International Civil Aviation Organization

Twelfth Meeting of the Common aeRonautical Virtual Private Network Operations Group (CRV OG/12)

Denarau Island, Fiji, 23-26 January 2024

Agenda Item 10: Review the requirement of CRV for SWIM
- Subscriber
- GEMS
- ANSP

OUTCOMES OF JOINT CRV OG EXPERTS AND SWIM TF TLS MEETINGS

(Presented Airways New Zealand)

SUMMARY

This paper presents an update on the meetings between the CRV OG Experts and the SWIM Taskforce Team Leads.

1. INTRODUCTION

1.1 The joint CRV OG experts and SWIM TF TLS meetings occurred thrice in 2023 on 22 February, 23 June, and 5 October 2023 via TEAMs. The next joint meeting is scheduled on 7 March 2024. This paper shared the key outcomes of three meetings held in 2023.

2. DISCUSSION

SWIM principally over CRV

2.1 SWIM Infrastructure was discussed including SWIM TI Interface Binding and the use of the internet for MET Information.

The SWIM TF remains concerned over the bandwidth capabilities of the CRV but have been assured that PCCWG is able to increase the bandwidth beyond the costed 2M services. The key discussion points can be accessed in **Appendix A**.

SWIM TF/6 Action Items related to CRV OG

2.2 No outcomes needed discussing.

PCCWG Console Connect Aviation Platform

2.3 PCCWGs platform was discussed. Several questions arose from the discussion, the main one being around the internet access and CRV based access to the platform. It was confirmed that there is separation between the two sides of the platform.

There are several other questions where CRV is involved in the connectivity but need to be answered by the SWIM TF.

CRV OG and SWIM TF Working Together

2.4 The meeting discussed the various stages of the SWIM implementation. There are now three SWIM groups, SWIM Taskforce, S3TIG and SWIM Implementation Pioneer Ad-Hoc group.

S3TIG and SWIM Taskforce are running the demo of SWIM over a Pseudo CRV for SWIM and Surveillance over SWIM. The Pseudo CRV is using several Package D connections provided by PCCW. The Pseudo CRV is a smaller version of CRV using separate tunnels and IP addressing to the Operational CRV.

Bandwidth is 2M. CoS will be BE.

Concerns were raised regarding the security of the PCCW Console Connect Platform due to the internet connectivity. This is addressed via the separation within the platform and that the internet cannot connect to the CRV network.

A lack of requirements from the SWIM Taskforce for the CRV continues to be discussed. As the SWIM platform is developed and the trial is carried out, it is expected that these details will be forthcoming. More discussion is required.

The SWIM TF asked who pays the cost for a 3rd party SWIM connects to the CRV. The meeting suggested that SWIM TF may consider adopting CRV approach, i.e. selecting SWIM service providers for a region and establishing a regional contract, in future. It was also recommended that the vendor(s) chosen should meet all requirements set by CRV OG for accessing the network. SWIM TF Co-Chair suggested more detailed deliberation for this proposal is needed. The key discussion points can be obtained in Appendix B and Appendix C.

CRV Governance

2.5 CRV Co-Chairs shared with the meeting the work being carried out on the Governance of the CRV.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper;
b) review the discussion of the meeting;
c) contribute into the CRV OG Ad-hoc Governance Group; and
d) discuss any relevant matter as appropriate

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PCCW Console Connect Aviation Platform

	CRV	Console Connect Platform for Aviation	Internet
Network Options	MPLS with GRE tunnel with customized options of Package A, B, B+, C, C+, D	Local Loop, IPSec Internet, SDWAN & IoT SIM	User's local internet
SLA	Stringent SLA depends on Package A, B, B+, C, C+, D	Standard SLA	No SLA
SWIM Enabled	Yes, CRV users' own SWIM platform or PCCW CRV SWIM	Yes, enable SWIM data exchange thru Console Connect SWIM to PCCW CRV SWIM	No
Ordering	PCCW Team looks after the whole processes	Self-service portal.	User orders own local internet with a fix contract term.
Core Network	PCCW Global Network backbone	PCCW Global Network backbone	Public Internet Exchange between different providers
Information Security	Highest	High	Low
Data	AMHS, Ground-to-Ground Voice, ADS-B etc.	SWIM Data only	Any
Performance and Speed	Reliable performance and bandwidth	Reliable performance and bandwidth	Variation in performance and bandwidth
Daily Support	Dedicated Service Manager	7 x 24 NOC Support	Self-trouble shooting

➢ Confirmations

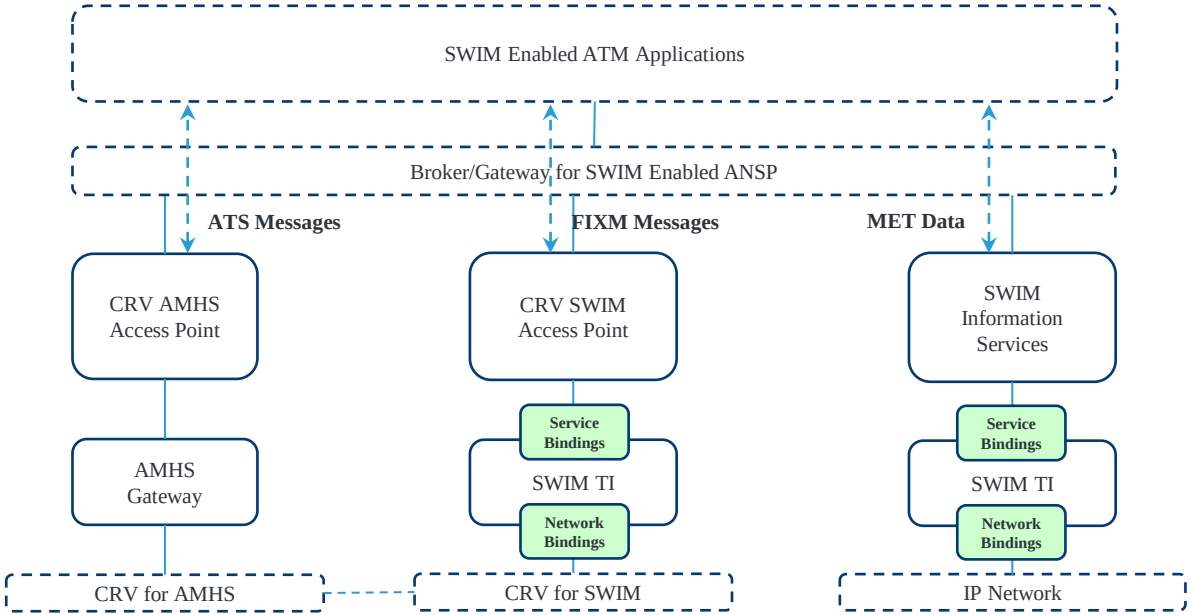
1. **The CRV AMHS and CRV SWIM are on a same physical network or different?**
2. **To access the CRV AMHS and CRV SWIM, ANSP users should use one access point or two?**
3. **PCCW will plan to provide AMHS/SWIM transformation service on CRV or not?**
4. **Is there any use case or solution to achieve the FF-ICE/R1 during the transition period?**
5. **Is there any governance for SWIM Technical Infrastructure (Messaging, Security, etc.) to achieve the interoperability between different SWIM platforms managed by different stakeholders?**
6. **Who will be responsible for theses issues? The regional technical community is expected.**

Decision SWIM TF/06/01 The Use of the Internet for MET Information Services

Decision CNS SG/26/04 (SWIM TF/06/01) - The Use of the Internet for MET Information Services in Regional SWIM architecture	
What: That, the use of Internet for meteorological information services will be considered in designing the regional SWIM architecture.	Expected impact: ☐ Political / Global ☐ Inter-regional ☐ Economic ☐ Environmental ☒ Ops/Technical
Why: To support cost-effective and efficient meteorological information services for exchange of less-sensitive meteorological information in SWIM.	Follow-up: ☐Required from States
When: 9-Sep-22	Status: Adopted by Subgroup
Who: ☒Sub groups ☐APAC States ☐ICAO APAC RO ☐ICAO HQ ☒Other: SWIM TF	

