



Message Exchange Patterns for APAC Common SWIM Information Services

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Agenda



- 1. Message Exchange Patterns**
- 2. SWIM Information Service Overview**
- 3. FF-ICE/R1 Services**
- 4. Proposed Policy**

Message Exchange Patterns



➤ MEPs Supported by SWIM

MEPs	Process	Restriction
Synchronous Request/Reply	The consumer initiates a request to an information service; the service processes the request and generates a reply to the consumer.	During the period of waiting for this response, the consumer cannot send or receive any other requests or responses.
Asynchronous Request/Reply	The consumer initiates a request to an information service; the service processes the request and generates a reply to the consumer.	This MEP requires that the consumer be able to receive messages at any time and correlate them with prior requests.
One-way	The consumer initiates a message to an information service without expecting any response from the information service.	This MEP is particularly useful at the lower application layer, where message responses are not required.
Publish/Subscribe	Push: The consumer initiates a subscription request to an information service, and the information service sends necessary updates (publish) to the consumer.	This MEP requires that the consumer can receive messages at any time.
	Pull: The consumer initiates a subscription request to an information service, and the information service would keep necessary updates available to the consumer.	This MEP requires that the consumer send requests to the information service to receive the updates.

Message Exchange Patterns



➤ MEPs Supported by SWIM

MEPs	Application	Communication Protocol
Synchronous Request/Reply	<ul style="list-style-type: none">• RESTful APIs for Real-time queries• Web services for transactional operations	<ul style="list-style-type: none">• HTTP/HTTPS (RESTful APIs)• SOAP over HTTP (Web Services)
Asynchronous Request/Reply	<ul style="list-style-type: none">• Distributed systems requiring delayed responses• Background processing tasks	<ul style="list-style-type: none">• AMQP• AMQP WebSockets
One-way	<ul style="list-style-type: none">• Event notifications• Sensor data transmission	<ul style="list-style-type: none">• AMQP
Publish/Subscribe	<ul style="list-style-type: none">• Real-time event distribution• Messaging systems	<ul style="list-style-type: none">• AMQP

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SWIM Information Service Overview



➤ Required fields in Information service overview

Field name	Detailed content	Field schema	Example	Rationale and guidance
Information service functions	Information service providers should provide a description of the business-level characteristics of the information service consumers with a business view of the interactions with the information service, without having to look at the interface details. The description should include the functionality of the service as a list of the functions and real-world effects. If an information service provider does not make the information service functions available, the <i>Information Service Functions</i> metadata field shall specify "NIL".	Free text or NIL	<p><i>Business Function: Service for the information service consumer to set (i.e. define or update) or delete the TOBT value for a specific flight.</i></p> <p><i>Real World Effect: The Target Off-Block Time (TOBT) values are updated for each flight as the information service consumer performs:</i></p> <ul style="list-style-type: none"> • Set TOBT – TOBT value is defined or updated • Delete TOBT – TOBT is marked as undefined 	<p>Rationale: The functions provide business and operational experts with a business view of the interactions with the information service, without having to look at the interface details.</p> <p>Guidance: Describe the functionality of the information service as a list of the functions and real-world effects.</p>
Information category	<p>The information domain(s) covered by the information service shall be listed as one or more of the following:</p> <ol style="list-style-type: none"> Flight information; and/or Aeronautical information; and/or Meteorological information; and/or Environment information; and/or Capacity, demand and flow information; and/or Surveillance information; and/or Other information 	<p>Flight information; and/or</p> <p>Aeronautical information and/or</p> <p>Meteorological information and/or</p> <p>Environment information and/or</p> <p>Capacity demand and flow information and/or</p> <p>Surveillance information and/or</p> <p>Other information</p>	<p><i>FLIGHT INFORMATION</i></p>	<p>Rationale: Information category supports the information service consumer in deciding whether the information service is suitable for their needs and supports ease of discovery by the information service consumer.</p> <p>Guidance: List the types of information provided by the information service.</p>
Brief description of the information service	Information service providers shall provide a brief summary description of the information service to assist information service consumers on whether the described service is suitable for use in a particular situation. The brief summary shall include the information domain(s) covered by the information service, the operational need being addressed by the information service, the intended use of the information service and the intended consumer audience for the information service.	Free text (intended use)	<p><i>The TargetOffBlockTimeSetting service supports the Airport CDM concept and its implementation by allowing airport collaborative decision-making (A-CDM) Partners, typically aircraft operators and ground handlers, with the capability to set the TOBT that indicates the target time for the aircraft to be ready for Off-Block.</i></p>	<p>Rationale: It supports the information service consumer in deciding whether the described information service is suitable for use in a particular situation</p> <p>Guidance: The brief description of the information service covers the following pieces of information:</p> <ul style="list-style-type: none"> – The operational need being addressed by the information service; – The intended use of the information service; and – The intended consumer audience for the information service.

