design review (optional), factory acceptance, on-site installation, system integration, site acceptance, commissioning, flight inspection, personnel training and so on.

To ensure the smooth implementation of the contract, it is recommended to set up a dedicated project management team responsible for communicating and coordinating with the relevant departments, driving the project implementation according to the scheme; monitoring the progress of all tasks, rationally managing the project implementation schedule; keeping records of all work activities, and promptly tracking the resolution of relevant issues; reporting project progress to the superior departments, so that the competent authorities and leaders can keep abreast of the project progress in a timely manner.

1. System design review (optional)

It is recommended that procurement contracts for ANS information system with high degree of software integration (such as ATMAS, Flow Management System, A-SMGCS, etc.) include system design review activities. Both parties to the contract can carry out sufficient communication and exchange on the scale of system construction, primary functions, human-machine interfaces, signal interfaces, safety, cybersecurity, risk management and other related issues. It ensures a better understanding and final confirmation of user's requirements and design implementation methods, leading to a consensus between both parties on the implementation methods and expected outcomes of the functionalities. This is conducive to the smooth implementation of system design and software development.

2. Factory acceptance

After the equipment manufacturer completes the design, development, production, and internal testing verification of the ANS system, it is suggested that the equipment manufacturer organize a factory acceptance with participation from the user group. This is to conduct the corresponding testing and verification on the ANS system to be delivered at the factory, ensuring that it satisfies all the technical requirements specified in the tendering document and the contract. The contents, methods, and indicators of the factory acceptance testing should be clearly defined in the contract terms.

3. On-site installation and commissioning

(1) Site preparation

The ANS system requires preliminary site preparation before on-site installation. The following are suggested to be included:

- a) Entrance Access, including roads, elevators, etc.
- b) Storage facilities, equipment warehouses should have waterproof, fire resistance, security and other conditions.
- c) Equipment deployment process conditions, including equipment cabinets, control platform, signal cable troughs, cabinet grounding, etc.
- d) Equipment installation environment, which should meet the requirements of constant

temperature, stable humidity, and dust-free for ANS equipment installation.

- e) Equipment power supply, it is suggested to have UPS power supply, diesel generators, and mains power supply as well.

(2) Installation and commissioning

In order to ensure the smooth progress of on-site installation and commissioning work for the ANS system, it is recommended that the project management team prepare the working plan and implementation scheme in advance. The project management team should assess and plan the sequence of various tasks, such as civil foundation construction, ANS system equipment installation, and ancillary facilities installation, on-site installation works and commissioning dates of ANS system. The project management team and the equipment manufacturer will then execute the works according to the predetermined plan and scheme.

4. System integration (Optional)

Conventionally, ANS information system with high-degree of software composition requires system integration after completing on-site installation and commissioning. Taking ATMAS as an example, the following is a brief description of the main tasks of system integration.

After the installation and commissioning of ATMAS, system integration is also needed, containing at least the following tasks:

- (1) External signal and dataflow integration, including flight plans, meteorological information, surveillance-sources data, etc.
- (2) External system interactive data integration, involving integration of data exchange with external system such as flow management system, A-SMGCS and so on.
- (3) Offline data preparation, controllers and technicians should cooperate with equipment manufacturers to complete the offline data preparation required for the normal operation of the system, containing the controlled airspace, air routes, control sectors, standard instrument departure procedures, standard instrument arrival procedures, as well as system coordinates and surveillance sources coordinates, etc.

5. Site Acceptance

Site Acceptance is an essential validation step for a brand new or expanded ANS system to guarantee operational safety and ensure any contractual obligations.

After completing system deployment, it is recommended that both parties of the contract form a site acceptance working group jointly to handle the Site Acceptance Test (SAT), ensuring the ANS system meets the associated requirements of the bidding documents and the contract and any post contract changes or safety related requirements.

It is recommended that the relevant site acceptance indicators be clearly stated in the terms of procurement contract.

The SAT plan is recommended to be jointly developed by both parties and include at least the following testing contents:

- (1) Performance testing, including identified load, integrity, reliability, and timeliness requirements.
- (2) Interface testing, including data handling requirements, integrity, and associated system functionality.
- (3) (Optional) ATMAS functionality that requires SAT integration to be conducted effectively including testing and verifying of system functions and external interfaces
- (4) Abnormal data processing, including erroneous input data or processing output that relates to

SAT configuration

- (5) Cybersecurity testing, including tests of physical security, network security, device security, application security, data security and recovery, and etc.
- (6) Stability testing, it is recommended to conduct stability testing for an agreed period that ensures all business as usually processes and expected system load conditions are incorporated. Stability testing should include a process for cessation, diagnosis, continuation, or re-set when issues are encountered during the stability period.
- (7) Regression testing commensurate for the size of issue identified during the SAT or agreed plan for post-SAT resolution for any items that are required to be resolved before go-live but do not require a re-set of the SAT.