User-based Access: Application Level Coexist

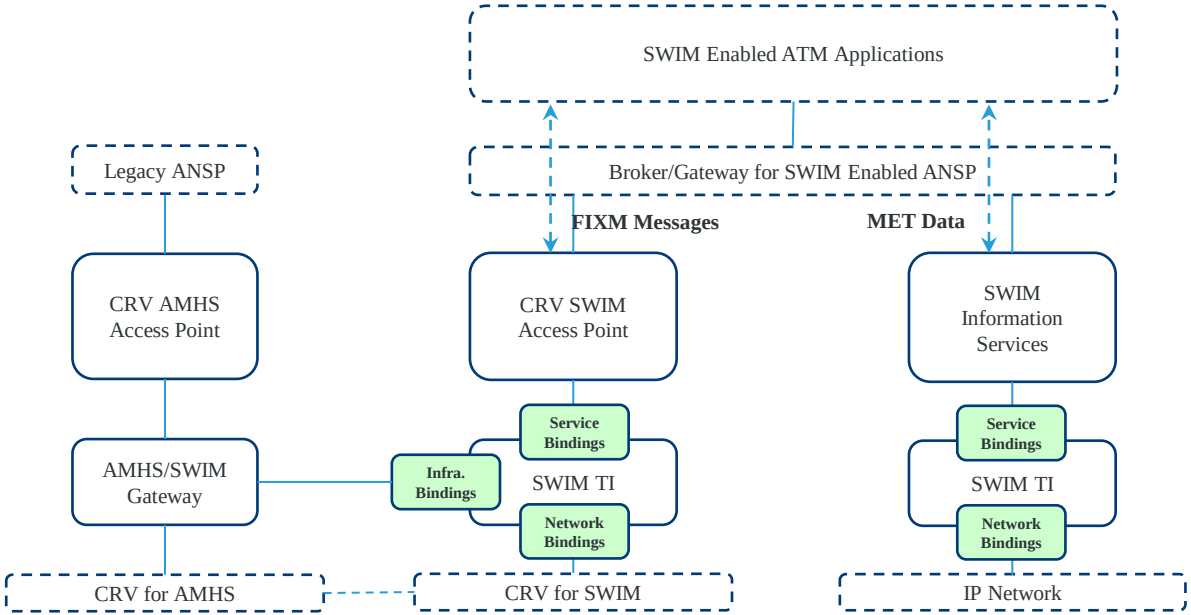
➢ Without AMHS/SWIM Gateway



- The network segments of CRV for AMHS and CRV for SWIM are connected by gateway and applications.
- The Broker/Gateway should be provided by each SWIM enabled ANSP.
- The message transformation and information integration should be implemented by SWIM enabled ATM applications.

User-based Access: Application Level Coexist

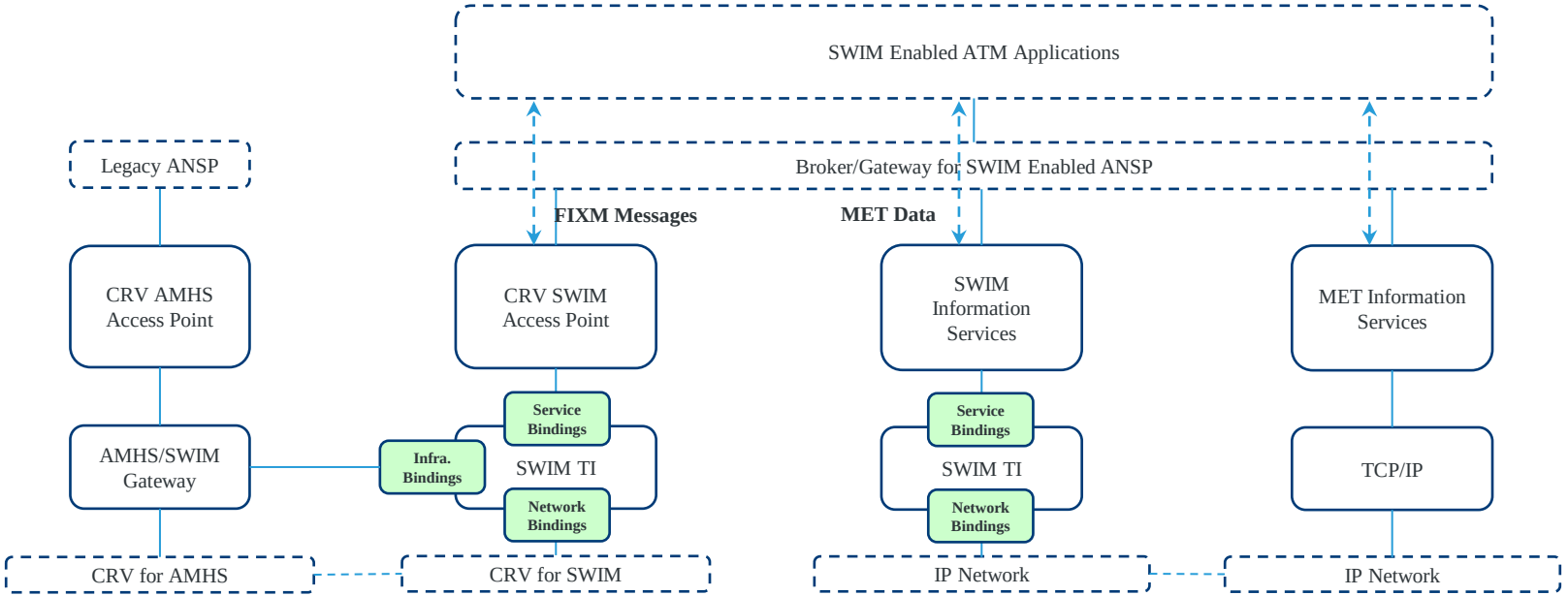
➢ With AMHS/SWIM Gateway



- **The AMHS/SWIM message transformation is implemented at messaging layer.**
- **The Broker/Gateway should be provided by each SWIM enabled ANSP.**
- **The information integration should be implemented by SWIM enabled ATM applications.**

User-based Access: Application Level Coexist

➢ Using Internet Services

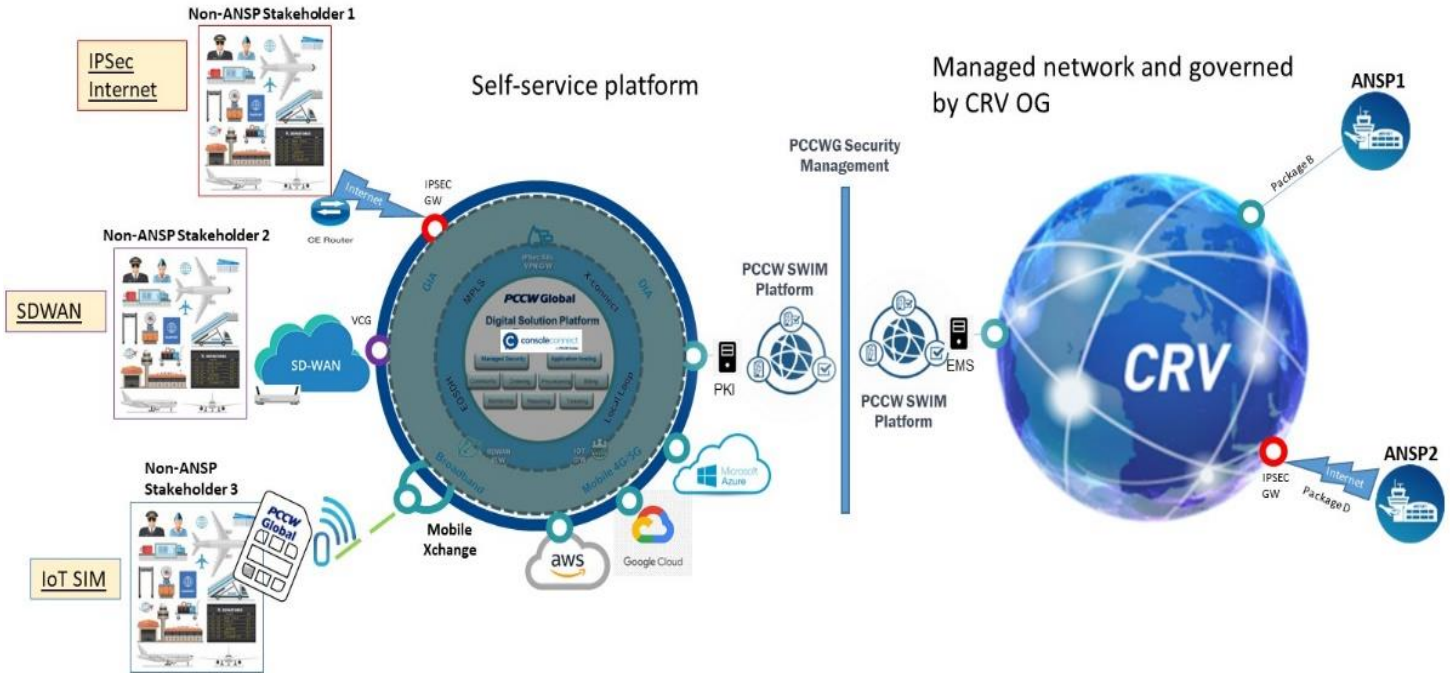


SWIM TI Interface Bindings Profile

SWIM TI Interface Bindings	Interface Types	Technology Standards
Network Bindings	- Message-oriented	- TCP/IP (IPv4 and IPv6)
Service Bindings	- Message-oriented - Resource-oriented - Method-oriented	- Publish/Subscribe: AMQP - Request/Reply: RESTful WS - Request/Reply: WFS
Infrastructure Bindings	- Message-oriented	- Publish/Subscribe: AMQP - Transform-Forward: AMHS/SWIM Gateway