SWIM Information Service Overview



➤ Required fields in Information service overview

<i>Field name</i>	<i>Detailed content</i>	<i>Field schema</i>	<i>Example</i>	<i>Rationale and guidance</i>
Message exchange patterns	Information service providers shall indicate the message exchange pattern used by the information service to assist information service consumers to understand relationships of multiple messages exchanged with the information service providers. The message exchange pattern shall be expressed as one or more of the following: a) request/reply; and/or b) one way; and/or c) publish/subscribe.	Request/reply and/or One way and/or Publish/subscribe	REQUEST/REPLY	Rationale: The message exchange pattern helps the information service consumer understand how the information interaction with the information service works. Guidance: Specify the message exchange pattern used by the information service (request/reply, one way ("fire-and-forget"), publish/subscribe).
Information exchange models	Information service providers shall indicate the domain-specific information exchange models used for their information service payloads, including the extensions of the information exchange models and their versions. If information service providers do not use the domain-specific information exchange models for their information service payloads, then information service providers shall describe the alignment to the AIRM and indicate the exchange schema used.	Free text	<i>The service is using an information exchange model, AIXM 5.1.1, which is aligned with the AIRM version 1.0.0.</i>	Specify the information exchange model (including extensions) and alignment with ATM information reference model (AIRM) of the information provided by this information service. Guidance: identify domain-specific information exchange models supported (e.g. AIXM, FIXM, etc.). Further guidance is provided in Chapter 4.
Geographical extent of information	Information service providers shall provide a description of the geographic coverage of the information exchanged to allow information service consumers to understand the geographical coverage of the information being provided. <i>Note.— The geographic coverage may be expressed in terms of ICAO region, FIR, aerodrome or polygon. More granular information such as coverage at Airport X, FIR Y may be provided as it may facilitate search responses.</i>	Free text	DONLON Airport	Rationale: To allow information service consumers to understand the geographical coverage of the information being provided. Guidance: Geographical coverage may be expressed in terms of ICAO region, FIR, aerodrome, polygon/geobox, etc. <i>Note.— Providing more granular information (e.g. coverage at Airport X, FIR Y) may facilitate search responses when provided textually (vs. graphically).</i>

