



ICAO

INTERNATIONAL CIVIL AVIATION ORGANIZATION

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Flight and Flow Information for a Collaborative Environment (FF-ICE) Services

FF ICE Overview

- ICAO Flight and Flow Information for a Collaborative Environment (FF-ICE)
 - Comprised of 2 releases
 - Release 1 (FF-ICE R1) applicability date – November 2024
 - Release 2 (FF-ICE R2) in validation state
- FF-ICE R1 Services
 - Comprised of 6 services
 - **Mandatory Service (2)**
 - **Filing Service**
 - **Flight Data Request Service**
 - **Optional Service (4)**
 - Trial Service
 - Planning Service
 - Notification Service
 - Publication Service

General FF ICE Service Structure

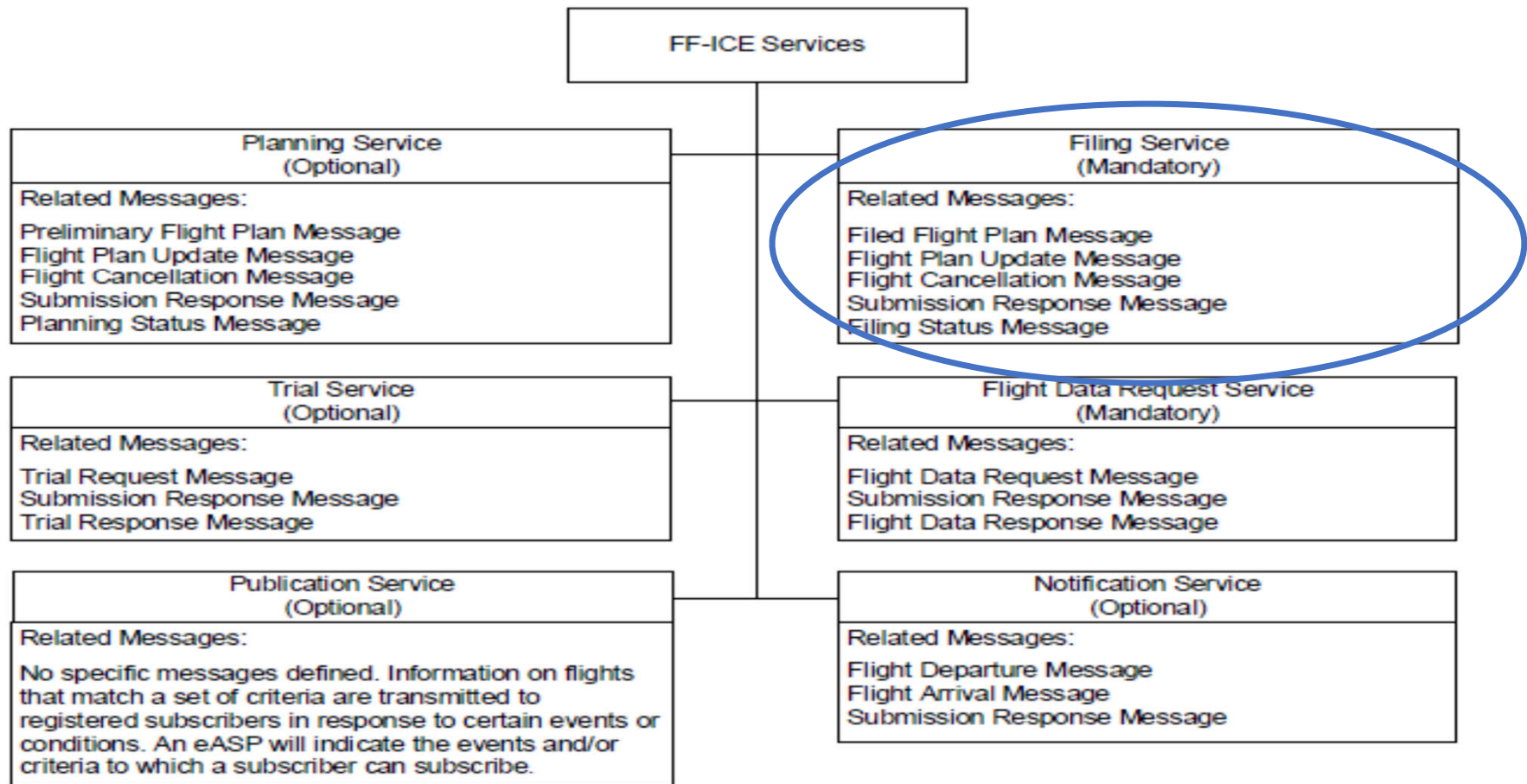
- Comprised of a message or initiating action
 - Message Information
- Comprised of a submission response
 - ACK
 - REJ
 - MAN (i.e. Manual)
- Comprised of a status response
 - ACCEPTABLE, NOT ACCEPTABLE, PENDING
 - CONCUR, NON CONCUR, NEGOTIATE

FF-ICE Acronym

Acronym	Description
ASP	ATM Service Provider
aASP	An ASP that is not capable of providing the mandatory FF-ICE services
eASP	An ASP that is capable of providing the mandatory FF-ICE services
ATC	Air Traffic Control
ATMRPP	Air Traffic Management Requirements and Performance Panel
AU	Airspace Users
eAU	An AU that is capable of using the mandatory FF-ICE services
aAU	An AU that is not capable of using the mandatory FF-ICE services
FDR	Flight Data Request

Acronym	Description
FF-ICE	Flight and Flow-Information for a Collaborative Environment
FIXM	Flight Information Exchange Model
FPL / FPL2012	ICAO Flight Plan 2012
GUFI	Globally Unique Flight Identifier
IG	Implementation Guidance
PANS-ATM	Procedures for Air Navigation Services – Air Traffic Management
R/T	Route/Trajectory
RQP	ATS Message - Request Flight Plan Message
RQS	ATS Message - Request Supplementary Flight Plan Message

1. FF-ICE Filing Service (Mandatory)



1. FF-ICE Filing Service (Mandatory) – Overview

- Filed Flight Plan using an FF-ICE (FIXM) format in lieu of the teletype-format FPL (FPL2012).
- FF-ICE eASP's automation provides feedback to the operator regarding whether the flight plan was successfully processed, and whether it is acceptable to the eASP.
- The operator (or its designated representative), is required to generate a FF-ICE flight plan with a Globally Unique Flight Identifier (GUFI).
- Version: an increment to the version whenever an update to the flight plan data
- Reference: a submission response should reference the flight plan version



1. FF-ICE Filing Service (Mandatory) – Messages (1)

- Globally Unique Flight Identifier (GUFI) consists of three components to ensure it is globally unique:
 - A version 4 UUID (Universally Unique Identifier)
 - A namespace identifier recording the GUFI's originator
 - A creation timestamp
- It is used in messages to associate flight data with the correct flight and distinguish between similar flights. Once a flight is cancelled, its **GUFI cannot be re-used or re-instated**, even if the operator decides to operate the same flight later.

