INTERNATIONAL CIVIL AVIATION ORGANIZATION

REPORT

OF

THE SECOND WORKING SESSION OF THE SWIM IMPLEMENTATION PIONEER AD-HOC GROUP (SIPG WS/2)

Bangkok, Thailand

26-30 May 2025

The views express in this Report should be taken as those of the Working Session and not the Organization

Approved by the Meeting and published by the ICAO Asia and Pacific Office, Bangkok

PART I – HISTORY OF THE WORKING SESSION

1 Introduction

1.1 The Second Working Session of the SWIM Implementation Pioneer Ad-Hoc Group (SIPG WS/2) was held from **26 to 30 May 2025** in the ICAO Asia Pacific Regional Office, Bangkok, Thailand.

2 Attendance

2.1 The Meeting was attended by **64** Participants from **20** States/Administrations and **2** International Organizations, including Australia, Bangladesh, China, Hong Kong China, India, Iran, Japan, Lao PDR, Malaysia, New Zealand, Pakistan, Philippines, Republic of Korea, Singapore, Sri Lanka, Thailand, USA, Vietnam, CANSO, and ICAO. The list of participants is provided in **Attachment 3.**

3 Opening of the Working Session

3.1 Mr. David Leow, Head (Quality Assurance), Civil Aviation Authority of Singapore and lead of the SIPG, opened the Meeting, welcoming all participants to the SIPG WS/2 meeting. David informed the Meeting that there would be a change in the agenda as a result of the outcomes of the SWIM TF/10 meeting that was held just the week prior. During the SWIM TF/10 Meeting, an additional **nine** action items were assigned to the SIPG, with an additional task of prioritizing the work items for SIPG to be included in the SWIM TF/10 report.

4 Officers and Secretariat

4.1 Mr. David Leow chaired the Meeting while Ms. Soniya Nibhani, Regional Officer ANS (CNS) Implementation, together with Ms. Varapan Meefuengsart, the Programme Assistant and Ms. Jian Xu, Associate Programme Officer ANS (CNS) Implementation from the ICAO Asia and Pacific Regional Office, provided logistics and IT support for the Meeting.

5 Organization, Working Arrangements, Language and Documentation

5.1 The SIPG WS/2 met as a single body during the session. The working language for the session was English, including all documentation and this Report. The working session considered **four (4)** Working Papers and **ten (10)** Presentations under its **nine (9)** Agenda Items. The list of papers and presentations is provided in **Attachment 4.**

PART II – REPORT ON AGENDA ITEM

1 Agenda Item 1 – Adoption of Agenda

Adoption of Agenda – SIPG Lead (SP/01)

1.1 The provisional agenda, as circulated with the invitation letter, was as follows:

Agenda Item 1: Adoption of the agenda

Agenda Item 2: SWIM Architecture: Requirements on Gateway EMS providers

i. Limits on the total number of Gateway EMS providers
ii. Minimum latency and throughput requirements
iii. Runtime governance for Gateway EMS
iv. A common set of message queues for Gateway EMS
v. Testing requirements and procedures for onboarding Gateway EMS

Agenda Item 3: SWIM Architecture: Routing Mechanism.

i. Message Headers, Message Properties or Topics?

Agenda Item 4: SWIM Architecture: PKI Requirements for APAC SWIM Use Case

Agenda Item 5: Standardized Nomenclature – Naming Conventions

Agenda Item 6: Conditions for SWIM Operationalization

Agenda Item 7: Next Meetings and Any Other Business

1.2 The revised agenda was proposed and presented in SP/01 SIPG 2nd Working Session – Agenda and Order of Business. The revised agenda was as follows.

Agenda Item 1: Adoption of the agenda

Agenda Item 2: Review of Action Items and Prioritization

Agenda Item 3: SWIM Architecture: Routing Mechanism.

i. Message Headers, Message Properties or Topics?

Agenda Item 4: SWIM Architecture: Requirement on Gateway EMS Providers.

i. Requirements of Gateway EMS
ii. Consider ATN Network Topology as a model for Gateway and Edge EMS assignments
iii. Testing requirements and procedures for onboarding Gateway EMS

Agenda Item 5: SWIM Architecture: PKI Requirements for APAC SWIM Use Case

Agenda Item 6: Request/Reply Architecture

Agenda Item 7: Standardized Nomenclature – Naming Conventions

Agenda Item 8: Conditions for SWIM Operationalization

Agenda Item 9: Next Meetings and Any Other Business

1.3 The proposal was accepted, and the revised agenda was adopted.

2 Agenda Item 2: Review of Action Items and Prioritization

SIPG Working Session 2 - SWIM Timeline Proposal – SIPG Lead (SP/02)

SIPG WS2 – Action Items from SWIM TF 10 – SIPG Lead (SP/08)

2.1 SIPG Lead presented the new action items that had been assigned by the SWIM TF/10 meeting to the SIPG. A total of 9 additional action items were reviewed and categorized in SP/07.

2.2 The Meeting then considered the various tasks of the SIPG in light of these additional action items in an attempt to merge the action items into the SIPG tasks. The result is the list of tasks shown in the table below.

Task ID	Task
Task 1	Define Functionality and requirements for Edge and Gateway EMS
Task 2	Review of the revised hierarchical architecture
Task 3	SWIM Architecture – Req/Rep MEP and guidance for Async and Sync
Task 4	Use of CRV Residual Bandwidth or CRV Test network (If Provisioned)
Task 5	SWIM architecture construction
Task 6	SWIM Security Implementation – Self-signed certs
Task 7	SWIM Registry Interconnection
Task 8	AMHS Protocol converters
Task 9	Testing of the APAC SWIM Prototype
Task 10	Measurement of performance metrics
Task 11	Conditions for SWIM Operationalization

2.3 After further deliberation, the Meeting decided that Task 4 and Task 8 should be excluded from the prioritization. Task 4 was excluded as it required input from the CRV OG to confirm if and when a CRV Test Network would be provisioned or, barring that, whether the CRV residual bandwidth could be used for testing. Task 8 was excluded as the Meeting decided that the AMHS Protocol conversion should not be treated as part of the SWIM Technical Infrastructure but rather as a service that an EMS provider may or may not offer.