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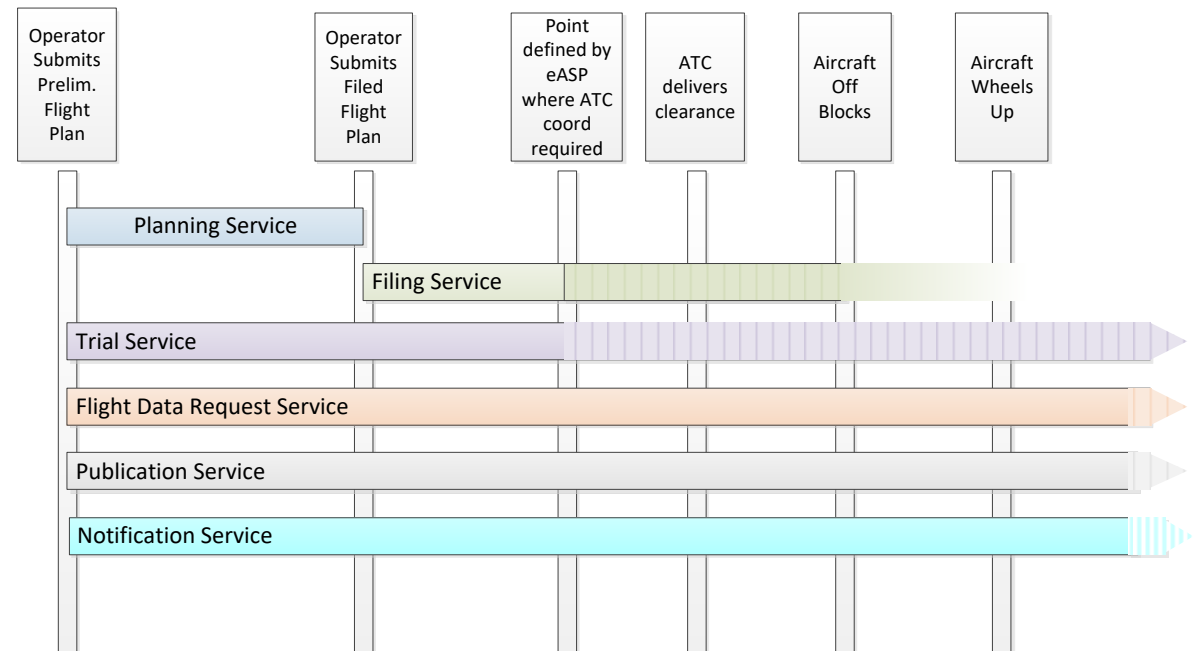
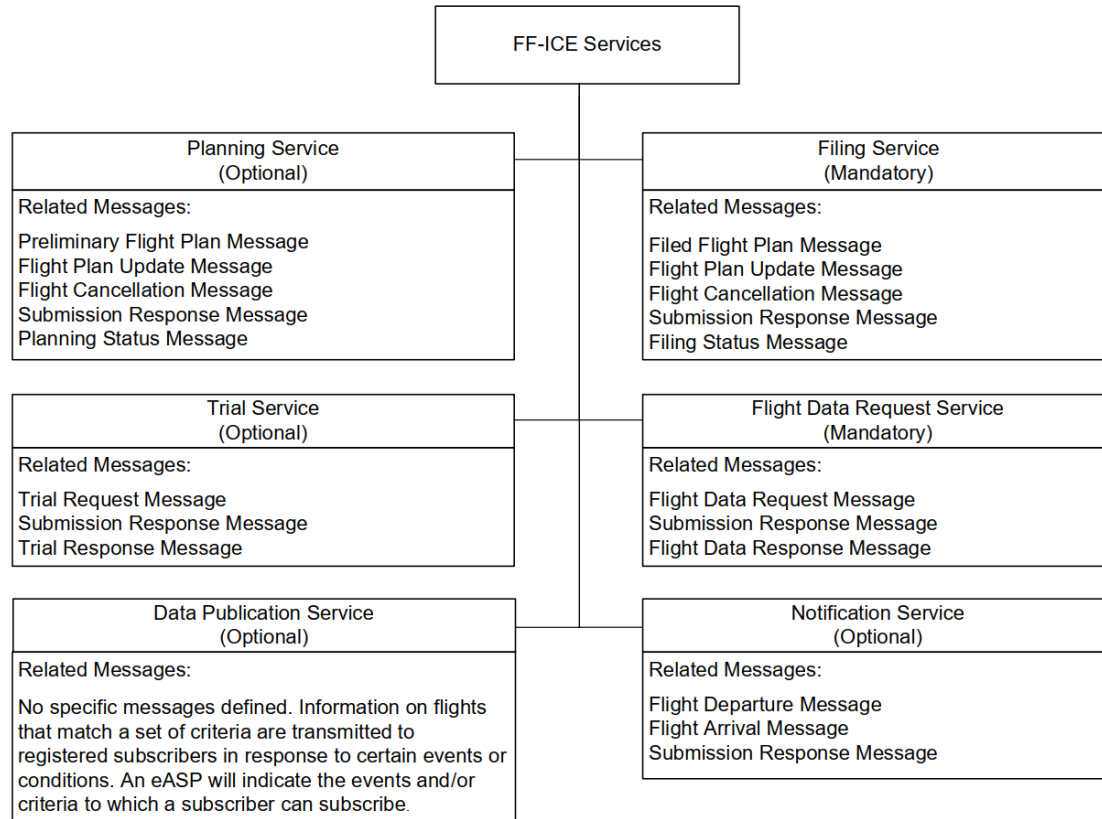