Messages:

- Filed Flight Plan (FFP) – A flight plan submitted as an eFPL to FF-ICE capable providers (eASPs), while a traditional FPL is submitted to non-FF-ICE capable providers (aASPs).
- Flight Plan Update (FPU) – A Flight Plan Update, which includes GUFI can be used to modify either a Preliminary or Filed Flight Plan. Upon receiving an update, eASPs evaluate it and provide a submission response. An eASP(s) that is no longer relevant to a flight as a result of a route update should be informed of the change of route via a Flight Update Message. A Flight Plan Update cannot be used to update a) The GUFI assigned to the flight; and b) The aircraft identification.
- Flight Cancellation (FC) – A Flight Cancellation should be submitted using the same procedure as the procedure used to submit the flight plan. Flight Cancellation should be provided to all eASPs having received either the Preliminary or Filed flight plan. A Flight Cancellation receives **only a Submission Response**, not a Filing Status response.

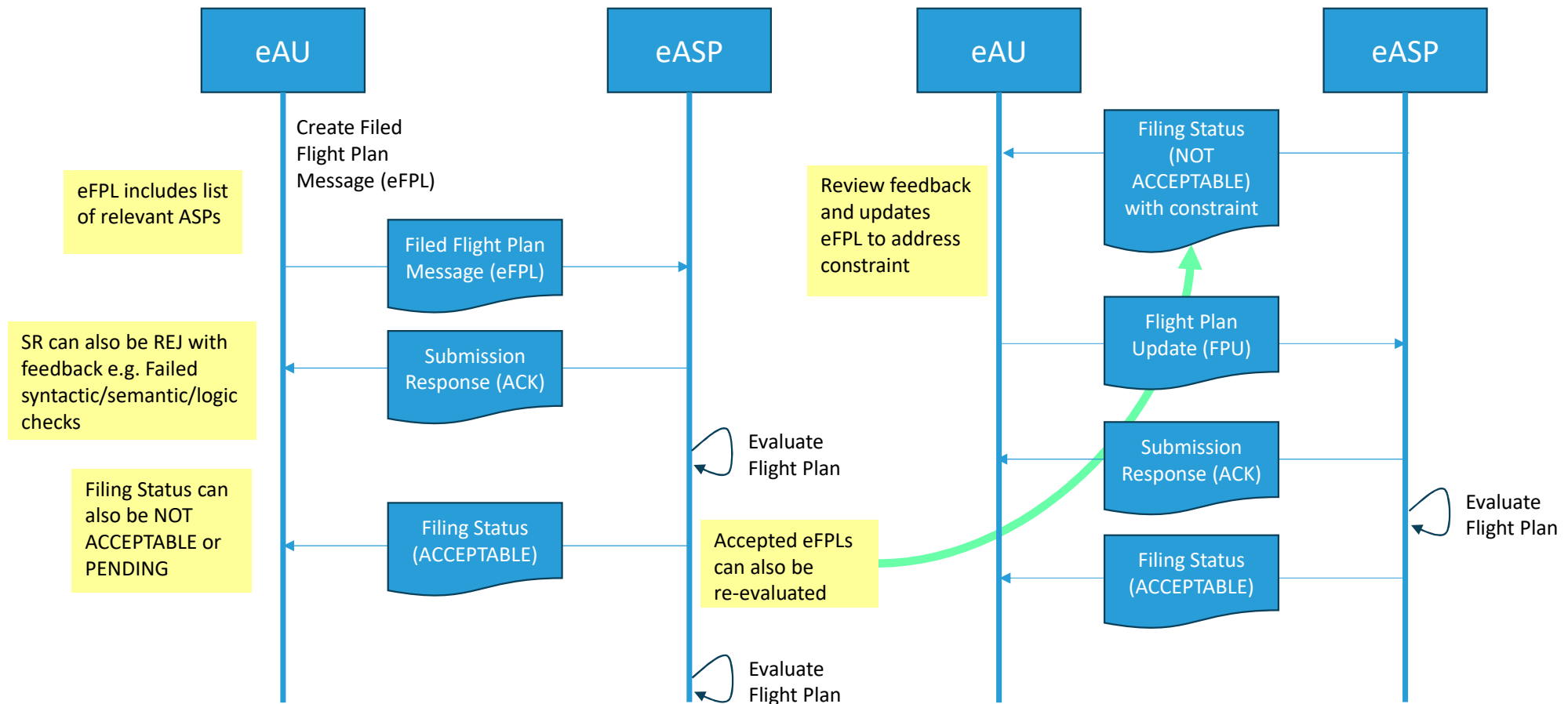


1. FF-ICE Filing Service (Mandatory) – Messages (2)

- Submission Response:
 - ACK: eASP received and the flight plan can be acted upon
 - REJ: eASP received and the flight plan cannot be processed
 - MAN: eASP received and the flight plan has been queued for manual processing
- Filing Status:
 - Acceptable – eASP systems may return with Restriction/Constraints and/or Agreed Route/Trajectory and the impact is the flight plan will be cleared; possibly with ATC changes as indicated in the response
 - Not Acceptable – The Route/Trajectory does not comply with the operating system. The eASP system returns Restriction/Constraint, it may also include either the Agreed or a Negotiating Route/Trajectory. The eAU is expected to make changes and resubmit a Flight Plan Update.
 - Pending – No evaluation performed, and no Operator action is needed.

1. FF-ICE Filing Service (Mandatory) – Scenario Flow

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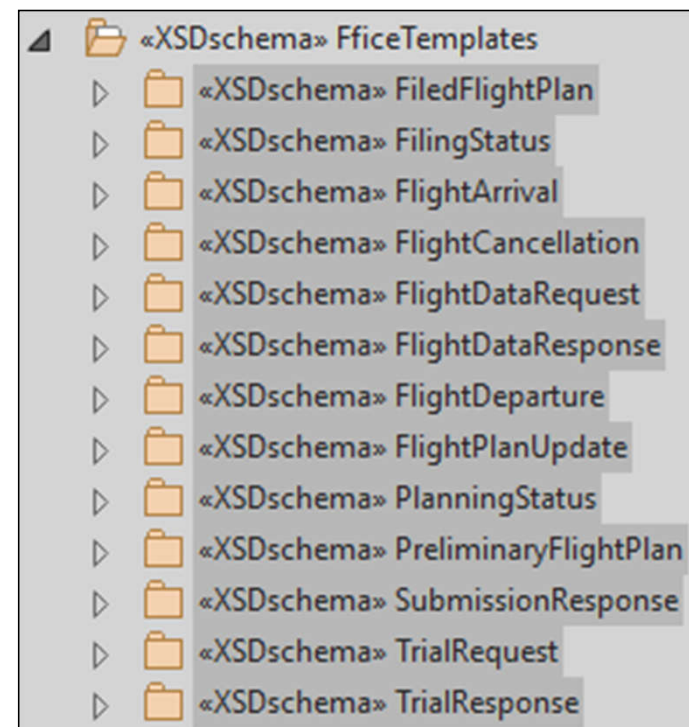