2.4 The Meeting also proposed that Task 5 be renamed "SWIM Technical Infrastructure Integration" to properly reflect the nature of the task. Similarly, Task 9 is to be renamed "APAC SWIM Integration Testing."

2.5 The finalized task list with associated priorities is listed in the table below.

Task ID	Task	
Task 1	Define Functionality and requirements for Edge and Gateway EMS	Priority 1
Task 2	Refine the revised hierarchical architecture	
Task 3	SWIM Architecture – Req/Rep MEP and guidance for Async and Sync	
Task 6	SWIM Security Implementation – Self-signed certs	
Task 7	SWIM Registry Interconnection	
		Priority 2
Task 5	SWIM Technical Infrastructure Integration	
Task 9	APAC SWIM Integration Testing	Priority 3
Task 10	Measurement of performance metrics	
Task 11	Conditions for SWIM Operationalization	

2.6 Task 7 in the table spanned both priorities 1 and 2 because there were two stages to the task. The first stage was to determine the version of the SWIM Discovery Service (SDS) specification to use that would be most suitable for the APAC region and the second stage was the actual implementation of the SDS and the interconnection of the different registries in the APAC SWIM.

2.7 The Meeting then proceeded to develop a work plan based on the above-prioritized task list. The target deadline to complete Tasks 1 through 10 is the **end of December 2026**. Task 11 is the development of a set of acceptance criteria for the operationalization of the APAC SWIM and that work is likely to extend beyond the end of 2026.

2.8 The diagram representing the SIPG work program can be found in **Attachment 1**.

2.9 The Meeting deliberated on the composition of the various task groups and task leads for each task group. It was decided that leads would be assigned for Tasks 1, 2, 3, 5, 6 and 7 at this Meeting since the work is starting almost immediately.

2.10 Task leads for tasks 9, 10, and 11 will be assigned at a later date once the earlier tasks are completed. This is so that the SIPG has enough resources to properly commit to a task.

2.11 The table of task assignments is captured in **Attachment 2.**

3 Agenda Item 3: SWIM Architecture: Routing Mechanism

APAC SWIM Architecture and Message Exchange over CRV – Japan (SP04)

APAC SWIM Routing – CANSO (SP08)

3.1 CANSO presented the use of Topics as a means of message routing to the Meeting. The presentation started with the definitions of terms like EMS, Message Broker, Message Properties, Message Header, Message Topic, and Message Topic Model. This is to establish a common understanding of what each of these terms means.

3.2 The presentation then delved into the use of Message Properties for routing and compared that with the use of Message Topics. It was noted that some message brokers do not support routing via Message Properties directly, so additional work needs to be done to modify the message brokers to do so.

3.3 However, Message Topics are supported by virtually all messaging protocols and message brokers. Message Topics use far less space than Message Properties and are similarly extensible. Further advantages of using Message Topics are listed below.

- There is no need to establish a naming convention to prevent name collisions, but it does require a topic model to ensure proper usage.
- Topics have the same proven structure as file and URL paths
- Topics allow for simple parallel processing that enables hardware acceleration.

3.4 The presentation went on to show how message routing could be achieved with Message Topics in the Gateway EMS and how message routing would work across the whole architecture. This was followed by an example using FF-ICE filing as a use case to demonstrate how the routing of an FF-ICE flight plan would work with Message Topic Routing.

3.5 CANSO went on to highlight the challenges faced by SIPG when it comes to message routing.

- The SIPG is attempting to develop, test, operate, maintain, and govern the most difficult distributed and federated features of individual message broker products that have the luxury of extreme homogeneity.
- The SIPG needs to make this work across a diverse and likely changing set and number of message broker products, product versions and related capabilities.

Therefore, given these challenges, it was recommended in the presentation that the Gateway EMS be kept as simple as possible. Similarly, for the Edge – Gateway interface and service.

3.6 The Meeting proceeded to have a lengthy discussion about the pros and cons of using message topics versus message properties, with many queries about the potential drawbacks that topics might have. It was noted that Japan, Singapore and Thailand have used Message Topics in their local SWIM implementation. However, this mechanism has not been tried at the APAC level.

3.7 After much deliberation, it was decided that Task 2 would conduct a trial on the use of Message Topics and message headers for message routing and coordinate with Task 1 to flesh out the

necessary requirements on the Gateway and Edge EMS. ACTION ITEM WS2-1

3.8 Japan presented on the APAC SWIM Architecture and Message Routing over CRV. This presentation covered two topics regarding APAC SWIM Architecture. Namely how internet connectivity should be provisioned in the APAC SWIM Architecture and how message routing can be implemented using Message Properties.

3.9 As this agenda item pertained to routing mechanisms, the record here will concern only the discussions on the use of Message Properties for routing.

3.10 Regarding the use of Message Properties as a routing mechanism, it was pointed out in the presentation that there may be advantages for specific use cases, specifically for the FF-ICE use case.

3.11 The presentation then showed how different configurations of Message Properties can affect message routing and the various trade-offs and considerations that we must make when deciding how Message Properties are to be used to address a particular use case.