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FF-ICE/R1 Services



➤ Overview

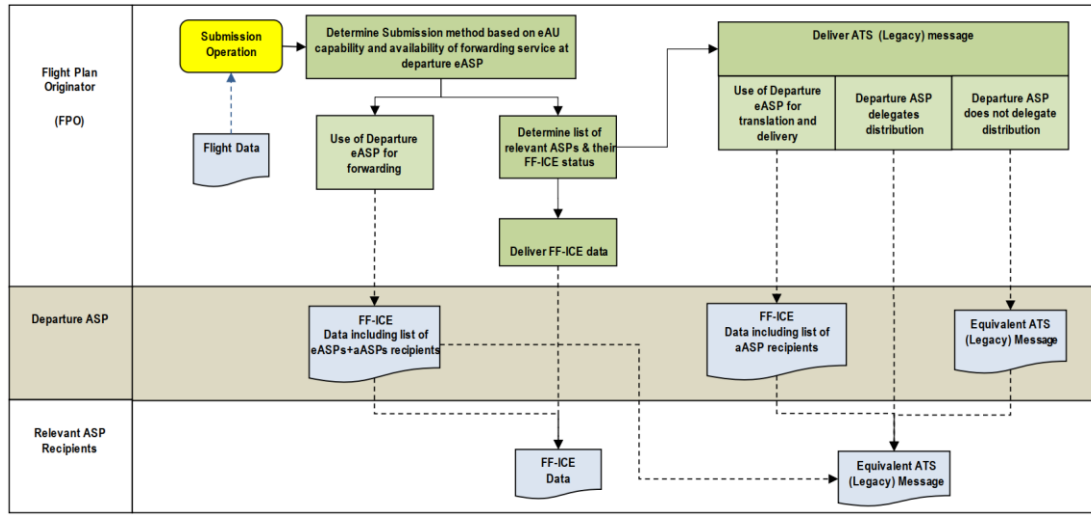


FF-ICE Services Defined in the FF-ICE Implementation Guidance

FF-ICE/R1 Services



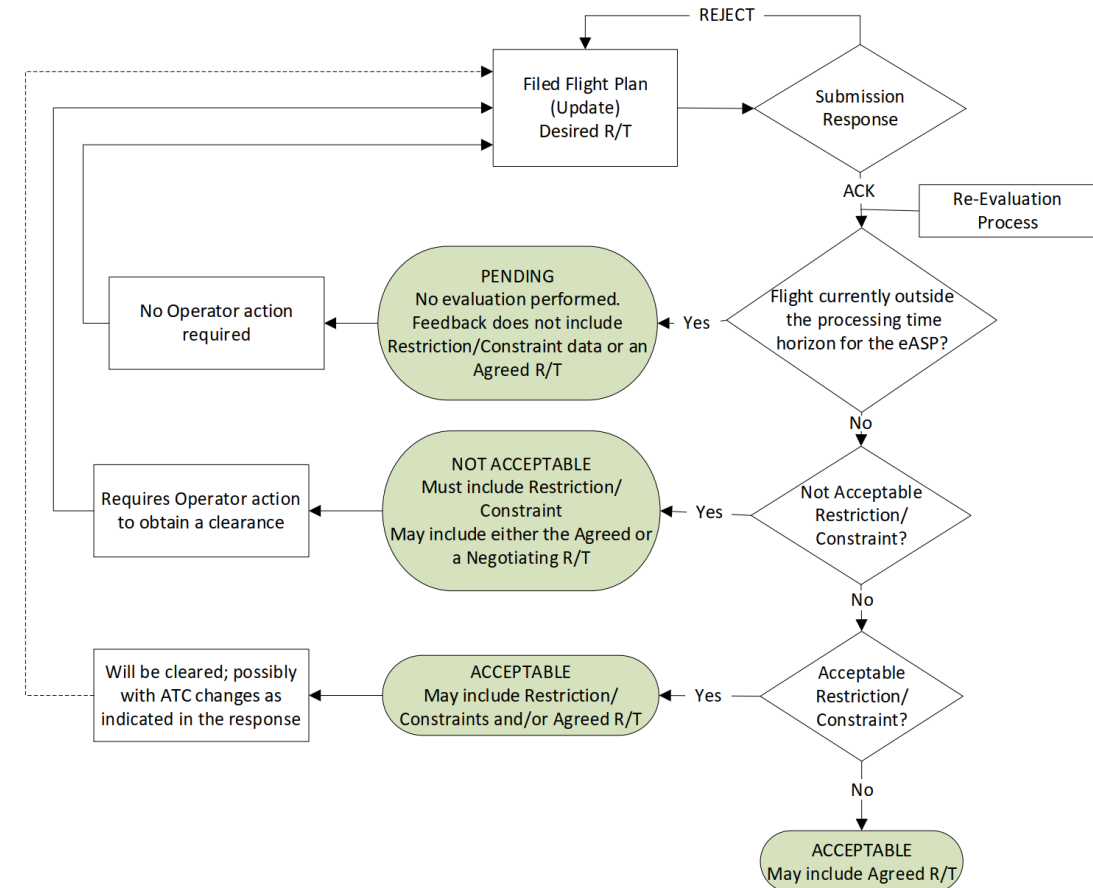
➤ Flight Plan Filing Service



Filed Flight Plan Submission Procedure

1. The eAU submits the Filed Flight Plan to each eASP.
2. The eAU submits the Filed Flight Plan to the Departure eASP, which then forwards to other relevant eASPs.

For discussion, the same approach and procedures are required for all eAUs and eASPs in a mixed mode environment.