EXTRA: FF-ICE Application and Message Templates

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- The FIXM CCB created and maintains the FF-ICE Message Application and its thirteen message templates^[1]
 - Correspond to the thirteen FF-ICE Messages defined in the FF-ICE Implementation Guidance (IG) Manual
 - Each template's content is based on the tables present in Appendix C of FF-ICE IG



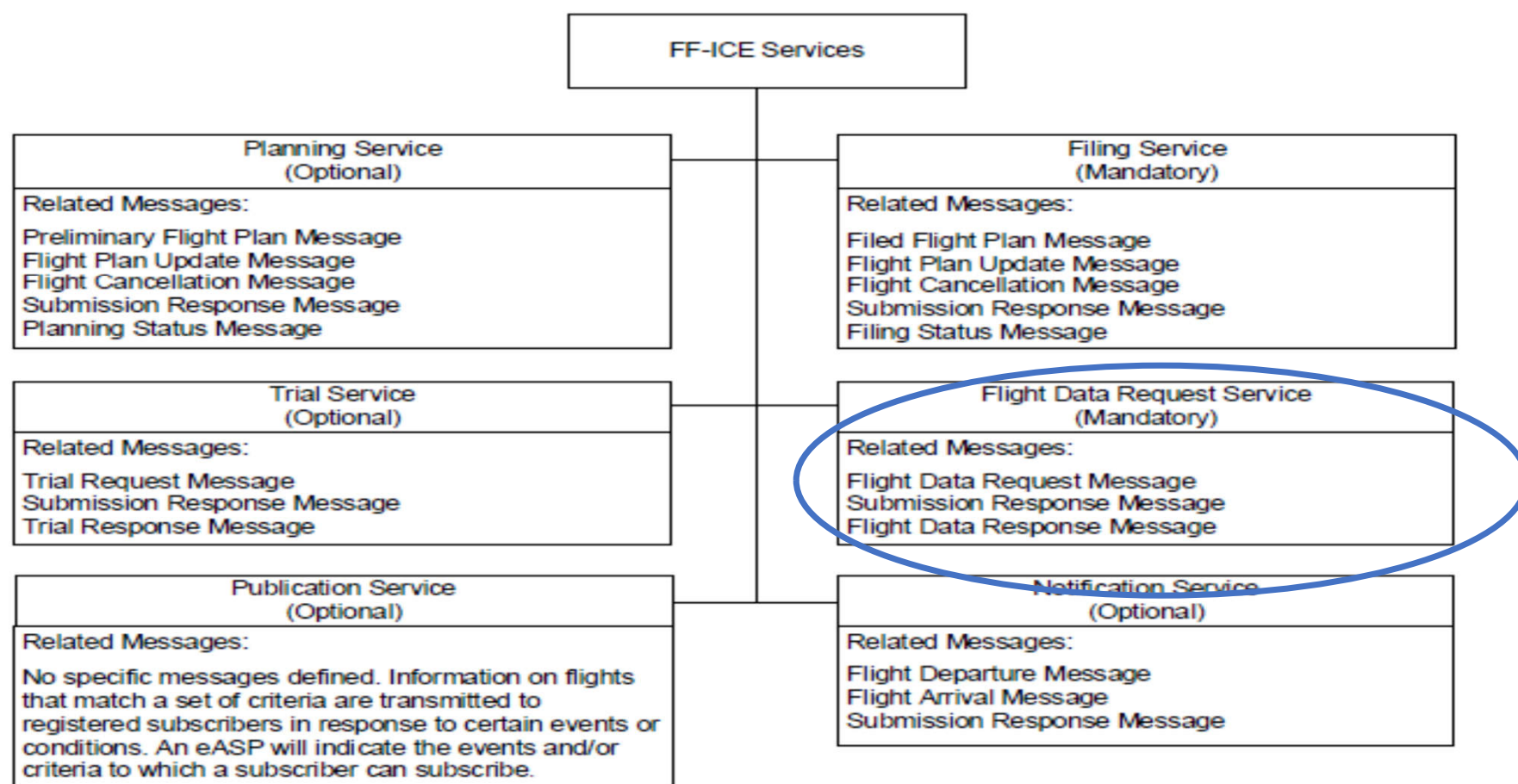
[1] <https://docs.fixm.aero/#/fixm-in-support-of-ffice/message-templates>

1. FF-ICE Filing Service (Mandatory) – Sources

1. ICAO PANS-ATM (4444)
 - Chapter 17 – Section 17.4.3: Filed Flight Plan (eFPL)
 - Chapter 17 – Section 17.4.4: Flight Plan Update
 - Chapter 17 – Section 17.4.6: Filed Cancellation
 - Table 17-1: Message Description
2. Volume II FF-ICE Implementation Guidance (9965)
 - Chapter 6 – Filing Service
 - Appendix B – FF ICE Model and Data
 - Appendix C – Section C-4 Filing a Flight Plan
 - Appendix C – FF-ICE Messages: C-5 Filing Status
 - Appendix C – FF-ICE Messages: Section C-8 Flight Cancellation
 - Appendix C – FF-ICE Messages: C-9 Flight Plan Update
 - Appendix G – GUF1 Construction



2. FF-ICE Flight Data Request (Mandatory*)





2. FF-ICE Flight Data Request (Mandatory) – Overview

- To allow stakeholders to obtain information about a flight:
 - AU/eAU – obtain the status of Operator’s own flight
 - ASP – obtain information about a flight
 - eASP – If information is missing or uncertain, use the service to obtain flight plan from stakeholders (AU or ASP)
- Minimum set for implementation:

Type of Information Requested	Information Provided
Flight Plan	A copy of the flight plan, analogous to the use of the RQP ATS message.
Supplementary Plan	A copy of the supplementary data filed for the flight, equivalent to use of the RQS ATS message.
Flight Status	A copy of the latest Planning or Filing status for the flight.

- A request for flight plan data should always refer to a Filed Flight Plan.
 - A Preliminary Flight Plan should not be returned in response to a flight plan request.