3.12 The Meeting proceeded to discuss the presentation and the pros and cons of using Message Properties as a routing mechanism. It was pointed out that since the past SWIM demonstrations have already used Message Properties as a means of routing, the SIPG has an understanding of how that works. While we should not ignore the use of message properties, the focus is now on exploring the use of message topics, as that is an unknown area. The comparison between Message Properties and Message Topics will thus be work assigned to task 2. ***ACTION ITEM WS2-2***

4 Agenda Item 4 – SWIM Architecture: Requirements on Gateway EMS providers

SWIM Architecture – Requirements on Gateway EMS - Singapore (SP/03)

Requirements Specification Template for GEMS and Global SWIM Service – Korea (WP/04)

4.1 Singapore presented the Requirements for Gateway EMS. The presentation covered the following topics: SIPG APAC SWIM Architecture, Groupings for Gateway EMS Communities, Functional Requirements for Gateway EMS, Non-Functional Requirements for Gateway EMS, Testing Requirements and Procedures for Onboarding a Gateway EMS, Runtime Governance for Gateway EMS.

4.1.1 SIPG APAC SWIM Architecture

4.1.1.1 Under the SIPG APAC SWIM Architecture, the presentation looked at the revised hierarchical architecture compared with the original hierarchical architecture. It compared the vulnerabilities of the original hierarchical architecture as raised in SWIM TF/9 WP/10 against the solutions proposed by China and Japan in SWIM TF/10 WP17 and SWIM TF/10 WP14, respectively.

4.1.1.2 The following presentation presented the Gateway and Edge EMS configuration that was used for the Joint Event held in June 2024. This configuration consisted of 4 Gateway EMS and 3 Edge EMS.

4.1.1.3 Under the topic of Functional Requirements of the Gateway EMS, the presentation grouped the solutions proposed by China and Japan in SWIM TF/10 WP17 and SWIM TF/10 WP14, respectively, into nine categories. They are Message Persistence, Acknowledgement and Confirmation, Retry and Redelivery, High Availability and Redundancy, Routing and Security, Monitoring and Logging, Network Failure Handling and Auto-recovery, Protocol Translation, and Additional Message Functionality.

4.1.1.4 Singapore talked about some existing Gateway EMS requirements and whether they remain relevant for the SIPG SWIM Prototype.

4.1.1.5 Next, the minimum non-functional Gateway EMS requirements were presented. Material presented in SWIM TF/10 WP/17 and SWIM TF/10 WP31 were extracted and presented here. It was noted that the current agreed overall availability for the APAC SWIM is set at 99.0% or greater. How this would translate to actual bandwidth and latency requirements for the Gateway EMS still needs to be determined. However, the presentation highlights that the values for these attributes would necessarily be higher for the Gateway EMS as compared to the Edge EMS due to the higher volume of traffic expected at the Gateway EMS.

4.1.1.6 The presentation also defined the boundaries with which Latency should be measured. It should be measured from the time a message arrives at an EMS to the time it is transmitted from the EMS.

4.1.1.7 The presentation talked about testing requirements and procedures for onboarding a Gateway EMS. The presentation proposed four categories under which these tests can fall: connectivity testing, latency testing, bandwidth testing, and cybersecurity testing. For each category, the presentation also proposes considerations.

4.1.1.8 The presentation also mentioned Runtime Governance for Gateway EMS. However, this is to highlight that this topic is not within the purview of the SIPG but rather Task 5 – Governance of the SWIM Task Force.

4.1.1.9 There were a lot of discussions on the requirements of Gateway EMS. Particular focus was given to the issue of assigning priorities to messages and how this could be done. It was pointed out to the Meeting that an agreed principle that this Meeting should abide by when considering requirements for Gateway EMS is that SWIM information services are not being used for aircraft separation. Therefore, any constraints and requirements proposed must consider the above principle. This is to prevent over-engineering of the requirements.

4.1.1.10 The discussion proceeded to discuss various options to implement priorities in messaging, using the “Time-to-Live (TTL)” parameter to manage orphaned messages and the use of multiple queues. The question of how priorities should be defined was considered and discussed. However, it was finally agreed that the SIPG does not have enough knowledge on how priorities should be assigned. It was also agreed that the SIPG is only responsible for delivering the capability to do message prioritization. How priorities are to be assigned should be left to the expert groups to decide.

4.1.1.11 The Meeting decided that the discussions all boil down to 3 questions.

1. Can we use multiple queues in the Gateway and Edge EMS?
2. Is it acceptable for the Gateway EMS to delete a message whose TTL parameter is expired?
3. How should message priority be implemented?

The Meeting agreed that these questions should be undertaken by tasks 1 and 2 for an answer. There was a suggestion to look at the AFTN/AMHS priorities as inputs for this question. ***ACTION ITEM WS2-3***

4.1.1.12 The Meeting then continued to discuss the solutions associated with guaranteed message delivery in the event of an EMS failure. Several solutions were proposed in the presentation, and all revolved around the failover mechanism or message persistence capability within the EMS. It was noted that this issue of guaranteed message delivery impacts not just the Gateway EMS but the Edge EMS as well.

4.1.1.13 Japan introduced the concepts of the Pull mechanism and Push mechanism for putting messages onto message queues. It was added that these have an impact on guaranteed message delivery and need to be properly explored. This is something for Task 1 to explore. ***ACTION ITEM WS2-4***

4.1.1.14 The Meeting proceeded to discuss the issue of a failure in the message delivery chain. Failure could occur at the network level or at the EMS level. These could be mitigated with a retry logic and message detouring. Both these solutions should work in concert, i.e., after a set number of retries, it should be deemed that the selected route is no longer viable and rerouting should occur. This was assigned to Task 2. ***ACTION ITEM WS2-5***

4.1.1.15 It was noted after all the discussion on the SIPG APAC SWIM Architecture that the material in this presentation, as well as the points discussed during the Meeting, should serve as inputs for Task 1 and Task 2. These tasks should then decide on the appropriate proof-of-concept trials to run to help progress their work. ***ACTION ITEM WS2-6***

4.1.2 Groupings of Gateway EMS communities

4.1.2.1 During the SWIM TF/10 meeting, it was proposed that the existing ATN Network Topology could be used as an initial reference for establishing the Gateway EMS providers. The proposal was for the current BBIS providers to take on the role of the Gateway EMS providers as well.

