



TỔNG CÔNG TY QUẢN LÝ BAY VIỆT NAM

VIETNAM SWIM PLANNING AND IMPLEMENTATION UPDATES

**2026 ICAO APAC SWIM Training cum Workshop
HaNoi - VietNam**



OVERVIEW

Agenda

- 1 - Flagship Program : SWIM & FF-ICE**
- 2 - Legal & Regulatory Framework**
- 3 - SWIM Readiness**
- 4 - VATM SWIM & FF-ICE Roadmap**
- 5 - Building the Platform (2026-2027)**
- 6 - Operational at scale (2028-2030)**
- 7 - Completing the FF-ICE transition (2030-2034)**
- 8 - Target Architecture (04 layers)**
- 9 - Technical Infrastructure**
- 10 - Key Actions**



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VATM FLAGSHIP PROGRAM 01

SWIM & FF-ICE — A Flagship Program

One of VATM's 10 flagship programs (2026–2030), built on six components:

SWIM architecture & service bus

Data governance & metadata catalogue

Mixed-mode operation & data translation

Data model standardization (AIXM · FIXM · IWXXM)

FF-ICE Release 1 (pre-departure phase)

Cybersecurity, identity & resilience

LEGAL & REGULATORY

Legal & Regulatory Framework

INTERNATIONAL

- ICAO Doc 10199 (PANS-IM) compliance for information services
- APAC SWIM Implementation Framework v2.0 — regional interoperability
- Data-quality liability in a service-oriented architecture (SOA)

NATIONAL (VIETNAM)

- Law on Data (eff. Jul 2025) — classifies aviation data as Important / Critical
- Personal Data Protection Law (eff. Jan 2026) — requires a PDPIA
- ANS Regulation (Jul 2026) — cover TBO, FF-ICE, SWIM implementation.

CURRENT STATE

SWIM Readiness — VATM Baseline

AIM	Ready	Live since 2023 — AIXM 5.1-compliant data sharing
MET	Emerging	National OPMET/NOC center established; IWXXM compliance
ATM - FIR HCMC	Emerging	Capability for SWIM without full system replacement
ATM – FIR Ha Noi	Not Ready	Little to no existing SWIM capability; major investment needed
ATFM	Not Ready	Under developing with SWIM capability
CNS / SWIM-TI	Emerging	Prototyping SWIM done; partially-implemented ATN/IPS; CR-V

IMPLEMENTATION PLAN

VATM SWIM & FF-ICE Roadmap



Building the Platform (2026–2027)

- Complete the SWIM architecture and service bus (SOA) design
- Issue the data governance framework; stand up the metadata catalogue
- Standardize priority data (AIXM · FIXM · IWXXM)
- Stand up the SWIM platform and a pilot environment
- Build the Corporation-wide FF-ICE transition plan

(VATM works with LfV Aviation Consulting AB on SWIM FS and demonstration (Demonstration to be presented next session))

Operating at Scale (2028–2030)

- Operate SWIM at full operational scale across VATM
- Pilot and expand FF-ICE/R1 (pre-departure) on priority routes & airports
- Establish mixed-mode operation with a data-translation mechanism
- Maintain uninterrupted service and safety-risk controls through transition

Completing the FF-ICE Transition (2030–2034)

- Expand FF-ICE scope and operational scale nationwide
- Prepare for the wide-scale transition; assess readiness periodically
- Retire ICAO Flight Plan 2012 (FPL 2012) before the 2034 deadline
- Exchange all flight-plan information on FF-ICE, with no service interruption

SWIM ARCHITECTURE

Target Architecture — Four Layers

Capability

ATM domains in scope: AIM, MET, ATFM, Surveillance

Operational

Stakeholders & organizations responsible

Systems

Technical systems — new systems shown in bold

Services

SWIM services provided and consumed

FAR-TERM: 4 NEW SYSTEMS FOR FULL SWIM COVERAGE

- New high-fidelity MET system (native IWXXM)
- New Ha Noi ATM system, consuming all SWIM domains
- New ATFM system, providing/consuming flow services
- New Flight Planning system for FF-ICE R1 (FIXM)