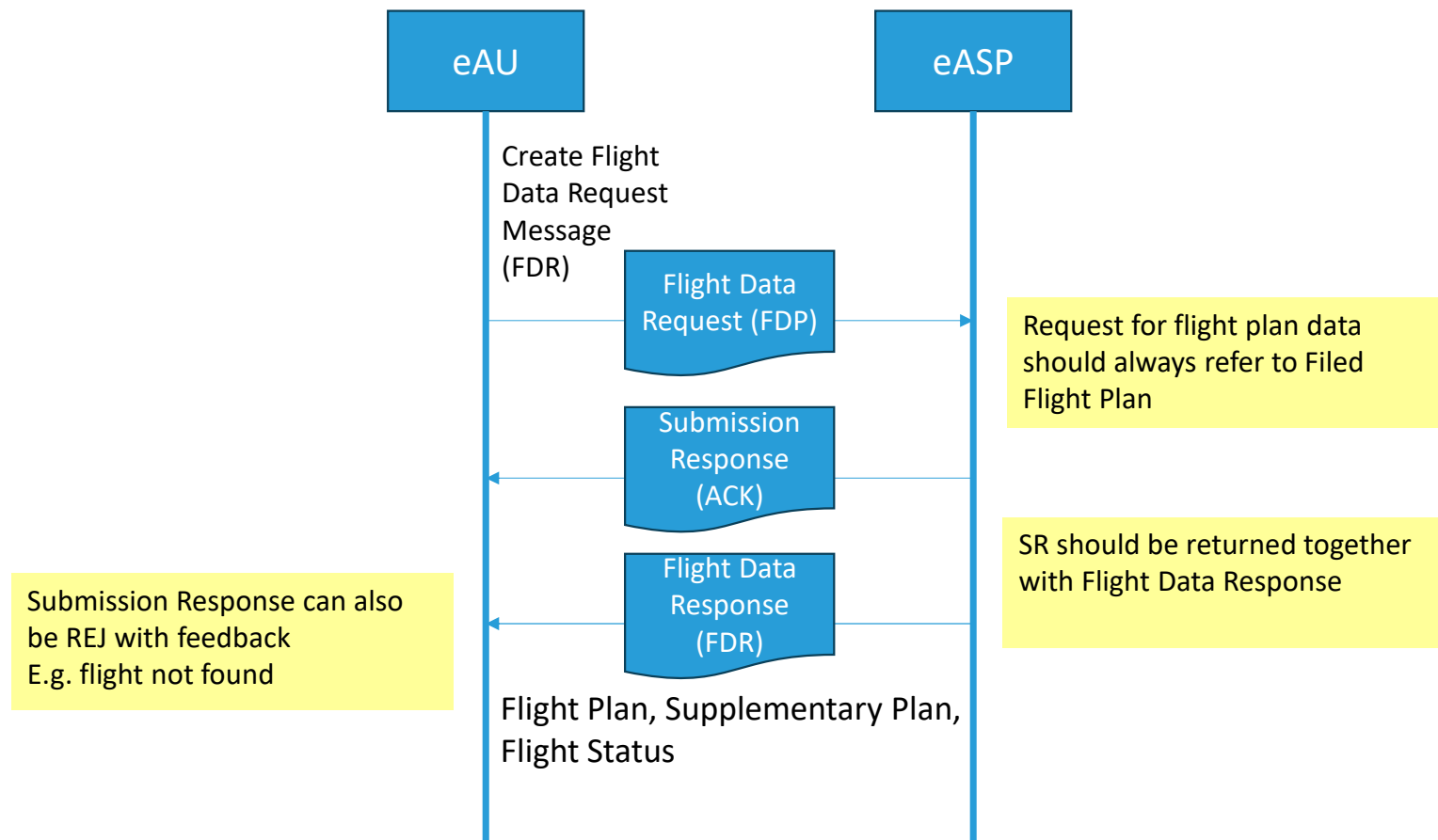


2. FF-ICE Flight Data Request (Mandatory) - Messages

- Flight Data Request – To request information about a flight (Filed Flight Plan), the use of a GUF1 along with other data fields can be found in Appendix C-10 of the Implementation Guidance (Doc 9965 Vol II). This request should balance with the network/system load.
- Submission Response – with explanation
 - REJ: (1) incorrect format, (2) missing information, (3) mismatched of information, (4) non-authorization*, (5) not supported.
- Flight Data Response – Contain the same information as Flight Data Request with the addition of requested information. The specific data fields of this message can be found in Appendix C-11 of the Implementation Guidance (Doc 9965 Vol II).
 - No response is expected from the recipient of the Flight Data Response

*NOTE: If the source of the request has no authorized access to the identified flight, a Submission Response of REJ should be returned with an explanation that the recipient does not have the requested information.