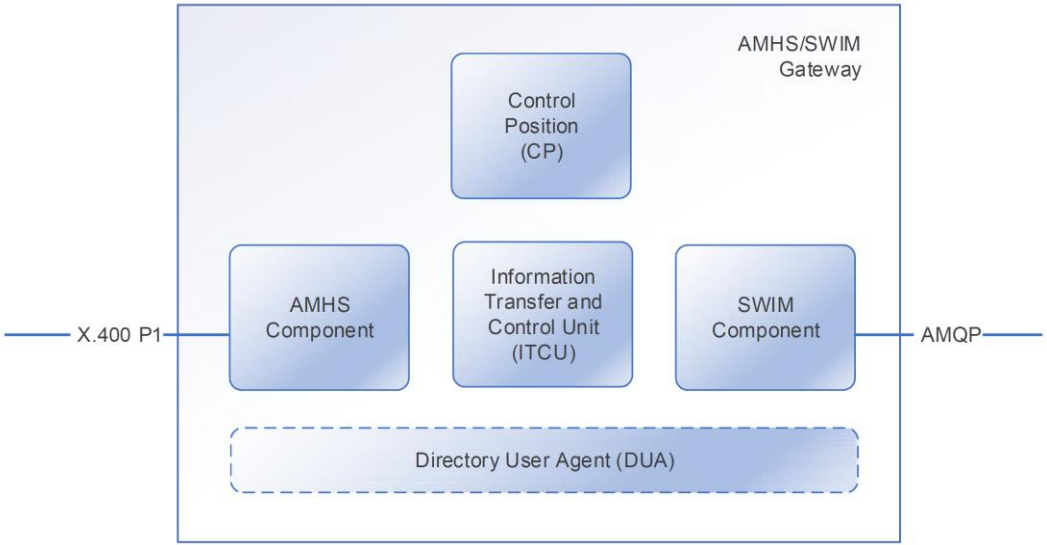
Thanks

PCCW Console Connect Aviation Platform



SWIM TI Interface Binding (SWIM TF/6 WP/09)

➢ AMHS/SWIM Gateway



- **AMHS/SWIM GATEWAY PROGRESS REPORT, SWAMWAY Study Group, AFS TO SWIM TRANSITION TASK FORCE (AST TF)**

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NO COUNTRY LEFT BEHIND

Agenda Items

1. Opening by CRV OG and SWIM TF Co-Chairs
2. CRV OG and SWIM TF Working Together
   - 2.1 SWIM over CRV Demonstration (the Demo)
   - 2.2 SWIM Implementation Pioneer Ad-Hoc Group
3. Regional SWIM Establishment
   - 3.1 SWIM principally over CRV
   - 3.2 PCCW Console Connect Aviation Platform
4. CRV Governance
5. Next Meeting Date and Any Other Business

1. Opening by CRV OG and SWIM TF Co-Chairs

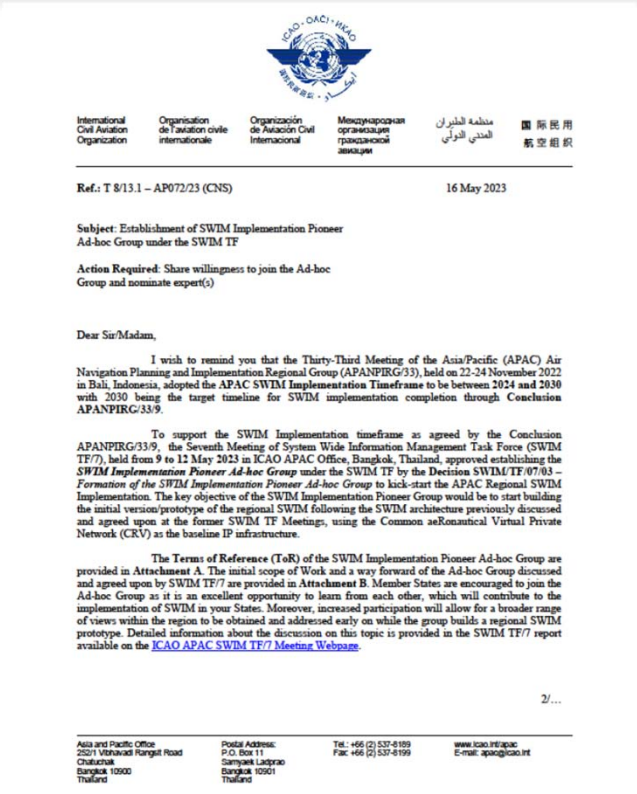
2. CRV OG and SWIM TF Working Together
   2.1 SWIM over CRV Demonstration (the Demo)
      - To be marked as the starting point of SUR data sharing in SWIM environment trial (the Trial), the work under S3TIG

To assist the CRV OG with understanding the operation of SWIM and to be able to plan for future bandwidth options, would you be able to provide the following information please:

1. Bandwidth and CoS proposed for the Package D connections.
2. Network drawings for the trial.
3. System drawing for the trial.
4. Test Plan for the trial.
5. Access to the PCCWG portal for the 5 Package D circuits to observe the network performance.
6. Access to the test report.

2.2 SWIM Implementation Pioneer Working Group

- Pseudo CRV
- Focus: SWIM TI
- Also included:
  - SWIM information services
    e.g. flight information, MET information
  - SWIM registry
  - AMHS/SWIM conversion



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Ref.: T 8/13.1 – AP072/23 (CNS) 16 May 2023

Subject: Establishment of SWIM Implementation Pioneer Ad-hoc Group under the SWIM TF

Action Required: Share willingness to join the Ad-hoc Group and nominate expert(s)

Dear Sir/Madam,

I wish to remind you that the Thirty-Third Meeting of the Asia/Pacific (APAC) Air Navigation Planning and Implementation Regional Group (APANPIRG/33), held on 22-24 November 2022 in Bali, Indonesia, adopted the **APAC SWIM Implementation Timeframe** to be between **2024 and 2030** with 2030 being the target timeline for SWIM implementation completion through **Conclusion APANPIRG/33/9**.

To support the SWIM Implementation timeframe as agreed by the Conclusion APANPIRG/33/9, the Seventh Meeting of System Wide Information Management Task Force (SWIM TF/7), held from **9 to 12 May 2023** in ICAO APAC Office, Bangkok, Thailand, approved establishing the ***SWIM Implementation Pioneer Ad-hoc Group*** under the SWIM TF by the **Decision SWIM/TF/07/03 – *Formation of the SWIM Implementation Pioneer Ad-hoc Group*** to kick-start the APAC Regional SWIM Implementation. The key objective of the SWIM Implementation Pioneer Group would be to start building the initial version/prototype of the regional SWIM following the SWIM architecture previously discussed and agreed upon at the former SWIM TF Meetings, using the Common aeRonautical Virtual Private Network (CRV) as the baseline IP infrastructure.

The **Terms of Reference (ToR)** of the SWIM Implementation Pioneer Ad-hoc Group are provided in **Attachment A**. The initial scope of Work and a way forward of the Ad-hoc Group discussed and agreed upon by SWIM TF/7 are provided in **Attachment B**. Member States are encouraged to join the Ad-hoc Group as it is an excellent opportunity to learn from each other, which will contribute to the implementation of SWIM in your States. Moreover, increased participation will allow for a broader range of views within the region to be obtained and addressed early on while the group builds a regional SWIM prototype. Detailed information about the discussion on this topic is provided in the SWIM TF/7 report available on the ICAO APAC SWIM TF/7 Meeting Webpage.