Technical Infrastructure

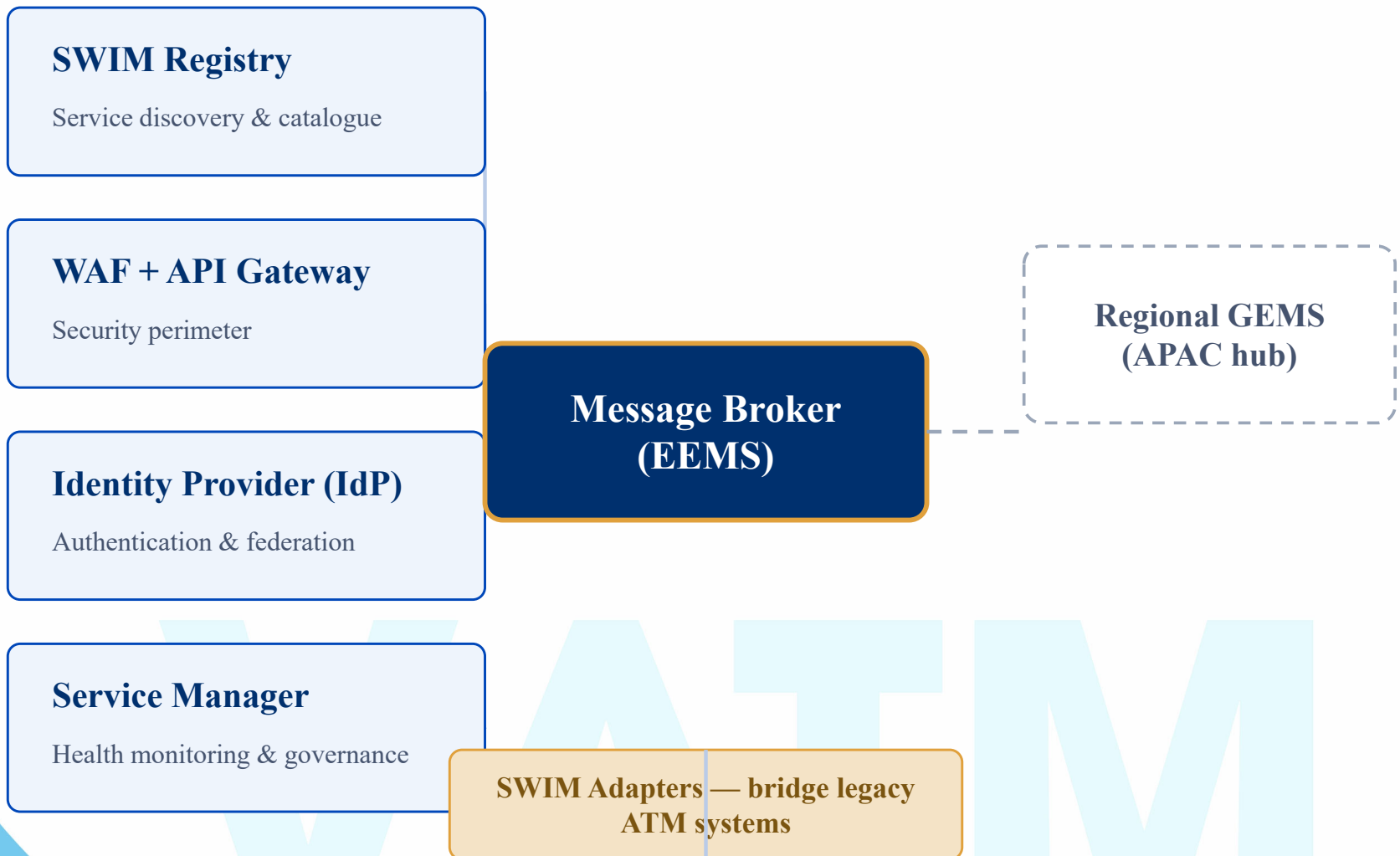
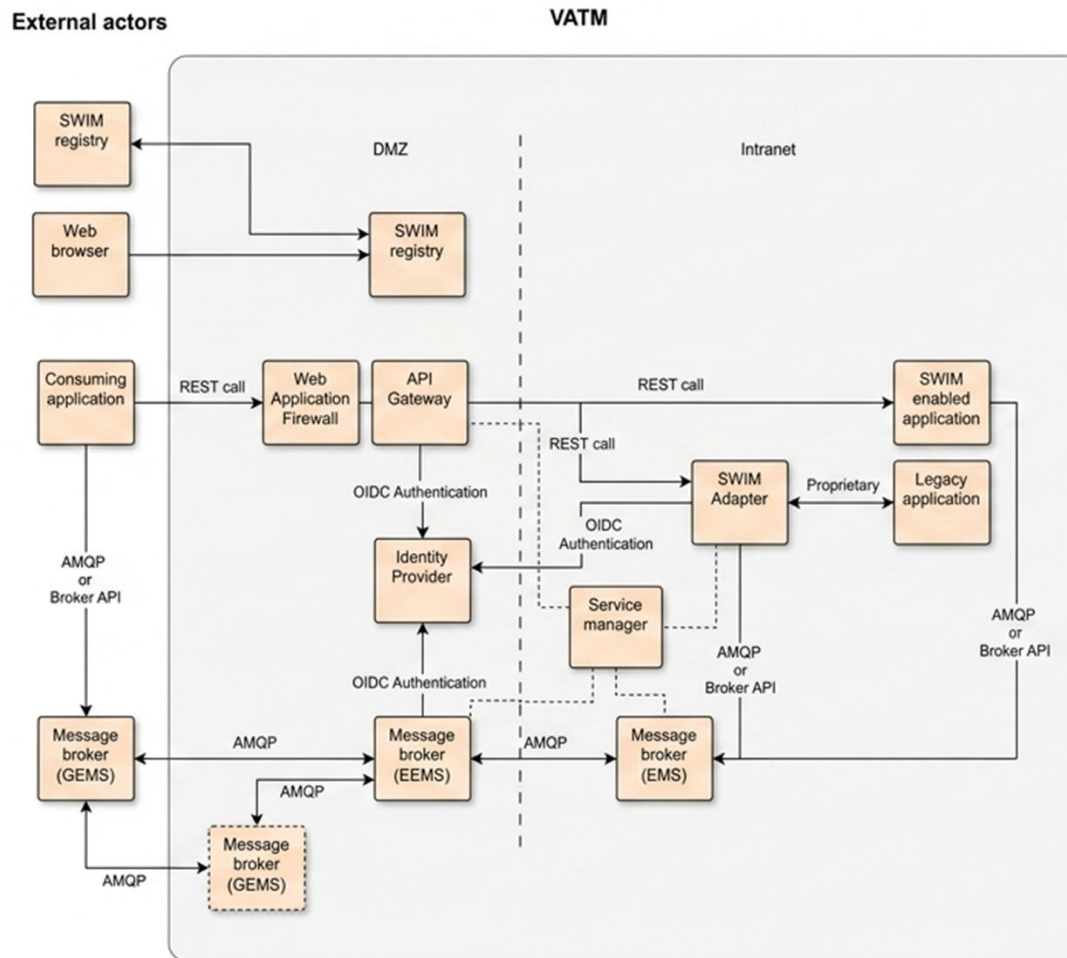