4.1.2.2 Australia highlighted that we should aim for a good geographical spread of Gateway EMS to reduce message transmission latency due to geographical distance. From the current ATN Topology, it seems that the candidate Gateway EMS providers are well spread out.

4.1.2.3 The SIPG Chair pointed out that the new hierarchical architecture only requires the Gateway EMS to connect to **2 or more other Gateway EMS** and does not mandate a mesh-type connection between all the Gateway EMS. Also highlighted was that this is the initial set of Gateway EMS. There is nothing inherently preventing a state that is not a BBIS from volunteering to be a Gateway EMS.

4.1.2.4 The list of initial Gateway EMS providers was as follows:

- Australia (Tentative)
- China
- Fiji
- Hong Kong China
- India
- Japan
- Republic of Korea
- Singapore
- Thailand
- USA

Australia was listed as tentative as they still need to confirm if they are able to support this role. The Republic of Korea and USA have volunteered to be a Gateway EMS provider despite not being an ATN BBIS provider. Malaysia will be an edge EMS while New Zealand is planning to be the Edge EMS providers.

4.1.2.5 There was a question about whether a Gateway EMS provider needs to provide another Edge EMS. The SIPG chair reminded the Meeting that at the SIPG WS/1 session, it was highly recommended to keep the functions of the Gateway EMS dedicated to performing Gateway message routing functions. That means that a separate Edge EMS is recommended for the Gateway EMS providers.

4.1.3 Functional Requirements for Gateway EMS, Non-Functional Requirements for Gateway EMS, and Testing Requirements and Procedures for Onboarding a Gateway EMS

4.1.3.1 It was decided by the Meeting that the material for the three topics should serve as inputs to task 1. Further, all tasks that specify requirements should use the requirements specification template as provided in the SWIM TF/10 WP/29 to specify the requirements. ***ACTION ITEM WS2-7***

4.1.4 Runtime Governance

4.1.4.1 No material was presented on this topic; instead, the Meeting reminded that there is a Governance Task under the SWIM Task Force. Work on runtime governance needs to be taken under the Governance Task and not at the SIPG level.

4.2 Japan presented on APAC SWIM Architecture and Message Exchange over CRV. It covered the following topics: Internet Connectivity, SWIM Architecture, and Message Routing. The discussions on Message Routing have been captured in section 3. Therefore, only Internet Connectivity and SWIM Architecture discussions will be addressed in this section.

4.2.1 Internet Connectivity

4.2.1.1 The presentation compared the differences between the Internet and the CRV when implementing the SWIM Technical Infrastructure. It gave two options for providing Internet connectivity to the SWIM TI. It was recommended that the SWIM Technical Infrastructure should not be built on the Internet.

4.2.2 SWIM Architecture

4.2.2.1 The table listing SWIM Technical Infrastructure (SWIM TI) Principles was presented at the Meeting. It contained five proposed principles, their description, and what system needs the principles address. Also, a diagram was shown of how AMHS can integrate with the SWIM Technical Infrastructure.

4.2.2.2 The Meeting discussed both topics and noted the options provided for Internet connectivity. It was noted in the diagram showing how AMHS can integrate with the SWIM TI, the user/consumer is isolated from the Gateway EMS by the Edge EMS. It was agreed that this was a good design principle and should be followed.

4.2.2.3 In the same diagram, it was clarified that the AMHS Router is actually an AMHS protocol conversion Information Service and treated as outside of the SWIM TI.

4.2.2.4 It was decided that this presentation should serve as a reference and input to tasks 1 and 2. ***ACTION ITEM WS2-8***

5 Agenda Item 5 – SWIM Architecture: PKI Requirements for APAC SWIM Use Case

SWIM Self-Signed Certificate Trial – Malaysia (SP/10)

5.1 Malaysia presented the current results of the self-signed certificate trial that they have been conducting. The objective is to study the feasibility of using self-signed certificates to enable secured and encrypted communication between EMS.

5.2 It was noted that the tests were currently carried out only between Malaysia and Singapore. It was expected that Thailand and Hong Kong China would join the trial soon. New Zealand expressed interest in joining the trial and China shared the intention to be an observer.

5.3 The Meeting discussed the results of the trial so far and the pros and cons of using self-signed certificates. It was highlighted that the lack of a central certificate authority makes it difficult to manage the exchange of certificates and to establish trust between agencies.

5.4 It was further pointed out that the Aviation Common Certificate Policy (ACCP) document is due to be published by the ICAO by the end of June 2025.

5.5 After deliberation, it was decided that the continuation of the Self-Signed Certificate Trial should be assigned to Task 6 and continue until August 2025. At which point the ACCP document is expected to be published. The review of the ACCP document is also assigned to Task 6. ***ACTION ITEM WS2-9***

6 Agenda Item 6 – Request / Reply Architecture

Request-Reply Message Exchange Pattern – Singapore (SP09)

Approach to Global API Gateway For SWIM Web Services (WP01)

6.1 Singapore presented an explanation for the Request-Reply Message Exchange Pattern (MEP) in an attempt to define clearly what the Request-Reply MEP is. The concepts of Synchronous and Asynchronous Request-Reply were introduced and the differences between the two were listed in a table.

6.2 The presentation highlighted that there was confusion over the understanding of the Request-Reply MEP, using the FF-ICE use case to help highlight the source of confusion. Essentially, the confusion centered around the terms Synchronous and Asynchronous and how, depending on viewpoints, the understanding differs.

6.3 The Meeting debated what should be done to help resolve the matter and clear up the confusion.

6.4 It was concluded that there is a need for a common understanding among the SIPG members when these terms are used. Therefore, a clear definition of what is meant by Synchronous Request-Reply and Asynchronous Request-Reply needs to be developed. There is a high-level definition given in ICAO Doc 10203, and the SIPG definition should be aligned with the high-level definition in Doc 10203. ***ACTION ITEM WS2-10***

6.5 Secondly, a set of questions needed to be developed to query the different expert groups on how they expect their information services to behave. These questions should avoid using technical language such as Publish / Subscribe or Request / Reply. ***ACTION ITEM WS2-11***

6.6 These two tasks were assigned to Task 3.

6.7 SIPG lead reminded the Meeting that the Republic of Korea had presented the paper titled, Approach to API Gateway for SWIM Web Services, at the SWIM Task Force. This paper has been forwarded to the SIPG for consideration.