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3. Reginal SWIM Establishment
   3.1 SWIM principally over CRV
   3.2 PCCW Console Connect Aviation Platform

Decision SWIM TF/06/01 The Use of the Internet for MET Information Services

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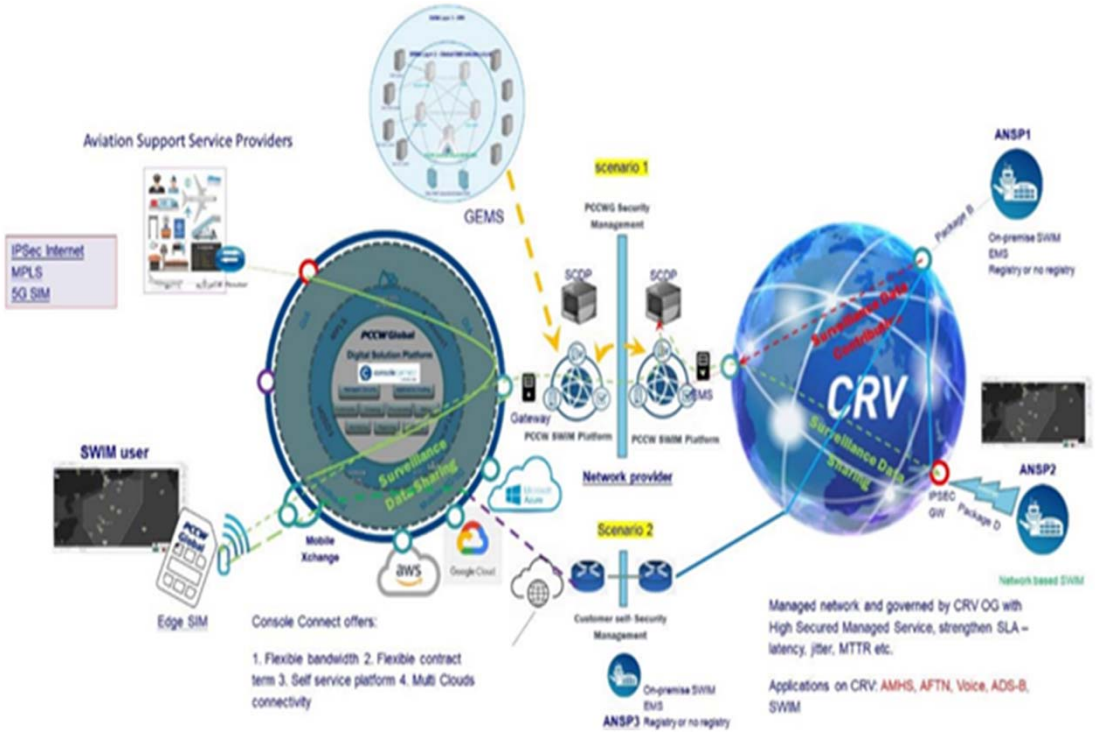
PCCW Console Connect platform (SWIM TF/6)

6-2	CRV OG, Secretariat	PCCW Console Connect Aviation Platform is in concept stage. However, there is the need to deliberate in CRV OG the **security impact of mixed operational environment**, i.e. connecting more service providers and users using internet/other network based services with CRV through a gateway

1. PCCWG to provide more details about the technical specifications of infrastructure to support the interconnection between CRV users and the PCCWG Console Connect platform users.

[PCCWG] The Prototype of Console Connect SWIM-as-a-Service is being developed and will be discussed & aligned with CRV OG, SWIM TF and SURSG. Meanwhile, please refer the above conceptual diagram.



2. Will there be a different GRE tunnel for AMHS data and SWIM data?
[PCCWG] A new GRE tunnel between CRV user and PCCWG SWIM platform will be setup if they use PCCWG SWIM-as-a-Service. States can ride on their existing GRE tunnel to share data (AMHS & SWIM) among themselves.

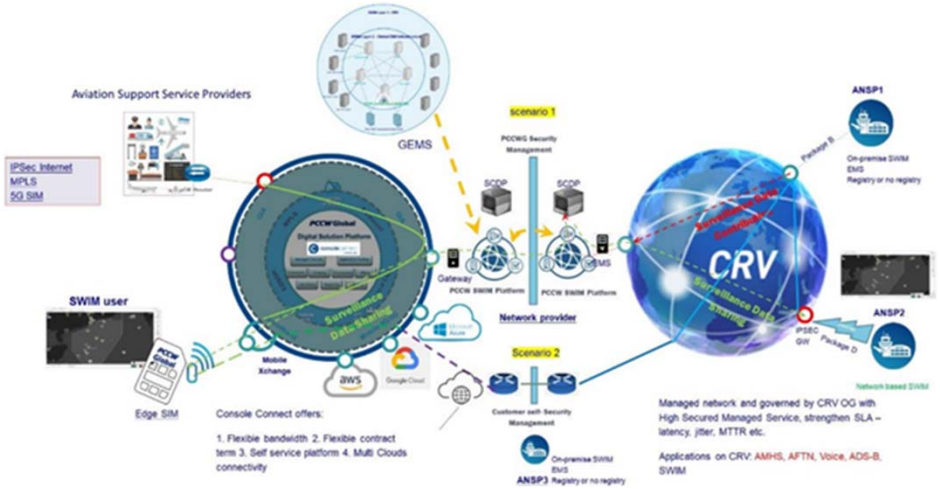
3. Are there two access points, i.e. one access point for AMHS and one access point for SWIM?
[PCCWG] In general, States could use the same CRV access if the capacity is available to support. States are also able to build a new access for SWIM if required.

4. If an ANSP have the capability to support both AMHS and SWIM, can a single access point be provided?
[PCCWG] Yes.

5. Assuming that an ANSP has already connected to CRV - If an ANSP wishes to use their own EMS rather than connecting through the Console Connect platform, how will they be able to connect their EMS to CRV and share the data? Will there be additional cost, apart from the cost for CRV connection already paid, for such ANSP to do so?
[PCCWG] States use their own CRV connection for data and voice communications. They could share SWIM data among themselves using their owned EMS (right hand side of the diagram).

6. As per the discussion at SWIM TF/6, it was understood that PCCWG Console Connect platform does not impose any bandwidth limitations. In such case, how will the CRV network, a physical layer where the Console Connect platform will connect to CRV users, handle the data in a 2 Mbps package?

[PCCWG] In principle, CRV users will connect to CRV SWIM platform only (right hand side) and Aviation support service providers will connect to Console Connect SWIM-as-a-Service.(left hand side) i.e. States and Aviation service providers will not connect across the platforms directly (only relevant data are exchanged (center) – details to be further discussed and aligned with the above mentioned work groups and task force).



7. Will AHMS/SWIM gateway be provided by CRV service provider (PCCWG)?
[PCCWG] Need to further discuss the scope of the AMHS/SWIM gateway.

8. If AMHS service provider and/or other service provider provide AHMS/SWIM gateway, can it be integrated into CRV?
[PCCWG] PCCWG SWIM platform currently work with Frequentis and Comsoft to supports standard FIXM, AIXM, IWXXM. If there are another providers wish to work with us, please contact us to further explore.

9. Can an ANSP use their own AMHS/SWIM gateway together with their own SWIM TI services and connect to CRV for their SWIM implementation?
[PCCWG] They are able to connect their SWIM IP enabled systems via their CRV connections.

10. Does the State/Administration need to sign another agreement if they are CRV users and wish to use AHMS/SWIM gateway if PCCWG is going to provide one?
[PCCWG] Yes, CRV users may sign a new service order with SWIM-as-a-Service specific terms.

PCCW Console Connect Aviation Platform

	CRV	Console Connect Platform for Aviation	Internet
Network Options	MPLS with GRE tunnel with customized options of Package A, B, B+, C, C+, D	Local Loop, IPSec Internet, SDWAN & IoT SIM	User's local internet
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Core Network	PCCW Global Network backbone	PCCW Global Network backbone	Public Internet Exchange between different providers
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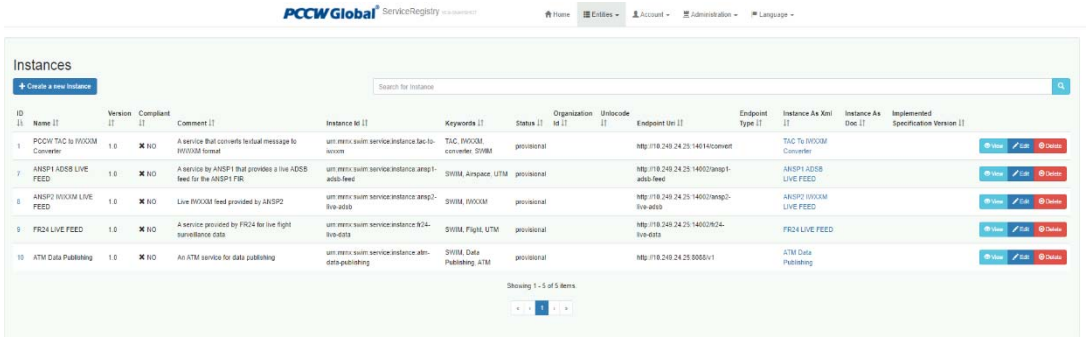
Performance and Speed	Reliable performance and bandwidth	Reliable performance and bandwidth	Variation in performance and bandwidth
Daily Support	Dedicated Service Manager	7 x 24 NOC Support	Self-trouble shooting

PCCW Console Connect Aviation Platform

Console Connect Platform provides web base user interface for SWIM application. The SWIM services from ANSPs on CRV will be listed on PCCW SWIM Registry where users can select and subscribe.