2. FF-ICE Flight Data Request (Mandatory) – Scenario Flow

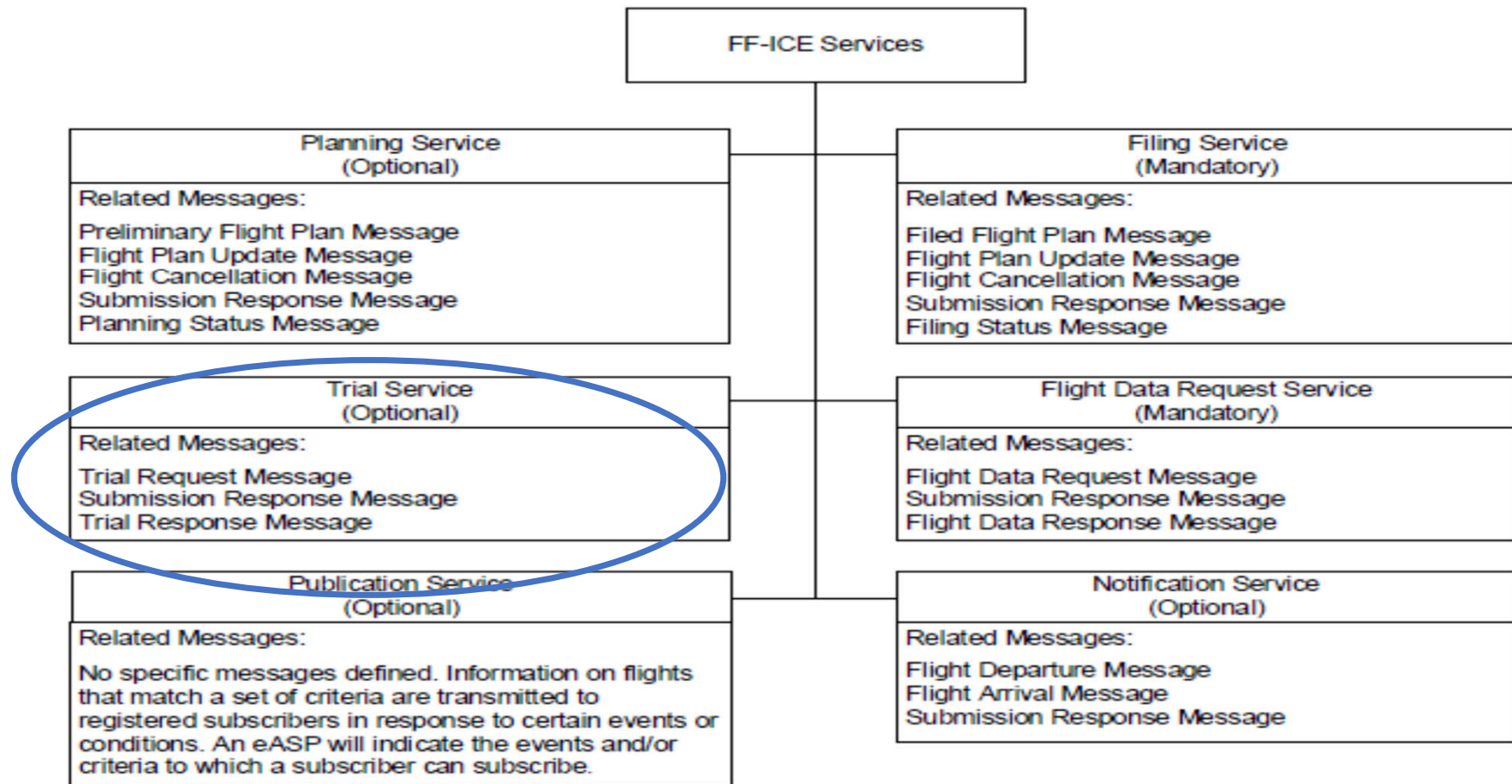


2. FF-ICE Flight Data Request (Mandatory) - **Source**

1. ICAO PANS-ATM (4444)
 - Chapter 17 – Section 17.4.7: Flight Data Request
2. Volume II FF-ICE Implementation Guidance (9965)
 - Chapter 8 – Flight Data Request Service
 - Appendix B – FF ICE Model and Data
 - Appendix C – FF-ICE Messages: Section C-10 Flight Data Request
 - Appendix C – FF-ICE Messages: Section C-11 Flight Data Response



3. FF-ICE Trial Service (Optional)



3. FF-ICE Trial Service (Optional) - Overview

- Perform by eAUs to evaluate an alternative to an existing flight plan, either Preliminary or Filed.
 - “What-if” type of investigations
- The request is treated by the eASPs as a separate, standalone transaction and existing flight plan data will not be modified as a result of a Trial Request.
- Initiated through the submission of a **Trial Request** message to the relevant eASP(s).
- Although GUFIs are **not required** for Trial Request, if a Preliminary or Filed or Flight Plan is already in the system, the GUFIs provide correlation to them.

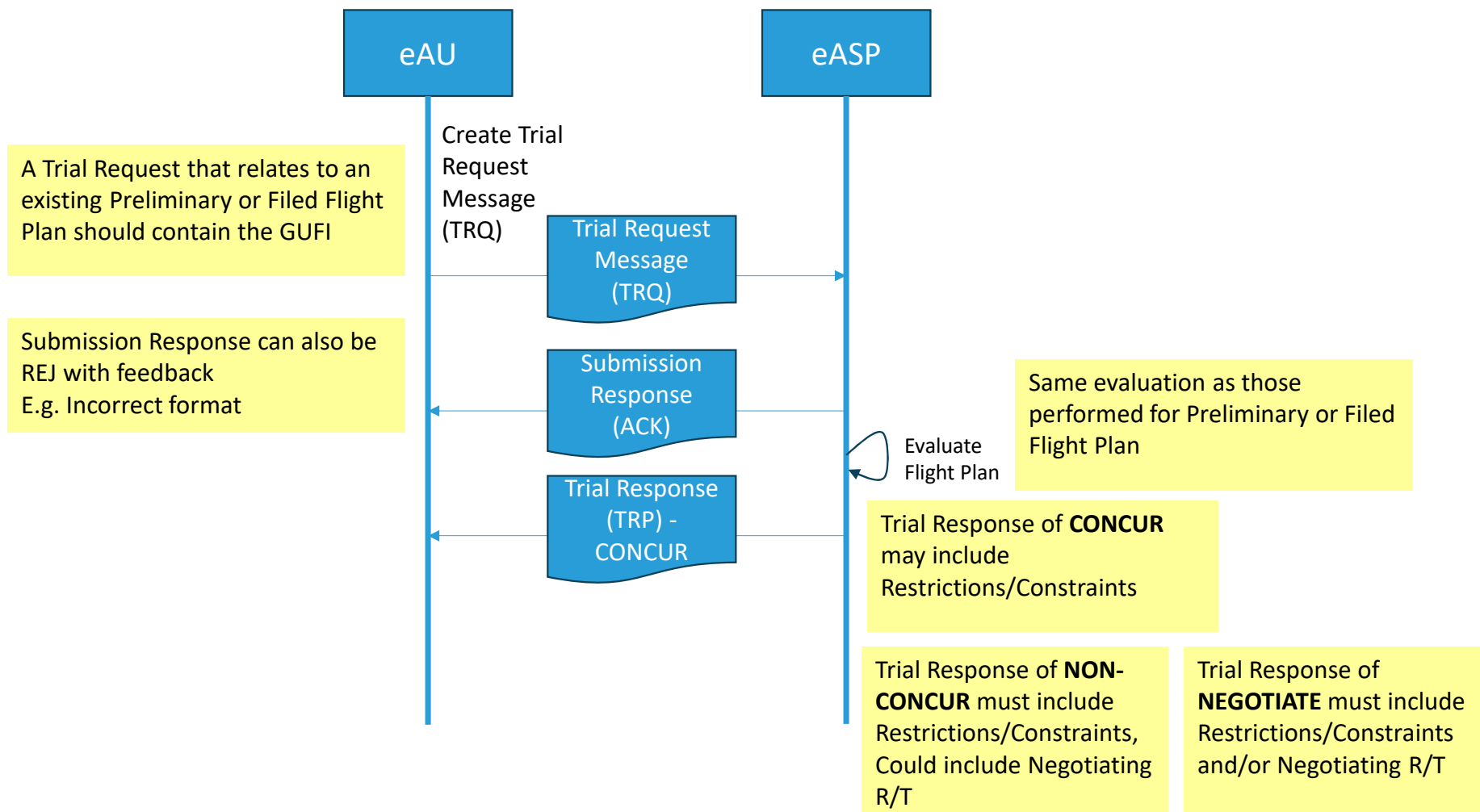


3. FF-ICE Trial Service (Optional) – Messages

- Submission Response:
 - ACK – eASP received and accepted the Trial Request.
 - REJ – The message failed validation
- Trial Response:
 - Concur – The Route/Trajectory proposed **comply with** the eASP operating system. The response may return with Restrictions/Constraints
 - Non-Concur – The Route/Trajectory proposed **does not comply** with the operating system. The eASP system will return Restriction/Constraint, it may also include a Negotiating Route/Trajectory.
 - Negotiate – The Route/Trajectory proposed **maybe comply** with the operating system. The eASP system will return Restriction/Constraint, it may also include a Negotiating Route/Trajectory.