It is recommended to record the problems discovered during the testing, and objectively and truthfully record the original data. If necessary, video, image and other recording methods can be used. Again, the parties of the site acceptance working group shall agree to the recording media and method of issues recording to ensure effective resolution.

After completing the testing, the site testing report is recommended to be compiled. The content of the report is suggested to include:

- (1) The agreed criteria that were used for SAT validation
- (2) Summary of test cases conducted, results and explanatory notations – this may include the testing time, testing personnel, testing item and testing conclusions,
- (3) Issues identified during SAT and their course of resolution and status (Resolved/outstanding)
- (4) Overall results and pass fail of the SAT against those criteria
- (5) Any accompanying videos, images, and other content recorded during the testing that are required support the test report conclusions.
- (6) Any other artifact documents that are used to support results or are used instead of testing during the SAT to verify SAT aspects.

6. Flight Inspection

Certain ANS system (such as radar, navigation, ATMAS, VHF equipment, etc.) require flight inspection after on-site installation and system integration to verify coverage range, signal quality and main functionalities of the system, etc. Flight inspection can be a part of site acceptance, and it is recommended that the specific contents of flight inspection be implemented according to the relevant regulations of each country/region.

7. Filing of Cybersecurity Level

Information system (such as ATMAS, ATFM system, etc.) may need to file for cybersecurity level at local cybersecurity department based on State/Administration regulations. Steps are suggested to include:

- (1) Determine the cybersecurity level of the information system referring to the relevant State/Administration regulations.
- (2) Rectify and strengthen the information system in accordance with the relevant State/Administration regulations, from the aspect of physical environment, security devices, security technique, security management and etc.
- (3) Entrust a qualified evaluation agency to test and evaluate the Cybersecurity Level of information system and form the evaluation report.
- (4) Submit the evaluation report to local cybersecurity department and finish the filing of system cybersecurity level.

The responsibilities of both parties in filing of cybersecurity level need be clearly specified in the procurement contract to progress it smoothly.

8. Personnel Training

In order to help ANS system users familiarize themselves with equipment performance and interface operations as soon as possible, it is recommended to conduct the equipment operation and maintenance. Personnel training is usually included in the equipment procurement contract. The training can be divided into factory training and on-site training, and the training content at least includes system functions, system processing mechanisms, system operations, hardware configurations, network configurations, software installation, etc.

Additionally, for ANS information system with high degree of software integration, it is suggested to provide specialized training for offline data, controller operations, and instructor controllers. Moreover, as needed, controllers and technicians can be arranged to participate in equipment development and supervision of manufacturing at the factory, and expert-level talents can be cultivated by this way.

2.6 Operation

The working procedures and related tasks for the commissioning and operation of ANS system shall be executed in accordance with the relevant regulations of each country/region.

1. Preparation for ANS system Operation

Before the ANS system is put into operation, it is suggested to complete the construction materials archiving, safety assessment and system transition.

(1) Construction Materials Archiving

- (2) The project management team is suggested to comprehensively collect and organize relevant materials for the construction of ANS procurement project, including factory acceptance reports, on-site installation materials, site acceptance reports, flight inspection reports, system commissioning reports, etc. These materials should be archived and handed over to the relevant departments for proper custody.

(3) Safety Assessment

The operations and maintenance team, along with stakeholders, is suggested to conduct a comprehensive safety assessment of the new system's online activities. The safety assessment should at least cover the following aspects:

- a) Scope and content of the evaluation
- b) Departments and personnel involved in the assessment
- c) Description of the current environment and system
- d) Identification and risk analysis of potential hazards
- e) Risk control measures
- f) Conclusions of the safety assessment

(4) (Optional) System transition

When new construction or major software and/or hardware upgrade of Information system (such as ATMAS, ATFM system, etc.), transition normally happens. It is recommended to be clearly specified in the contract terms that system suppliers need to provide technical support for the system transition.

For a more complex transition that involves multiple stakeholders and equipment, change management, safety risk management, transition plan, rehearsal, and post-transition support are the key elements to ensure a smooth system transition.

There are mainly four transition phases of system transition: transition preparation, transition rehearsal, system transition, observing operation.

2. Operation and Maintenance

The ANS system goes to the system maintenance phase after being put into operation. System maintenance is necessary for the entire service life of the system. Critical functions and equipment should normally work even as the environment changes through planned and organized maintenance. The purpose of system maintenance is to guarantee stable and continuous operation and to improve the performance of the system.

At the same time, it is recommended that the system supplier should offer on-site technical support and assistance for the commissioning and operation of complex system (such as ATMAS), the relevant requirements can be clearly specified in the procurement contract to ensure the ANS system is put into operation smoothly.

To support system operation and make the maintenance more conveniently, necessary tools such as multimeters, network analyzers, spectrum analyzers, etc., are recommended to be included in the procurement contract. Additionally, a testing platform is suggested to be available to analyze system failures or conduct tests for system software upgrades.