The Console Connect Platform provide an alternative path for non-ANSP users to exchange SWIM data with ANSPs who are on the CRV Network.

4. CRV Governance

5. Next Meeting Date and Any Other Business

Next Meeting Date:

September or October 2023?

7 September = CRV OG Ad-hoc Expert Group Meeting

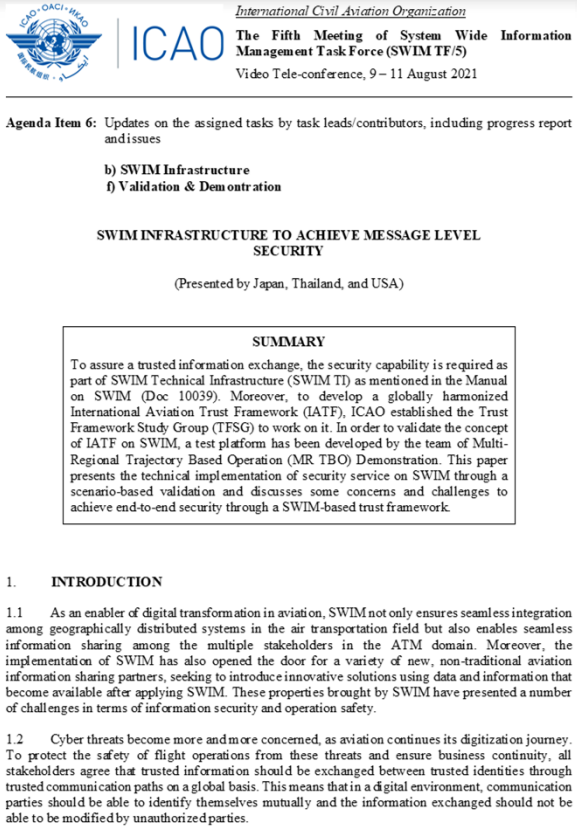
2 October= CRV OG Ad-hoc Governance Group

Thanks

SWIM INFRASTRUCTURE

- SWIM principally over CRV
- WP21 of SWIM TF5- SWIM INFRASTRUCTURE TO ACHIEVE MESSAGE LEVEL SECURITY

5-4	Share and further deliberate the information contained in the WP21 of SWIM TF/5 to Task-2, Task-3, Task-5 and Task-6 groups of SWIM TF along with Common Aeronautical Virtual Private Network Operations Group (CRV OG) and Aeronautical Communication Services Implementation Coordination Group (ACSICG)



International Civil Aviation Organization

ICAO **The Fifth Meeting of System Wide Information Management Task Force (SWIM TF/5)**

Video Tele-conference, 9 – 11 August 2021

Agenda Item 6: Updates on the assigned tasks by task leads/contributors, including progress report and issues

b) SWIM Infrastructure
f) Validation & Demonstration

SWIM INFRASTRUCTURE TO ACHIEVE MESSAGE LEVEL SECURITY

(Presented by Japan, Thailand, and USA)

SUMMARY

To assure a trusted information exchange, the security capability is required as part of SWIM Technical Infrastructure (SWIM TI) as mentioned in the Manual on SWIM (Doc 10039). Moreover, to develop a globally harmonized International Aviation Trust Framework (IATF), ICAO established the Trust Framework Study Group (TFSG) to work on it. In order to validate the concept of IATF on SWIM, a test platform has been developed by the team of Multi-Regional Trajectory Based Operation (MR TBO) Demonstration. This paper presents the technical implementation of security service on SWIM through a scenario-based validation and discusses some concerns and challenges to achieve end-to-end security through a SWIM-based trust framework.

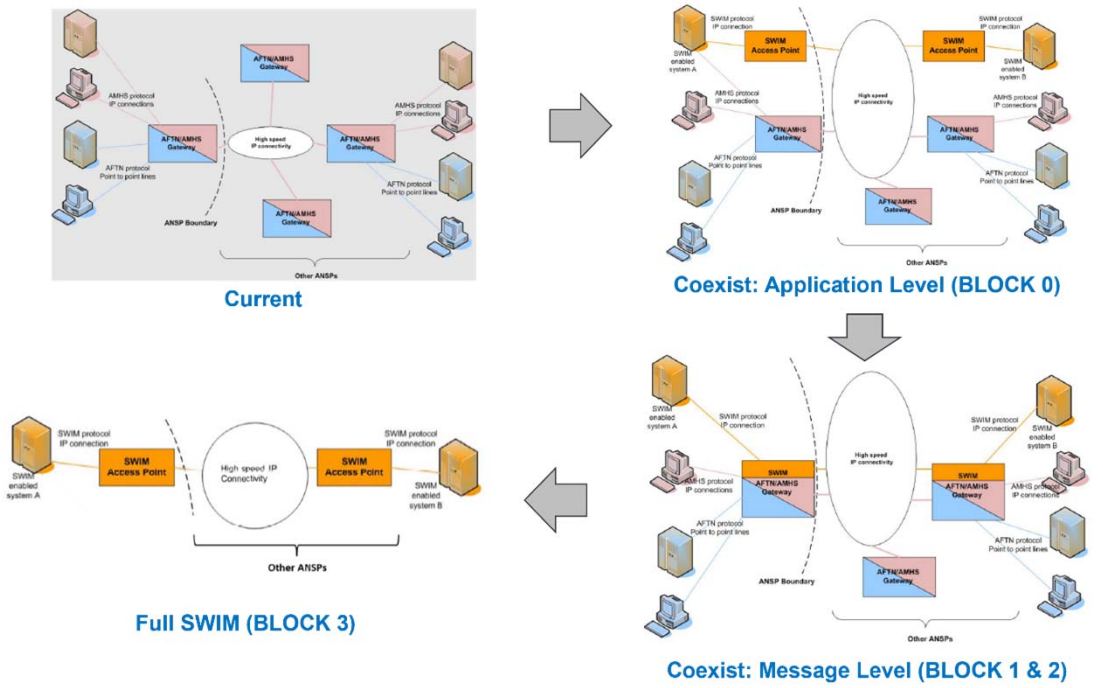
1. **INTRODUCTION**

1.1 As an enabler of digital transformation in aviation, SWIM not only ensures seamless integration among geographically distributed systems in the air transportation field but also enables seamless information sharing among the multiple stakeholders in the ATM domain. Moreover, the implementation of SWIM has also opened the door for a variety of new, non-traditional aviation information sharing partners, seeking to introduce innovative solutions using data and information that become available after applying SWIM. These properties brought by SWIM have presented a number of challenges in terms of information security and operation safety.

1.2 Cyber threats become more and more concerned, as aviation continues its digitization journey. To protect the safety of flight operations from these threats and ensure business continuity, all stakeholders agree that trusted information should be exchanged between trusted identities through trusted communication paths on a global basis. This means that in a digital environment, communication parties should be able to identify themselves mutually and the information exchanged should not be able to be modified by unauthorized parties.