Exhibit C: SWIM Technical Infrastructure (SWIM-TI)



The 7 Core Components

1. **SWIM Registry**
(Authoritative catalogue)
2. **Web Application Firewall / WAF**
(Outer security)
3. **API Gateway**
(Access-control perimeter)
4. **Identity Provider / IdP**
(Authentication & federation)
5. **Message Broker**
(Central messaging fabric)
6. **SWIM Adapters**
(Legacy ATM translation)
7. **Service Manager**
(Operational oversight)

Network Segmentation & Perimeter Security

Zones Comparison

DMZ (Demilitarized Zone)

Internet-facing. Exposes minimum attack surface. Houses external-facing components. Perimeter firewall permits only HTTPS (443) and AMQPS (5671).

Intranet

Protected internal network. Holds sensitive operational data and legacy ATM systems. Strict allow-list boundary from the DMZ.

Security Components

Web Application Firewall (WAF)

Performs Layer 7 Deep Packet Inspection. Blocks malicious patterns (SQL injection, XSS) before entering internal systems.

API Gateway

Primary managed entry point for RESTful services. Enforces rate limiting, throttling, and logs telemetry.

Service Discovery & Identity Governance

SWIM Registry (Discovery)

- Functions as the 'source of truth' based on ICAO Doc 10203/10199.
 - Contains essential metadata: service definitions, OpenAPI/AsyncAPI specifications, security policies, and contact details.
 - Supports the full service lifecycle and search functionalities.
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Identity Provider / IdP (Trust Framework)

- Central authority for Authentication and Authorization.
 - Utilizes OpenID Connect (OIDC) and OAuth 2.0.
- Issues security tokens (JSON Web Tokens) to validate credentials.
- Enables Single Sign-On (SSO) across the VATM environment.