6.8 The paper highlighted that, to date, most of the trials and demonstrations have centered around the Publish / Subscribe MEP and the Request / Reply MEP was not explored. The paper also introduced the concept of an API Gateway and proposed various deployment models and approaches to how API Gateways could be deployed in SWIM. The paper stated that there was a need to agree on a consistent implementation of the Request / Reply MEP within the APAC SWIM and called for more work to be done in this Area.

6.9 The Meeting deliberated on the paper, especially on the need for API Gateways in the SWIM TI. It was decided that there was indeed a need for API Gateways in the SWIM TI. However, work needs to be done to explore how API Gateways should be deployed.

6.10 How HTTP RESTful Request / Reply can be done in the SWIM TI was discussed in the Meeting. It was agreed that more work also needed to be done to explore implementation options.

6.11 The above work to explore API Gateway deployment and HTTP RESTful Request / Reply implementation was assigned to Task 3. The SIPG WS/2 WP/01 should be used as input for these tasks. ***ACTION ITEM WS2-12***

7 Agenda Item 7 - Standardized Nomenclature – Naming Conventions

7.1 No material was submitted for this agenda item.

7.2 SIPG Led informed the Meeting that given the discussions from SWIM TF/10 and this Meeting, it was clear that this agenda item was not mature enough to be discussed. It has dependencies on the results of Task 2 before we can begin deliberations. Hence, this agenda item will be put on hold for now.

8 Agenda Item 8 – Conditions for SWIM Operationalization

- *Strategies To SWIM Operationalization in the Aspect of Validation – Republic of Korea (WP03)*
- *Minimum Conditions for APAC SWIM Operationalization – Singapore (SP06)*

8.1 SIPG Led listed the main points presented in WP/03, which was also presented in the SWIM TF/10 meeting. The paper highlighted that while Doc 10203 gives some guidance to the testing and validation of information services, no such guidance for testing and validation of the SWIM

TI exists. However, reference could be made to the same guidance for testing information services when the SIPG develops test cases and procedures for testing the SWIM TI.

8.2 The paper then proposed three possible approaches to developing test cases. As well as the approaches to conducting these tests. The paper also recommends some form of certification to improve the objectivity of the tests.

8.3 SIPG Lead then went on to present the Minimum Conditions for APAC SWIM Operationalization. He informed the Meeting that this presentation was prepared prior to the SWIM TF/10 meeting and that since the rewriting of the SIPG Terms of Reference, some of the material in this presentation may no longer be relevant.

8.4 The presentation introduced the need for SWIM operationalization, stating that there needs to be an agreed method for determining the readiness and suitability of the APAC SWIM Technical Infrastructure for operational use. SWIM Architecture, SWIM Security, and SWIM Governance all need to be considered for testing and validation.

8.5 SWIM Information Services no longer needs to be considered since it is no longer the responsibility of the SIPG to implement Information Services.

8.6 The Meeting debated both the paper and the presentation. It was agreed that the paper and the presentation would serve as inputs to Task 11..

8.7 After further discussions, it was decided that the scope of Task 11 is as follows:

- Take the outputs from Tasks 1, 2, 3, 5, 6, and 7 and develop a set of test procedures for the SWIM TI.
- Present these procedures to the SIPG and SWIM Task Force for acceptance and approval.
- Work with Tasks 5, 9 and 10 to execute the test procedures and obtain the results.
- Prepare a test report based on the results and present them to the SWIM Task Force for acceptance.

8.8 It was noted that the consequence of accepting these test results would take the SWIM TI from a prototype phase into the production phase. There is still a need to transmit it into the operational phase. The SWIM Task Force should define what this operational phase should be. SIPG will share this information with SWIM TF. ***ACTION ITEM WS2-13***

8.9 There was a suggestion that the AFTN to AMHS transition document could be used as a reference to help define how SWIM should transition from Production into operation.

8.10 The Meeting also decided that the timeline for Task 11 should start in February 2026 and end no later than April 2027. This is so that the SWIM Task Force can meet its deadline of having an operational SWIM by the end of 2030. ***ACTION ITEM WS2-14***

9 Next Meeting Dates and Any Other Business.

9.1 Japan presented a draft version of the proposed DGCA/60 paper. The paper highlighted the work being done by the SWIM Task Force and the SIPG. It also presented the future work of the SWIM Task Force and emphasized the importance of SWIM for global aviation.

9.2 The paper called for states to be more involved in APAC SWIM implementation and for states to participate in SWIM-related workshops and seminars.

9.3 The Meeting provided feedback and comments on the paper. Japan requested the Meeting to review the paper and to send them all feedback and comments before **6 June 2025**. ***ACTION ITEM WS2-15***

9.4 The Meeting discussed the need for one more In-person working session after SIPG WS/3. It was reminded that the initial plan was to conduct three In-Person working sessions; however, based on progress in the next session, the need for another in-person session will be deliberated further. It was agreed that the next SIPG working session will be planned for **26-30 January 2026**. The venue of the Meeting was tentatively set at the ICAO Regional Office in Bangkok, Thailand. A reply from Australia or Singapore regarding their availability to host the next SIPG Working Session is pending.