3. FF-ICE Trial Service (Optional) - Scenario Flow

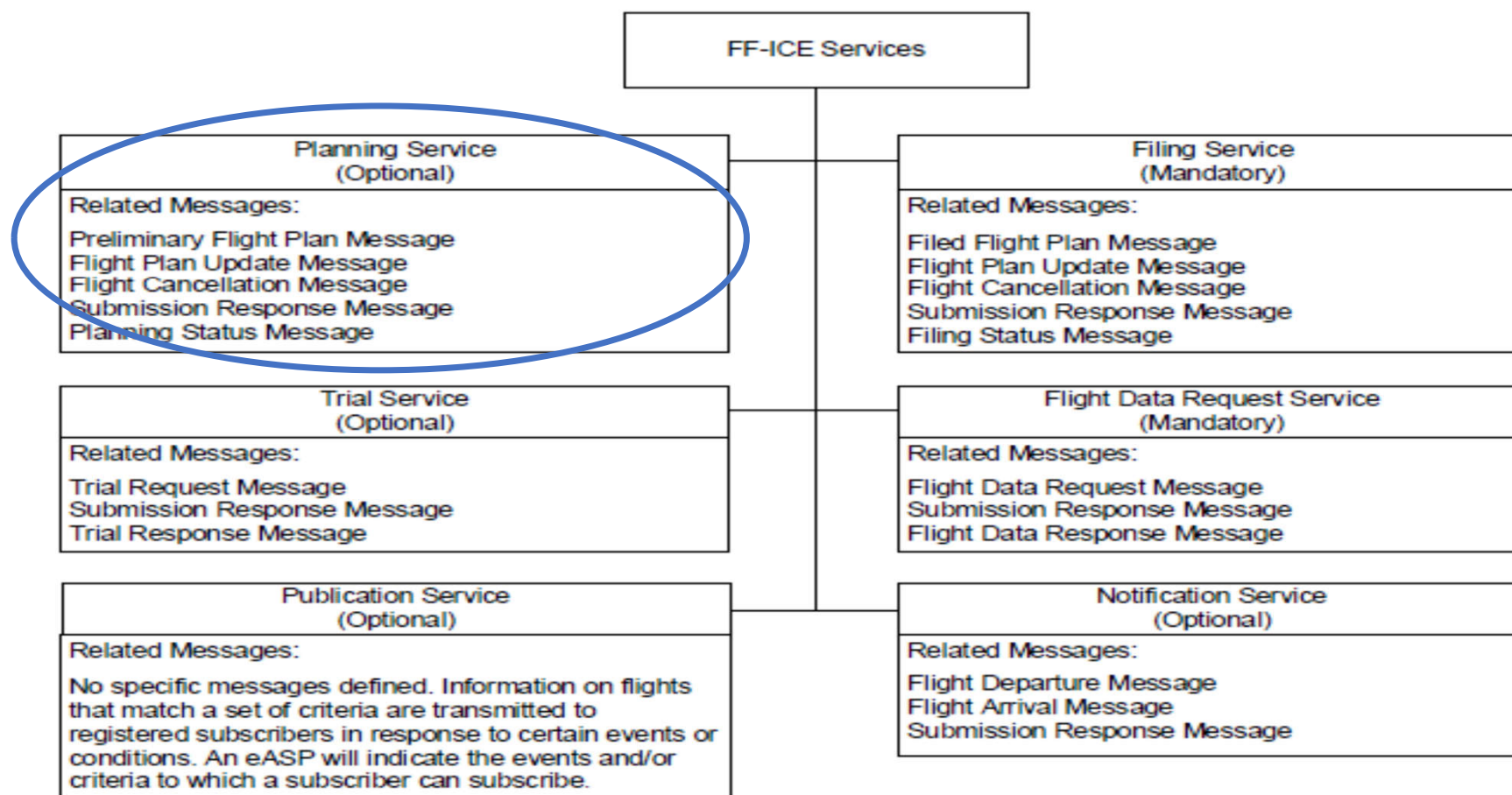
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3. FF-ICE Trial Service (Optional) - **Source**

1. ICAO PANS-ATM (4444)
 - Chapter 17 – Section 17.4.8: Trial Request
2. Volume II FF-ICE Implementation Guidance (9965)
 - Chapter 5 – Trial Service
 - Appendix B – FF ICE Model and Data
 - Appendix C – FF-ICE Messages: Section C-6 Trial Request
 - Appendix C – FF-ICE Messages: Section C-7 Trial Response

4. FF-ICE Planning Service (Optional)





4. FF-ICE Planning Service (Optional) – Overview

- Planning Service is expected or recommended to be provided by an eASP whose airspace is complex and/or regularly constrained e.g. high traffic demand where an ATFM service is already provided, area with frequent military activities, or area with frequent severe weather conditions
- Provides a CDM process between the eAU and eASP(s) concerning intended operation of a flight. Serve 2 main purposes:
 - Assist the eAU in determining the optimal route for a flight
 - Enable eASP(s) to obtain an earlier, more detailed and more accurate assessment of the anticipated traffic demand. Improvement in predictability will enable eASP the flexibility and ability to facilitate eAU in overcoming short-term difficulties
- Details provided via the exchange of trajectory information allows the eAU and the eASP to share their expectations in an unambiguous manner
 - eAU provides a “Desired” Trajectory/Route* for planning
- Once a flight plan (eFPL) has been filed for the flight, it becomes the reference for all ATM purposes and the Preliminary Flight Plan is no longer relevant.