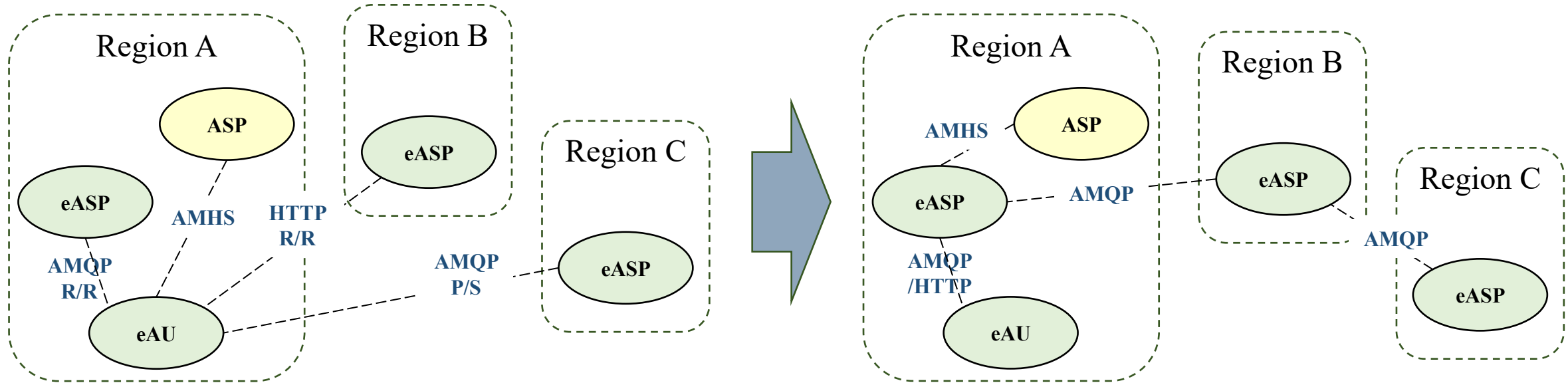


Filing Service

FF-ICE/R1 Services



➤ Filed Flight Plan Submission



The eAU submits the Filed Flight Plan to each eASP or ASP using different communication protocols and approaches.

Local SWIM based operations without Regional SWIM TI

The eAU submits the Filed Flight Plan to one eASP, which then forwards it to other relevant eASPs and ASPs using the agreed communication protocol and approach.

Local-Regional-Global SWIM based operations with Regional SWIM TI

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Proposed Policy



➤ Aeronautical Information Services

Business functionality of the information service	Brief description of the service	Type of information to be exchanged	Information exchange model / Message type	Message exchange pattern	Priority of Recommended Service in Initial APAC Common SWIM IS (1) / (2) / (3)
APAC Common SWIM Aeronautical Information Services					
Airspace management service	Exchanges of airspace status information between ASM Support System and Air Traffic Control (ATC) System. The sharing of airspace availability and airspace structure in real-time will contribute to a more efficient execution of the flight as information impacting the trajectory will be exchanged.	Airspace availability, restricted area, danger area, search and rescue regions	AIXM	Pub/Sub	2
Airspace feature service	Provides the characteristics of the three-dimensional airspace, described as horizontal projection with vertical limits, and their relevance to air traffic.	FIR/UIR boundaries, waypoints, enroute ATS routes, SIDs and STARs, navaids, procedures	AIXM	Pub/Sub or Req Reply	2
Aerodrome feature service	Provides current and/or planned airport layout features, such as aerodrome mapping data, runway, taxiway, passenger facilities.	Runways, movement areas, aerodrome services, navaids, instrument landing systems, Aerodrome location, communication facilities (frequencies)	AIXM	Pub/Sub	2

This service includes different information

1. To retrieve static data or active data of aeronautical information, a Synchronous Request/Reply pattern is preferred.
2. To distribute dynamic and updated aeronautical information, a Pub/Sub pattern is preferred.

Proposed Policy



➤ Flight Information Services

Business functionality of the information service	Brief description of the service	Type of information to be exchanged	Information exchange model / Message type	Message exchange pattern	Priority of Recommended Service in Initial APAC Common SWIM IS (1) / (2) / (3)
APAC Common SWIM Flight Information Services					
GUFI service	GUFI (Globally Unique Flight Identifier) generation and provision	GUFI	FIXM	Req/Reply	1
ATFM/A-CDM integrated service	Allows exchanges of flight plans and A-CDM milestone parameters among different stakeholders (such as arrival/departure ATFM units, airlines and airport operators) to connect A-CDM process to ATFM operations.	CLDT, TOBT, CTOT, CTO, TTOT, TSAT, etc.	FIXM	Pub/Sub Req/Reply	1
This service includes different operational processes					

1. To allow an AU to process a specific information (ex. TOBT), a Synchronous Request/Reply pattern is preferred.
2. To enable an ASP to distribute updated flight information, a Pub/Sub pattern is preferred.