Attachment 1 – High Level Timeline for SIPG Work Program

Timelines	**25 June**	**25 July**	**25 August**	**25 September**	**25 October**	**25 November**	**25 December**	Remarks
Task 1 - Req of Edge and Gateway EMS								
Task 2 - New hierarchical architecture								
Task 3 - Req/Rep guidance (Async and Sync)								
Task 5 - SWIM TI Integration								
Task 6 - SWIM Security requirements and implementation.								Aug - End of self-signed certificate trial. Review ACCP after trial.
Task 7 - SWIM Registry req and implementation								

(Legend)

Requirements Group	Sys Engineering Group	Test and Validation Group

Attachment 1 – High Level Timeline for SIPG Work Program

Timelines	**Jan 26**	**Feb 26**	**Mar 26**	**Apr 26**	**May 26**	**Jun 26**	
Task 5 - SWIM TI Integration							
Task 7 - SWIM Registry Interconnection							

Timelines	**26 July**	**26 August**	**26 September**	**26 October**	**26 November**	**26 December**	
Task 5 - SWIM TI Integration							
Task 9 - APAC SWIM Integration testing							
Task 10 - Performance Testing							
Task 11 - SWIM Operationalization Guidance Material							

(Legend)

Requirements Group	Sys Engineering Group	Test and Validation Group

SIPG WS/2
Attachment 2 to the Report

Table of Task Assignments

Task ID	Tasks Description	Team

Task 1	Requirements and Functionalities of the Edge EMS and Gateway EMS
	- Coordinate with Task 2 for requirements on Topics.
	- Standardizing of the topic structure and / or message properties.
	- Consider the treatment of message TTL within the Gateway EMS and Edge EMS
	- How to do guaranteed message delivery. Push vs Pull method.
	- To include maintenance requirements and procedures for the Gateway and Edge EMS
	  o Updates of software
	  o Updates of the configuration
	  o Updates of certificates
		Lead:
		Thailand
		
		Members:
		Australia,
		China,
		Hong Kong China,
		India,
		Japan,
		Fiji,
		Singapore,
		Malaysia,
		USA,
		Republic of Korea,
		New Zealand,
		CANSO

Task 2	New proposed hierarchical architecture refinement
	- Use SWIM TF/10 WP/17 as inputs
	- Routing via Topics
	- Explore the use of Multiple Queues and how that can be configured. (e.g. by data domain, by QoS)
	- How is message priority going to be implemented. SIPG's task is to look at how priority can be achieved. What priorities should each message type have is up to the domain and operational expert groups
	- Message transmission retry mechanism.
	  o What is the logic for failover
	  o Scope is limited to Edge-Gateway-Gateway-Edge message transmission
	  o Methodology for redelivery. Who gets informed of the tx failure? How many retries? What are the rules for rerouting?
	- Comparison between use of Message Properties and Message Topics for Routing.
		Lead:
		China
		
		Members:
		Australia,
		Hong Kong China,
		India,
		Japan,
		Fiji,
		Singapore,
		Thailand,
		Malaysia,
		USA,
		Republic of Korea,
		New Zealand
		CANSO

Task 3	Guidance for the Sync Req / Rep and Async Req / Rep Message Exchange Pattern	**Lead:** **Republic of Korea**

Table of Task Assignments

Task ID	Tasks Description	Team
	- Most important task is to get alignment within the SIPG on what we mean by Sync Req /Rep and Async Req / Rep. Need to tie back to the definition found in Doc 10203 - Should not pose technical questions to other expert groups but rather ask them to state how they believe their information services should behave. - Use Korea's paper SWIM TF/10 WP 18 as inputs - Consider the use of API Gateways and how they can be deployed. - How to support RESTful Req/Rep MEP?	**Members:** Australia, China, Hong Kong China, India, Japan, Fiji, Singapore, Thailand, Malaysia, USA, New Zealand CANSO
Task 5	SWIM Technical Infrastructure Integration	**Lead:** **Singapore** **Members:** Australia, China, Hong Kong China, India, Japan, Fiji, Thailand, Malaysia, USA, Korea, New Zealand CANSO
Task 6	SWIM Security Requirements and Implementation - Review of the ACCP when published by the TFP - Continue with the Self-signed certificate testing with more participants - Explore how trust can be established across different entities using self-signed certificates - To consider how the renewal of certificates should be handled. - To use Malaysia's presentation at SIPG as input to this task	**Lead:** **Malaysia,** **Members:** Singapore, Thailand, Vietnam, Hong Kong, USA, Japan Philippines, China (Observer), New Zealand (Observer)
Task 7	SWIM Registry Requirements and Implementation	**Lead:** **USA**

Table of Task Assignments

Task ID	Tasks Description	Team
		Members: China, Sri Lanka, Philippines, Republic of Korea, Thailand, Singapore, Japan, *Hong Kong China (Observer)*
Task 9	APAC SWIM Integration Testing - To develop Use Cases and test scenarios to test the SWIM TI. - Propose to use the TBO Pathfinder Use Case as a starting point. - To remember to include Surveillance Use cases	**Lead: TBD** **Members:** Australia, China, Hong Kong China, India, Japan, Fiji, Singapore, Thailand, Malaysia, USA, Republic of Korea, New Zealand CANSO
Task 10	Performance Testing SWIM TI - Latency - Functional Capacity - Data Integrity	**Lead: TBD** **Members:** Republic of Korea, India, Singapore, USA.
Task11	Regional SWIM TI Production Readiness Document - Scope: 1) Propose the test procedures for the SWIM TI 2) Report of the test results based on agreed test procedures - To include the requirements, test procedures and key performance indicators as captured in the above tasks 1, 2, 3, 6 & 7. - Prepare the acceptance criteria for the SWIM TI	**TBD?**