* Format can be found in Appendix B of the FF-ICE Implementation Guidance



4. FF-ICE Planning Service (Optional) – Messages (1)

- Preliminary Flight Plan – can only be provided to eASPs that provide a Planning Service and will be of interest only to planning and resource management functions such as ATFM and ASM, not to ATC
 - Not available for non-FF-ICE capable (aASPs)
 - Reduce any surprise when filing Filed Flight Plan
- Flight Plan Update – A Flight Plan Update with a GUF1 may be used to update the Preliminary Flight Plan*. The eASPs should conduct evaluation and provide submission response. An eASP(s) that is no longer relevant to a flight as a result of a route update should be informed of the change of route via a Flight Update Message.
- Flight Cancellation – A Flight Cancellation should be submitted using the same procedure as that used to submit the corresponding flight plan. Flight Cancellation should be provided to all eASPs having received either the Preliminary or Filed flight plan.
- Submission Response:
 - ACK: eASP received and the flight plan can be acted upon
 - REJ: eASP received and the flight plan cannot be processed
 - MAN: eASP received and the flight plan has been queued for manual processing

* Should not be use to update GUF1 or Aircraft ID

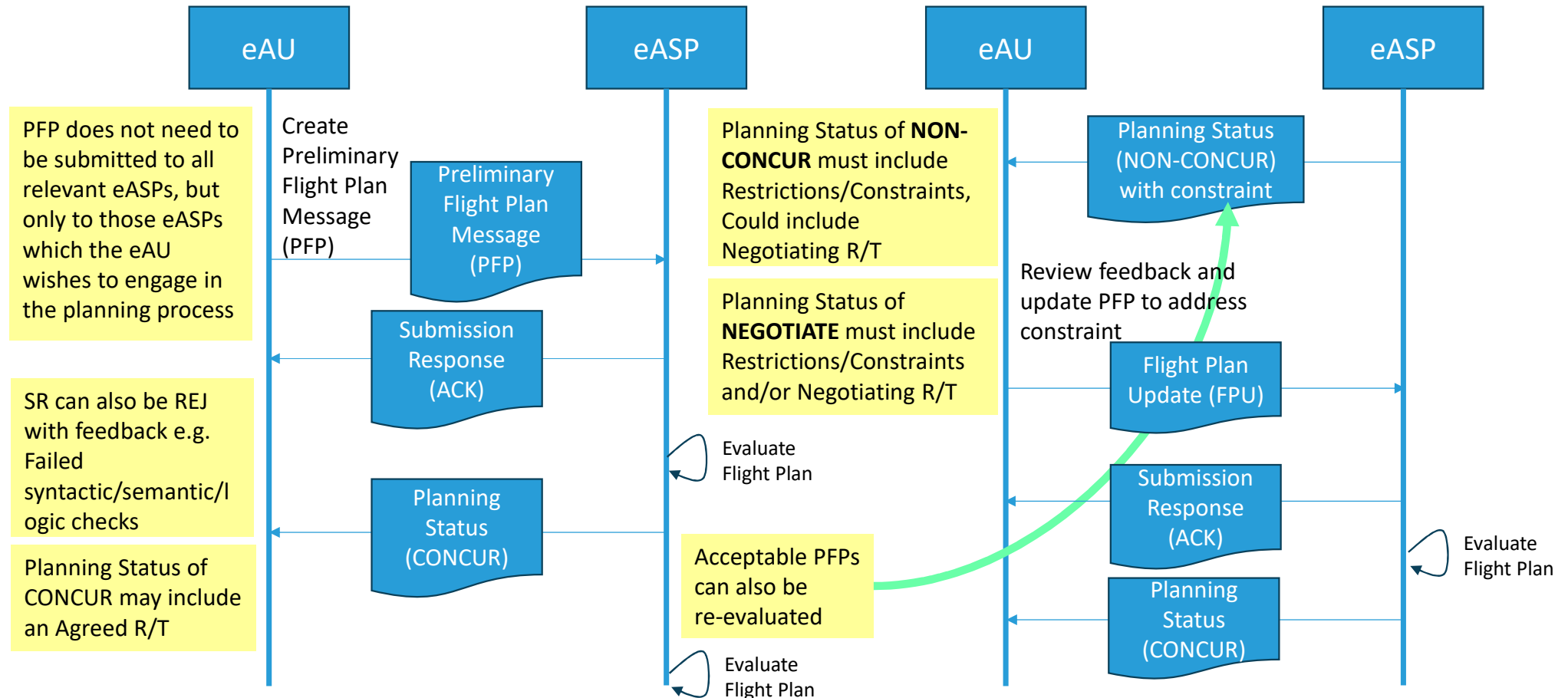


4. FF-ICE Planning Service (Optional) – Messages (2)

- Planning Status:
 - Concur – The PFP is **acceptable** and would be accepted if filed. eASP systems may return with Restriction/Constraints and/or Agreed Route/Trajectory and the impact is the flight plan will be cleared; possibly with ATC changes as indicated in the response
 - Non-Concur – The Route/Trajectory **does not comply** with the operating system. The eASP system returns Restriction/Constraint, it may also include either the Agreed or a Negotiating Route/Trajectory. The eAU is expected to make changes before filing eFPL or resubmit a Flight Plan Update.
 - Negotiate – The PFP is **acceptable** and would be accepted if filed. However, the Route/Trajectory determined by eASP have included ATM factors (such as runway-in-use or MET data), resulting in some differences with the Desired Route/Trajectory. The eASP system returns Restriction/Constraint and/or a Negotiating Route/Trajectory. If filed without change, the flight may be cleared differently.