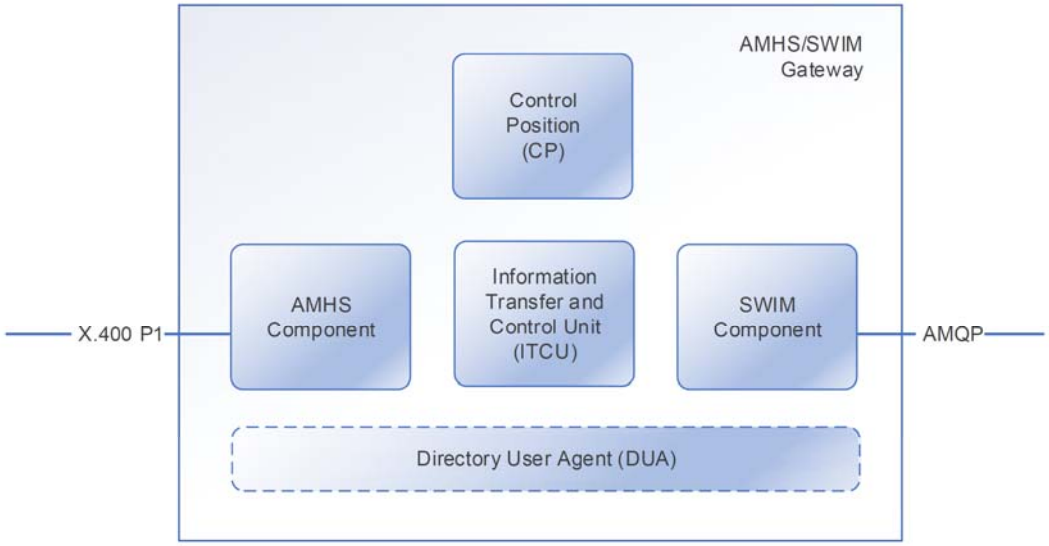
SWIM TI Interface Binding (SWIM TF/6 WP/09)

- **From AFTN/AMHS to SWIM**



SWIM TI Interface Binding (SWIM TF/6 WP/09)

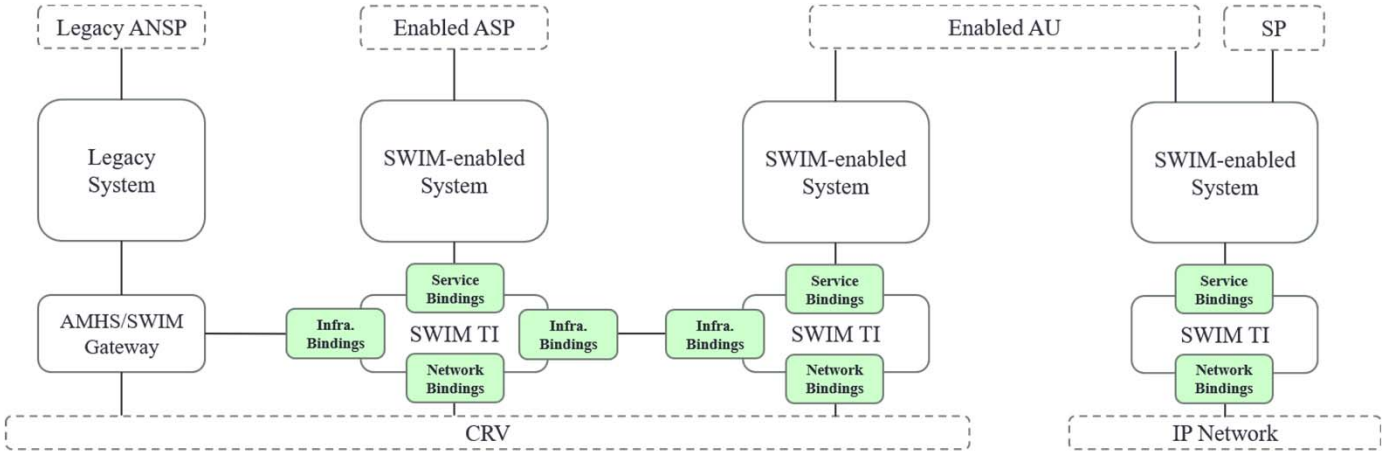
➢ AMHS/SWIM Gateway



- **AMHS/SWIM GATEWAY PROGRESS REPORT, SWAMWAY Study Group, AFS TO SWIM TRANSITION TASK FORCE (AST TF)**

SWIM TI Interface Binding (SWIM TF/6 WP/09)

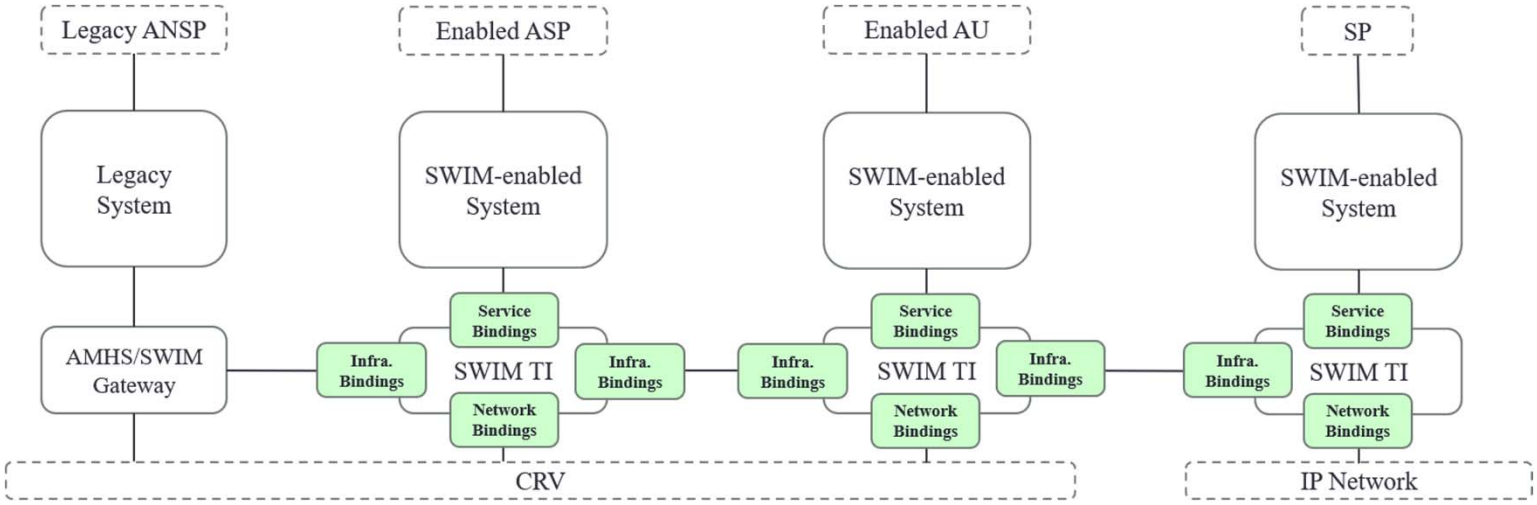
➢ User-based Access



- **Network Bindings: Specify what is expected by the SWIM TI to communicate over the IP network, including protocols from the network and transport layers;**
- **Service Bindings: Specify the service interface technical interoperability, including protocols to interface with the ATM applications;**
- **Infrastructure Bindings: Specify the interface used by a SWIM TI to communicate with other infrastructure systems, including protocols for communication with internal and external services.**

SWIM TI Interface Binding (SWIM TF/6 WP/09)

- **SWIM-based Access**



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WELCOME TO SWIM and CRV Joint Meeting

SWIM TF TL and CRV OG Ad-hoc Expert Group Joint Meeting

Video Teleconference, 5 October 2023, 0800 – 1000 AM (UTC+7)

Agenda

Agenda Item 1: Welcome & Opening Remarks

Agenda Item 2: CRV OG and SWIM TF Working Together

- SWIM over CRV Demonstration
- SWIM Implementation Pioneer Ad-Hoc Group

Agenda Item 3: Regional SWIM Establishment

- Establishment of Regional SWIM principally over CRV
- Third-Party SWIM TI Service Provision over CRV, e.g. PCCW Console Connect Aviation Platform

Agenda Item 4: CRV Governance

Agenda Item 5: Next Meeting Date and Any Other Business

Agenda Item 1: Welcome & Opening Remarks

Agenda Item 2: CRV OG and SWIM TF Working Together

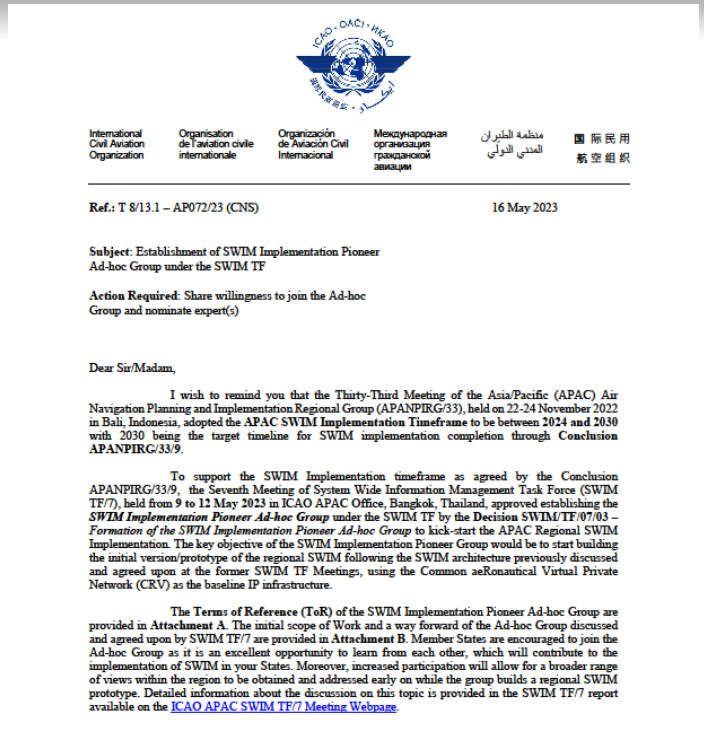
- SWIM over CRV Demonstration
- SWIM Implementation Pioneer Ad-Hoc Group

SWIM over CRV Demonstration

Fiji, on behalf of the CRV OG, in the last meeting, suggested SWIM TF Chair to send CRV OG Chairs for the intention of using Pseudo-CRV in the Joint Event. Since Fiji was absent in the meeting, ICAO Secretariat will help follow up this issue with Fiji by email and/or in the next joint meeting of SWIM TF TLs and CRV OG Experts.