LIST OF PARTICIPANTS

	STATE/NAME		TITLE/ORGANIZATION	E-MAIL
1.	**AUSTRALIA (1)**			
	1.	Mr. Bruce Arnold	Aviation Technology Manager, Bureau of Meteorology Australia	bruce.arnold@bom.gov.au;
2.	**BANGLADESH (3)**			
	2.	Mr. Jogesh Karmakar	Deputy Director (ATM), Civil Aviation Authority of Bangladesh (CAAB)	jogesh_caab@yahoo.com;
	3.	Mr. MD SHAKHAOAT HOSSAIN	Assistant Director (Airspace Design), Civil Aviation Authority of Bangladesh (CAAB)	shakhaoat-atm@caab.gov.bd;
	4.	Mr. Kazi Shamsul Alam	Assistant Director CNS	Shamsulcaab@gmail.com;
3.	**CHINA (3)**			
	5.	Ms. Honglei Gao	Senior engineer, ATMB of CAAC	hlgao_atmb@foxmail.com;
	6.	Mr. Jing Fang	Engineer, ATMB of CAAC	robertfang@126.com;
	7.	Mr. Lisi Su	Senior Engineer, SWATMB of CAAC	slslsl13@163.com;
4.	**HONG KONG CHINA (1)**			
	8.	Mr. Henry Chan	Electronics Engineer, Civil Aviation Department, Hong Kong, China	hhlchan@cad.gov.hk;
5.	**INDIA (3)**			
	9.	Sh. Hemant M. Ramchandani	GM(CNS)	hemantr@AAI.AERO;
	10.	Smt. Latha Balakrishnan	DGM(CNS)	lathabk@AAI.AERO;
	11.	Sh. Vinayak Katke	DGM(ATM)	vinayak@AAI.AERO;

	STATE/NAME		TITLE/ORGANIZATION	E-MAIL
6.		**IRAN (3)**		
	12.	Mr. Ali Reza Mohammadzadeh Balsini	ATN Supervisor, Directorate General of Communication and Navigation/ATN office, Iran Airports and Air navigation Company (IAC)	alirezacraft@gmail.com; abalsini@airport.ir;
	13.	Mr. Ehsan Mottaghifar	Aeronautical Telecommunication Expert, Aeronautical Telecommunication and ICT, Iran Airports and Air navigation Company (IAC)	ehsanmottaghy@gmail.com; e.mottaghifar@airport.ir;
	14.	Mr. Mohammadreza Babalou	Operational Team Lead for Network Monitoring, Aeronautical Telecommunication and ICT, Iran Airports and Air navigation Company (IAC)	babalou.mr@gmail.com; m.babaloo@airport.ir;
7.		**JAPAN (3)**		
	15.	Mr. Xiaodong Lu	Principal Researcher, ELECTRONIC NAVIGATION RESEARCH INSTITUTE	luxd@mpat.go.jp;
	16.	Mr. YUKINOBU RYU	Director for Flight Information Management Planning, Operations and Flight Inspection Division, Japan Civil Aviation Bureau	ryuu-y2ea@mlit.go.jp;
	17.	Mr. Yosuke MORO	Special Assitant to the Director, JCAB/JAPAN	moro-y02vf@mlit.go.jp;
8.		**LAO PEOPLE'S DEM. REP. (1)**		
	18.	Mr. Manivong DOUANGPHACHANH	Deputy Director Division, Department of Civil Aviation of Lao PDR	manivongmd2499@gmail.com;
9.		**MALAYSIA (5)**		

	STATE/NAME		TITLE/ORGANIZATION	E-MAIL
	19.	Mr. Mohd Azmadi Bin Abdullah		azmadi@siagalabs.com;
	20.	Dr. Nurul Husna Binti M Saad		husna@siagalabs.com;
	21.	Mr. Muhammad Hafidz Bin Ibrahim		mhafidz_ibrahim@caam.gov.my;
	22.	Mr. Anwar Bin Awang Man		anod@tm.com.my;
	23.	Mr. Mohd Yusof Abdul Razak		yusof@novatis.com.my;
10.	**NEW ZEALAND (2)**			
	24.	Mr. Christopher Cloughley	Software Engineer, Airways New Zealand	chris.cloughley@airways.co.nz;
	25.	Mr. Edmund Heng	Senior Technical Specialist Aeronautical Services, Civil Aviation Authority of New Zealand	edmund.heng@caa.govt.nz;
11.	**PAKISTAN (4)**			
	26.	Mr. Shamsuddin Hakro	Additional Director Com Ops, PAKISTAN Civil Aviation Authority - Communication Operations	AdlD.ComOps@caapakistan.com.pk;
	27.	Mr. Shahid Hussain	Senior Joint Director, Com-Ops, Pakistan Airports Authority - Operations Directorate	shahid.hussain@caapakistan.com.pk;
	28.	Mr. Saad Qaisar	Senior Assistant Director, Pakistan Airports Authority - CNS Directorate	saad.qaisar@caapakistan.com.pk;
	29.	Mr. Sohail Ahmed	Deputy Director / CNS Inspector, PAKISTAN Civil Aviation Authority - AAR Directorate	sohail_ahmed@caapakistan.com.pk;
12.	**PHILIPPINES (7)**			

	STATE/NAME		TITLE/ORGANIZATION	E-MAIL
	30.	Ms. Cyndi Balucating	Air Traffic Management Officer IV, Civil Aviation Authority of the Philippines	cyndi.balucating@gmail.com;
	31.	Ms. Jesseelyn Heje	Division Chief - AIS Division, Aeronautical Information Service (AIS) - Civil Aviation Authority of the Philippines	jellane27@yahoo.com;
	32.	Mr. Ernesto Jr Gagtan	Div. Chief III, CAAP	egagtanjr@yahoo.com;
	33.	Mr. Gilmar Tiro	CNS Systems Officer, CAA PHILIPPINES	gilmar.tiro@gmail.com;
	34.	Ms. Helen Grace Fortes	Air Traffic Management Officer, CAAP, Manila	miaka_gracie@yahoo.com;
	35.	Mr. Nickson M. Morada	Division Chief IV, ATMSID	nmmorada@caap.gov.ph;
	36.	Mr. Roseller Nicanor A De Dios	Senior ASSI, ATMSID	rnadedios@caap.gov.ph;
	37.	Ms. Lea L. Bordon	ASSI II, ATMSID	llbordon@caap.gov.ph;
13.	**REPUBLIC OF KOREA (5)**			
	38.	Mr. Joohwan Bang	Assistant Director, Minisry of Land, Infrastructure and Transport, Republic of Korea / Air Traffic Management Office	joohwan.bang@gmail.com;
	39.	Ms. Hannare Park	officier, Minisry of Land, Infrastructure and Transport, Republic of Korea / Air Traffic Management Office	narae96@korea.kr;
	40.	Ms. Sim Suin	Assistance Director, Korea Airports Corporation (KAC)	