The Messaging Fabric (AMQP)

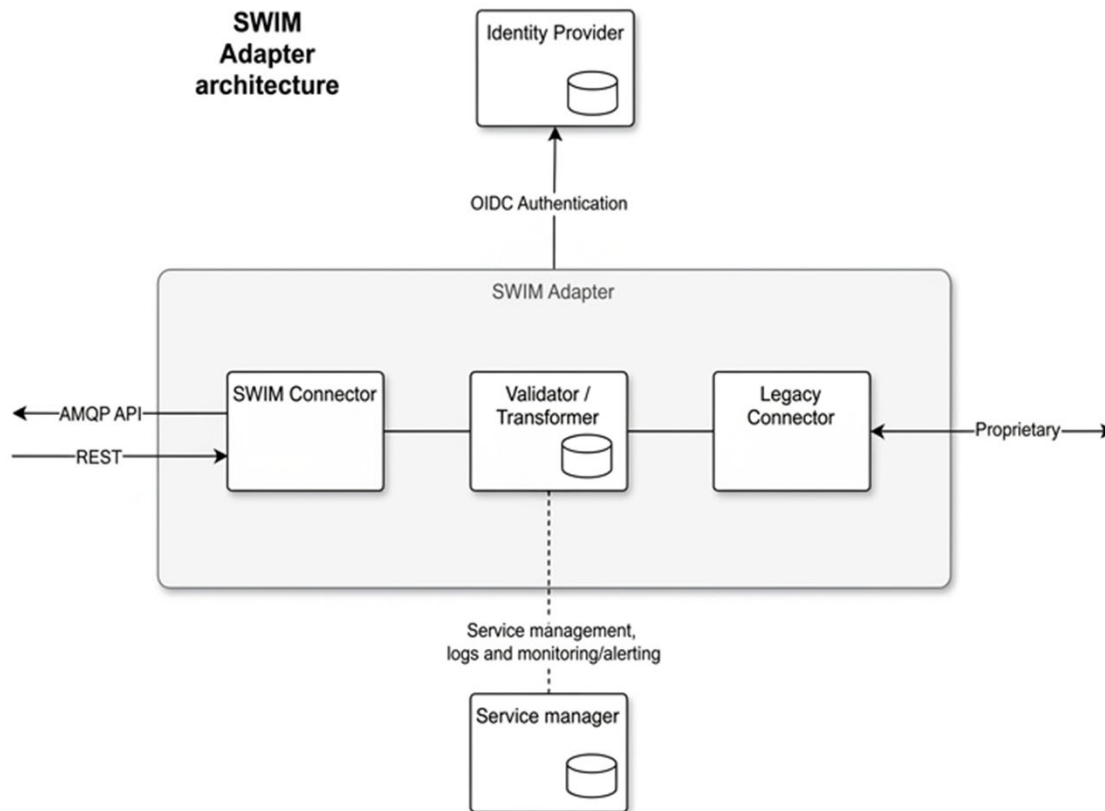
Message Exchange Patterns (MEPs)

Synchronous request/reply	Consumer waits for immediate response.
Asynchronous request/reply	Consumer receives messages at any time; correlates with prior requests.
One-way (fire-and-forget)	Initiates message without expecting a response.
Publish/subscribe (P/S)	Consumer subscribes to specific filtering parameters.

Broker Hierarchy

GEMS	Gateway Enterprise Message Service: Regional hubs for APAC data sharing (VATM recommended not to provide GEMS).
EEMS	Edge Enterprise Message Service: Placed in the DMZ. Acts as a bridge between internal systems and regional GEMS.
EMS	Enterprise Message Service: Internal broker for intra-system transfers.

Exhibit D: Legacy Integration via SWIM Adapter



Purpose

Translates non-standard data formats into standard models (AIXM, FIXM, IWXXM) avoiding costly system replacements.

Component 1: SWIM Connector

Connects to services via AMQP or REST; handles OIDC authentication.

Component 2: Validator / Transformer

Contains a data store to compile/disassemble messages; provides logs to the Service Manager.

Component 3: Legacy Connector

Bridges the gap using proprietary protocols understood by the non-SWIM enabled system.

Continuous Oversight: The Service Manager

Core Role: Operates as part of the Control Plane to oversee health, performance, and internal governance of the infrastructure.

Key Responsibilities:

SLA Enforcement: Ensures the infrastructure meets the rigorous Service Level Agreements required for mission-critical ATM operations.

Lifecycle Management: Detects service failures, activates/deactivates instances, and redirects traffic during maintenance.

Security Coordination: Works directly with the API Gateway and IdP to ensure service-to-service communication remains secure.

Closing Statement : By providing a centralized view of system status, the Service Manager guarantees the stability required to achieve both technical interoperability and long-term environmental sustainability.

NEXT STEPS

Key Actions

- Produce a Service Design Document for every service in the portfolio, in cooperation with other ICAO APAC states
- Move swiftly on core SWIM-TI: Registry, WAF, API Gateway, EEMS, IdP, Service Manager
- Build a SWIM Adapter framework to bring legacy systems onto SWIM
- Engage more actively in the SWIM Task Force service-design activities (operational benefits, data modelling, service interfaces)



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Thank You