The 4th S3TIG Joint Event Meeting
25 September 2023

SWIM Implementation Pioneer Ad-Hoc Group



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Ref.: T 8/13.1 – AP072/23 (CNS) 16 May 2023

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Dear Sir/Madam,

I wish to remind you that the Thirty-Third Meeting of the Asia/Pacific (APAC) Air Navigation Planning and Implementation Regional Group (APANPIRG/33), held on 22-24 November 2022 in Bali, Indonesia, adopted the **APAC SWIM Implementation Timeframe** to be between **2024 and 2030** with 2030 being the target timeline for SWIM implementation completion through **Conclusion APANPIRG/33/9**.

To support the SWIM Implementation timeframe as agreed by the Conclusion APANPIRG/33/9, the Seventh Meeting of System Wide Information Management Task Force (SWIM TF/7), held from **9 to 12 May 2023** in ICAO APAC Office, Bangkok, Thailand, approved establishing the ***SWIM Implementation Pioneer Ad-hoc Group*** under the SWIM TF by the **Decision SWIM/TF/07/03** – *Formation of the SWIM Implementation Pioneer Ad-hoc Group* to kick-start the APAC Regional SWIM Implementation. The key objective of the SWIM Implementation Pioneer Group would be to start building the initial version/prototype of the regional SWIM following the SWIM architecture previously discussed and agreed upon at the former SWIM TF Meetings, using the Common aeRonautical Virtual Private Network (CRV) as the baseline IP infrastructure.

The **Terms of Reference (ToR)** of the SWIM Implementation Pioneer Ad-hoc Group are provided in **Attachment A**. The initial scope of Work and a way forward of the Ad-hoc Group discussed and agreed upon by SWIM TF/7 are provided in **Attachment B**. Member States are encouraged to join the Ad-hoc Group as it is an excellent opportunity to learn from each other, which will contribute to the implementation of SWIM in your States. Moreover, increased participation will allow for a broader range of views within the region to be obtained and addressed early on while the group builds a regional SWIM prototype. Detailed information about the discussion on this topic is provided in the SWIM TF/7 report available on the ICAO APAC SWIM TF/7 Meeting Webpage.

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Agenda Item 3: Regional SWIM Establishment

- Establishment of Regional SWIM principally over CRV
- Third-Party SWIM TI Service Provision over CRV, e.g. PCCW Console Connect Aviation Platform

Outcomes of the SWIM TF and CRV OG Coordination Meeting 23 June 2023

- Security concern on connecting the PCCWG CCP accessible via the Internet and other commercial networks with the CRV network
  - CRV OG Co-Chair (Asia) informed there is no direct connection between CRV and PCCWG CCP.
  - A desktop exercise and potential penetration test will be done for CRV security assessment by CRV OG in future, in which this scenario can be added. **ACTION ITEM 3-2**
  - CRV OG Co-Chair (Asia) suggested that requirements from a SWIM perspective, e.g. the accessibility to SWIM traffic exchanged over CRV for non-CRV users, can be added for further consideration by CRV OG.

Outcomes of the SWIM TF and CRV OG Coordination Meeting
23 June 2023

- Third-party SWIM service provision over CRV
  - Cost model
  - The difference in CRV usage terms

Third-party SWIM service provider vs. CRV service provider to provide SWIM services over CRV

  - SWIM TF may consider adopting CRV approach, i.e. selecting SWIM service providers for a region and establishing a regional contract, in future.
  - It was also recommended that the vendor(s) chosen should meet all requirements set by CRV OG for accessing the network.
  - SWIM TF Co-Chair suggested more detailed deliberation for this proposal is needed. ACTION ITEM 3-3

Agenda Item 4: CRV Governance

Agenda Item 5: Next Meeting Date and Any Other Business

Next Meeting Date

- 8-10 November 2024 SWIM TF/8 Meeting
- 14 December 2023 CRV OG Ad-hoc Expert Group Meeting
- 12 January 2024 SWIM TF Task Leads Meeting
- 22-26 January 2024 CRV OG/12 Meeting

Thank You

PCCW Console Connect platform (SWIM TF/6)

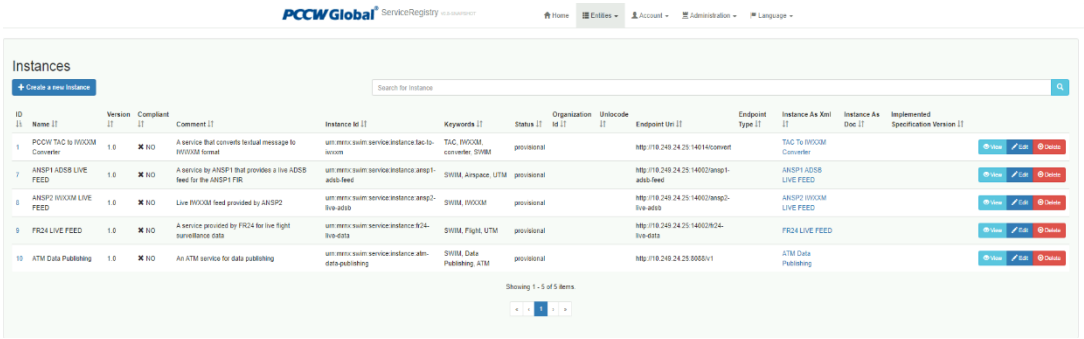
6-2	CRV OG, Secretariat	PCCW Console Connect Aviation Platform is in concept stage. However, there is the need to deliberate in CRV OG the security impact of mixed operational environment, i.e. connecting more service providers and users using internet/other network based services with CRV through a gateway

PCCW Console Connect Aviation Platform

	CRV	Console Connect Platform for Aviation	Internet
Network Options	MPLS with GRE tunnel with customized options of Package A, B, B+, C, C+, D	Local Loop, IPSec Internet, SDWAN & IoT SIM	User's local internet
SLA	Stringent SLA depends on Package A, B, B+, C, C+, D	Standard SLA	No SLA
SWIM Enabled	Yes, CRV users' own SWIM platform or PCCW CRV SWIM	Yes, enable SWIM data exchange thru Console Connect SWIM to PCCW CRV SWIM	No
Ordering	PCCW Team looks after the whole processes	Self-service portal.	User orders own local internet with a fix contract term.
Core Network	PCCW Global Network backbone	PCCW Global Network backbone	Public Internet Exchange between different providers
Information Security	Highest	High	Low
Data	AMHS, Ground-to-Ground Voice, ADS-B etc.	SWIM Data only	Any
Performance and Speed	Reliable performance and bandwidth	Reliable performance and bandwidth	Variation in performance and bandwidth
Daily Support	Dedicated Service Manager	7 x 24 NOC Support	Self-trouble shooting

PCCW Console Connect Aviation Platform

Console Connect Platform provides web base user interface for SWIM application. The SWIM services from ANSPs on CRV will be listed on PCCW SWIM Registry where users can select and subscribe.



The Console Connect Platform provide an alternative path for non-ANSP users to exchange SWIM data with ANSPs who are on the CRV Network.