	STATE/NAME		TITLE/ORGANIZATION	E-MAIL
	41.	Mr. Sehwan Han	Senior Research Engineer, Korea Airports Corporation	hsh91@airport.co.kr;
	42.	Mr. Soo-Hyun Lee	Technological Research Department, Korea Airport Corporation	haha0982@airport.co.kr;
14.	**SINGAPORE (6)**			
	43.	Mr. David Shin Hwah Leow	Head (Quality Assurance), Civil Aviation Authority of Singapore	david_leow@caas.gov.sg;
	44.	Mr. Wei Xiong Elvin Liow	Head (Open Platform for Air Navigation Services), Civil Aviation Authority of Singapore	elvin_liow@caas.gov.sg;
	45.	Mr. Jackson Ho	Senior Engineer, Civil Aviation Authority of Singapore (CAAS)	jackson_ho@caas.gov.sg;
	46.	Mr. Adriel Chan	Engineer, Civil Aviation Authority of Singapore (CAAS)	adriel_chan@caas.gov.sg;
	47.	Mr. Joel Ng	Senior Chief (OT), Civil Aviation Authority of Singapore	joel_ng@caas.gov.sg;
	48.	Mr. Jonathan Kua	Project Manager (NCS Pte. Ltd.)	
15.	**SRI LANKA (2)**			
	49.	Mr. Asanga Bandara	Deputy Head of Electronics & Air Navigation Engineering, Airport and Aviation Services (Sri Lanka) Ltd.	asanga.eane@airport.lk;
	50.	Mr. B. A. Sampath Sisira Kumara	Manager Aeronautical Information Management, AASL Sri Lanka	sampath.aim@airport.lk;
16.	**THAILAND (6)**			

	STATE/NAME		TITLE/ORGANIZATION	E-MAIL
	51.	Mr. Chaiwat Saekhew	Officer, The Civil Aviation Authority of Thailand	chaiwat.s@caat.or.th;
	52.	Mr. Piyanat Mentaisong	Aeronautical Information Management System Officer, The Civil Aviation Authority of Thailand	piyanat.m@caat.or.th;
	53.	Mr. Nathapoom Charerntaungseewilai	Aeronautical Information management System Officer., The Civil Aviation Authority of Thailand	Nathapoom.c@caat.or.th;
	54.	Ms. Amornrat Jirattigalachote	Expert (Director Level), Aeronautical Radio of Thailand Ltd. (AEROTHAI)	amornrat.ji@aerothai.co.th;
	55.	Mr. Arthit Tosukolvan	Engineer, AEROTHAI, Aeronautical Radio of Thailand Ltd.	arthit.to@aerothai.co.th;
	56.	Mr. Worapong Jirojkul	Executive Air Traffic Systems Engineer, AEROTHAI, Aeronautical Radio of Thailand Ltd.	worapong.ji@aerothai.co.th;
17.	**UNITED STATES OF AMERICA (1)**			
	57.	Mr. Shayne Campbell	Senior International Air Traffic Representative Asia Pacific, United States Federal Aviation Administration (FAA)	shayne.a.campbell@faa.gov;
18.	**VIETNAM (3)**			
	58.	Mr. Nguyen Hong Hiep	Manager, CNS Department, VATM	nguyenhonghiepbk@vatm.vn ;
	59.	Mr. Ngo Quang Huy	Speacialist, Technical Operation Center of VNAIC, VATM	
	60.	Mr. Giang Hoang	CNS Technician, VATM – ATTECH	giangh@attech.com.vn;

	STATE/NAME		TITLE/ORGANIZATION	E-MAIL
19.	**CANSO (1)**			
	61.	Mr. Wayne Osse	Chief Architect, Global Aviation and Transportation, Solace	wayne.osse@solace.com;
20.	**ICAO (3)**			
	62.	Ms. Soniya Nibhani	Regional Officer ANS Implementation (CNS) Asia and Pacific Office International Civil Aviation Organization	snibhani@icao.int;
	63.	Ms. Jian Xu	Associate Programme Officer, Air Navigation Systems (CNS) Implementation, International Civil Aviation Organization Asia and Pacific Office	jixu@icao.int;
	64.	Ms. Varapan Meefuengsart	Programme Assistant, CNS/MET Asia and Pacific Office International Civil Aviation Organization	vmeefuengsart@icao.int;

LIST OF WORKING PAPERS

WP No.	Agenda Item	Subject	Presented by
WP/01	2	Approach to a Global API Gateway for Web Services	ROK
WP/02	2	Comparison of SWIM Discovery Service (SDS)	ROK
WP/03	2	Requirements Specification Template for GEMS and Global SWIM Service	ROK
WP/04	6	Strategies for SWIM operationalization in the aspect of validation	ROK

LIST OF PRESENTATION

		PRESENTATIONS	
SP No.	**Agenda Item**	**Title**	**Presented by**
SP/01	1	Agenda and Working Arrangements	SIPG Led
SP/02	7	SWIM Timeline Proposal	SIPG Led
SP/03	2	SWIM Architecture: Requirements on Gateway EMS	SIPG Led
SP/04	3	APAC SWIM Architecture and Message Exchange over CRV	Japan
SP/05	5	Standardized Nomenclature – Naming Conventions	SIPG Led
SP/06	6	Conditions for SWIM Operationalization	SIPG Led

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