Proposed Policy



➤ Flight Information Services

FF-ICE filing service	Provides a means to submit, update or cancel flight plans through a SWIM-based interface using FIXM.	Flight plan for registration, update or cancellation	FIXM	Req/Reply Pub/Sub	1
FF-ICE data publication service	Provides harmonised sharing of flight plan information in a global standard supporting common situation awareness.	Flight plan information for publication	FIXM	Pub/Sub	2
FF-ICE trial service	Allows operators to test the effect of a potential change in a flight plan prior to committing to the change.	Proposed changes in a flight plan	FIXM	Req/Reply	2
FF-ICE flight data request service	Allows an operator to request the current status of a flight plan, or an ANSP can request an operator to submit the latest version of their flight plan.	Current status of a flight plan, a copy of flight plan or supplementary plan	FIXM	Req/Reply	1
FF-ICE notification service	Provides notification of a change in flight state, such as Departure (DEP) and Arrival (ARR) Air Traffic Service (ATS) messages.	ARR, DEP messages	FIXM	Pub/Sub Req/Reply	1
FF-ICE planning service	Allows operators to submit preliminary flight plans for early Air Traffic Flow Management (ATFM) planning and to obtain feedback regarding restrictions/constraints affecting the flight.	Preliminary flight plan for early ATFM planning	FIXM	Req/Reply Pub/Sub	2

1. To process a flight plan between specified members, an Asynchronous Request/Reply pattern is preferred.
2. To distribute updated flight information to relevant stakeholders, a Pub/Sub pattern is preferred.

Proposed Policy



➤ Meteorological Information Services

APAC Common SWIM Meteorological Information Services					
FOR AERODROME					
METAR/SPECI information service	Provides of IWXXM-formatted METAR/SPECI product specified in ICAO Annex 3.	Provision of the existing Annex 3 product via an information service in Annex 3. Information service will be enabled through Amendment 81 to Annex 3 as recommended practice with applicability from Nov 2024.	IWXXM	Pub/Sub Req/Reply	1
TAF information service	Provides of IWXXM-formatted TAF product specified in ICAO Annex 3.		IWXXM	Pub/Sub Req/Reply	1
Aerodrome Meteorological Observation Information Service observation information service	Provides continuous observations of weather parameters at an aerodrome. Advanced meteorological SWIM (MET-SWIM) service being developed by MET Panel.	To be introduced as recommended practice in Annex 3 (Amd 8483) in Nov 20302027 tentatively (Note: Level of standardisation needs to be considered, as different aerodrome information services may be required for different use cases.)	IWXXM	Pub/Sub or Req/Reply	2*
Aerodrome Meteorological Forecast Information Service forecast information service	Provides information of the expected meteorological conditions, including probability, at an airport during a specified period. Advanced meteorological SWIM (MET-SWIM) service being developed by MET Panel.		IWXXM	Pub/Sub or Req/Reply	2*
FOR ENROUTE					
SIGMET information service	Provides of IWXXM-formatted SIGMET product specified in ICAO Annex 3.	SIGMETs for thunderstorm, tropical cyclone, turbulence, icing, mountain wave, duststorm.	IWXXM	Pub/Sub Req/Reply	1

1. To distribute dynamic and updated meteorological information, a Pub/Sub pattern is preferred.
2. To retrieve published meteorological information, a Synchronous Request/Reply pattern is preferred.

Proposed Policy



➤ **Type of information service (for unspecified number)**

- **To retrieve static, active or historical information:**
 1. **Without a defined message type for the request: Synchronous Request/Reply**
 2. **With a defined message type for the request: Asynchronous Request/Reply**
- **To distribute dynamic or updated information: Publish/Subscribe**

➤ **Type of operations (for specified members)**

- **To confirm, generate, update or delete specific information from AUs:**
 1. **Without a defined message type for processing: Synchronous Request/Reply**
 2. **With a defined message type for processing: Asynchronous Request/Reply**
- **To delivery the updated information for a specific process:**
 1. **Without a defined message type for processing: Use existing approaches**
 2. **With a defined message type for processing: Asynchronous Request/Reply**