SWIM INFRASTRUCTURE

- SWIM principally over CRV
- WP21 of SWIM TF5- SWIM INFRASTRUCTURE TO ACHIEVE MESSAGE LEVEL SECURITY

5-4	Share and further deliberate the information contained in the WP21 of SWIM TF/5 to Task-2, Task-3, Task-5 and Task-6 groups of SWIM TF along with Common Aeronautical Virtual Private Network Operations Group (CRV OG) and Aeronautical Communication Services Implementation Coordination Group (ACSICG)

International Civil Aviation Organization

The Fifth Meeting of System Wide Information Management Task Force (SWIM TF/5)

Video Tele-conference, 9 – 11 August 2021

Agenda Item 6: Updates on the assigned tasks by task leads/contributors, including progress report and issues

b) SWIM Infrastructure
f) Validation & Demontration

SWIM INFRASTRUCTURE TO ACHIEVE MESSAGE LEVEL SECURITY

(Presented by Japan, Thailand, and USA)

SUMMARY

To assure a trusted information exchange, the security capability is required as part of SWIM Technical Infrastructure (SWIM TI) as mentioned in the Manual on SWIM (Doc 10039). Moreover, to develop a globally harmonized International Aviation Trust Framework (IATF), ICAO established the Trust Framework Study Group (TFSG) to work on it. In order to validate the concept of IATF on SWIM, a test platform has been developed by the team of Multi-Regional Trajectory Based Operation (MR TBO) Demonstration. This paper presents the technical implementation of security service on SWIM through a scenario-based validation and discusses some concerns and challenges to achieve end-to-end security through a SWIM-based trust framework.

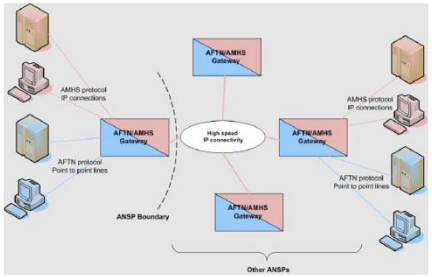
1. **INTRODUCTION**

1.1 As an enabler of digital transformation in aviation, SWIM not only ensures seamless integration among geographically distributed systems in the air transportation field but also enables seamless information sharing among the multiple stakeholders in the ATM domain. Moreover, the implementation of SWIM has also opened the door for a variety of new, non-traditional aviation information sharing partners, seeking to introduce innovative solutions using data and information that become available after applying SWIM. These properties brought by SWIM have presented a number of challenges in terms of information security and operation safety.

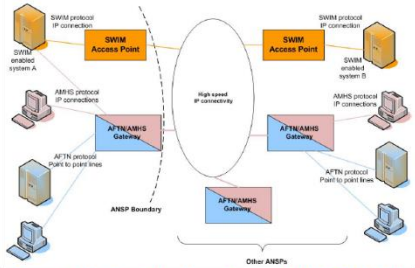
1.2 Cyber threats become more and more concerned, as aviation continues its digitization journey. To protect the safety of flight operations from these threats and ensure business continuity, all stakeholders agree that trusted information should be exchanged between trusted identities through trusted communication paths on a global basis. This means that in a digital environment, communication parties should be able to identify themselves mutually and the information exchanged should not be able to be modified by unauthorized parties.

SWIM TI Interface Binding (SWIM TF/6 WP/09)

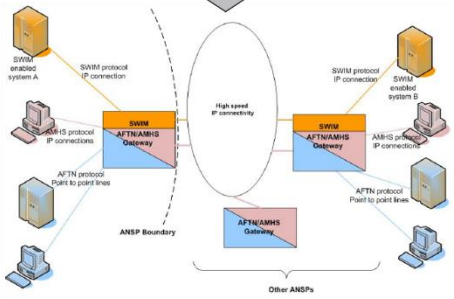
➢ From AFTN/AMHS to SWIM



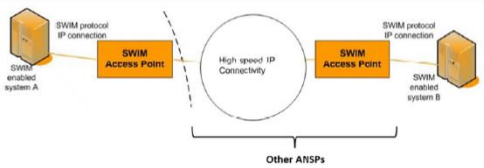
Current



Coexist: Application Level (BLOCK 0)



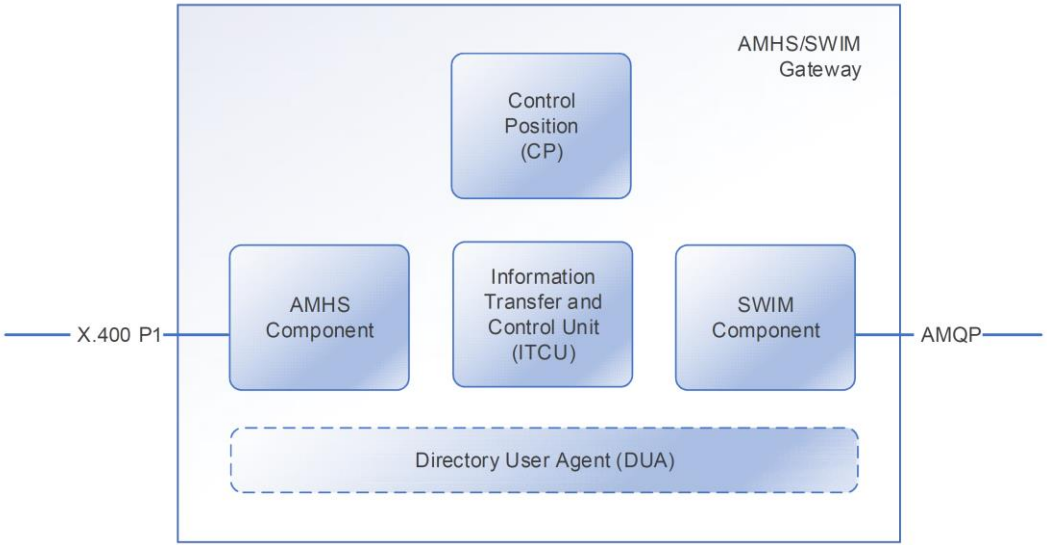
Coexist: Message Level (BLOCK 1 & 2)



Full SWIM (BLOCK 3)

SWIM TI Interface Binding (SWIM TF/6 WP/09)

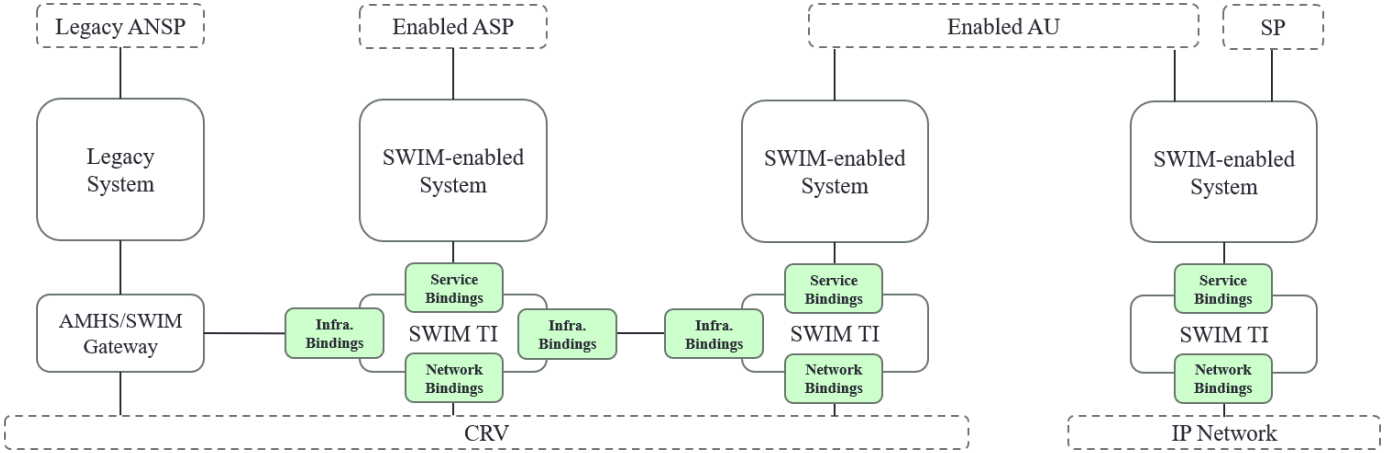
➢ AMHS/SWIM Gateway



- **AMHS/SWIM GATEWAY PROGRESS REPORT, SWAMWAY Study Group, AFS TO SWIM TRANSITION TASK FORCE (AST TF)**

SWIM TI Interface Binding (SWIM TF/6 WP/09)

➢ User-based Access



- **Network Bindings: Specify what is expected by the SWIM TI to communicate over the IP network, including protocols from the network and transport layers;**
- **Service Bindings: Specify the service interface technical interoperability, including protocols to interface with the ATM applications;**
- **Infrastructure Bindings: Specify the interface used by a SWIM TI to communicate with other infrastructure systems, including protocols for communication with internal and external services.**

SWIM TI Interface Binding (SWIM TF/6 WP/09)

➢ SWIM-based Access