4. FF-ICE Planning Service (Optional) – Scenario Flow

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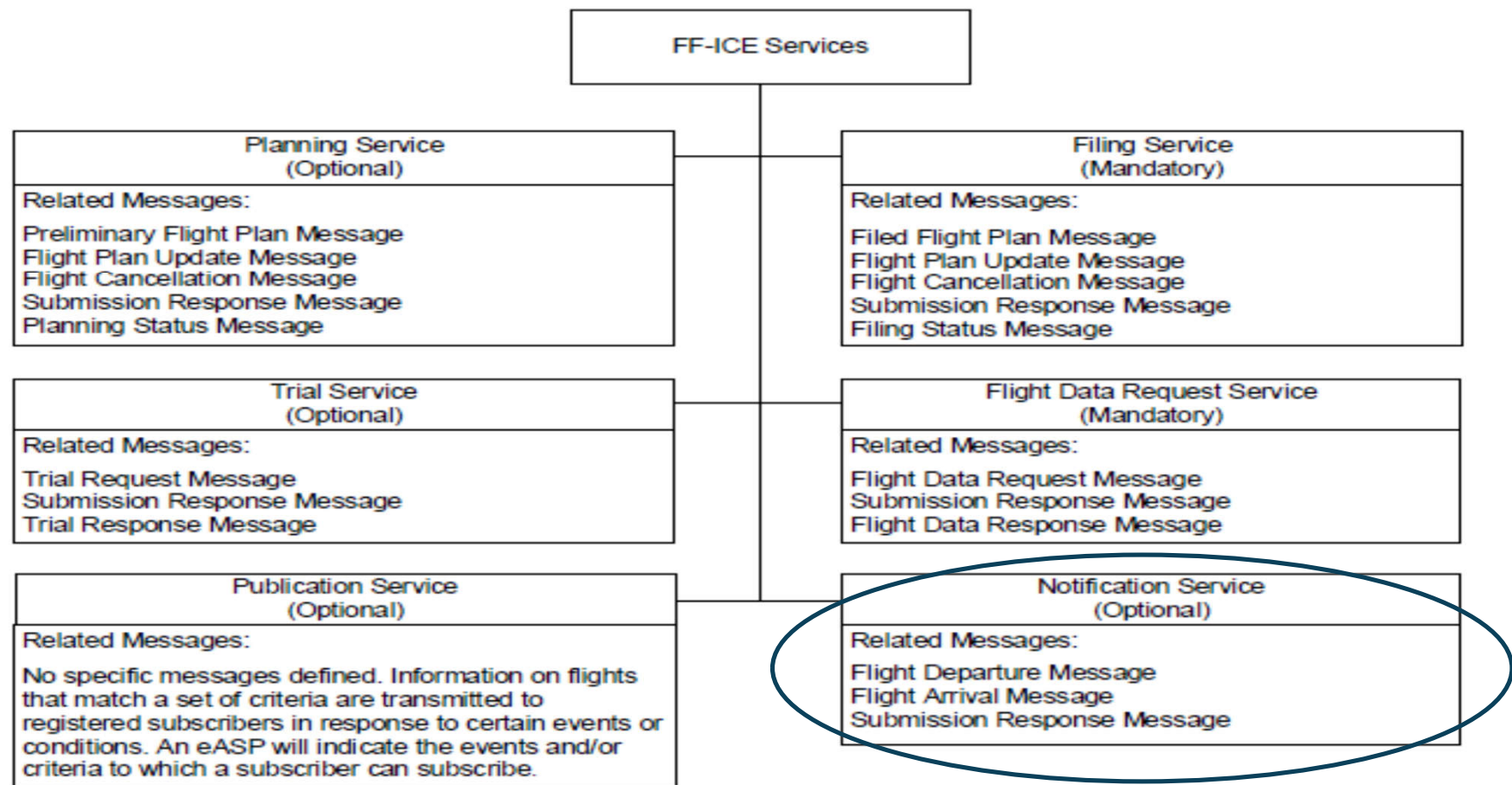
4. FF-ICE Planning Service (Optional) – Source

1. ICAO PANS-ATM (4444)
 - Chapter 17 – Section 17.4.2: Preliminary Flight Plan (PFP)
2. Volume II FF-ICE Implementation Guidance (9965)
 - Chapter 4 – Planning Service
 - Appendix B – FF ICE Model and Data
 - Appendix C – Section C-2 Preliminary Flight Plan
 - Appendix C – Section C-3 Planning Status
 - Appendix C – Section C-8 Flight Cancellation
 - Appendix C – Section C-9 Flight Plan Update
 - Appendix G – GUF1 Construction

* Format can be found in Appendix B of the FF-ICE Implementation Guidance



5. FF-ICE Notification Service (Optional*)



* Link to FPL2012 sunset



5. FF-ICE Notification Service (Optional) – Overview

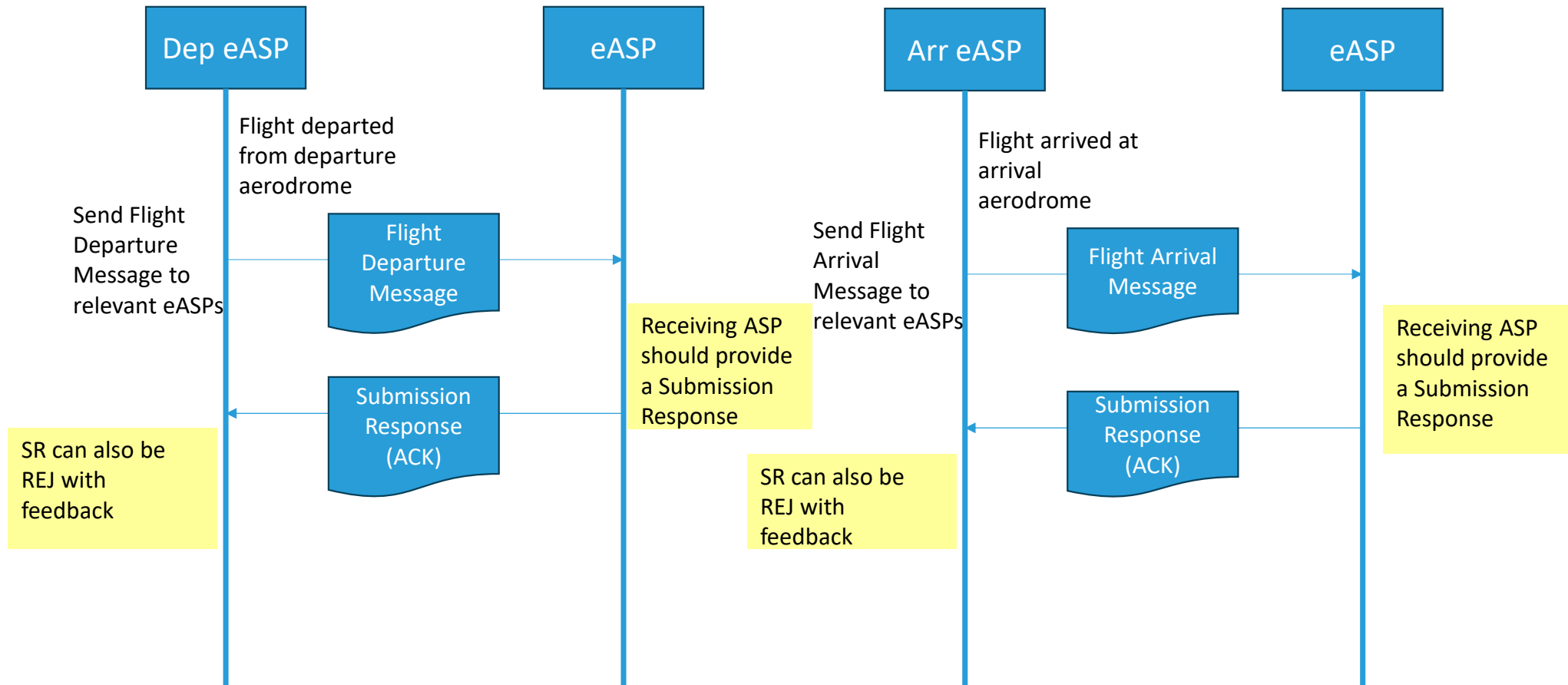
- Currently foreseen for the notification of departure and arrival.
 - Anticipated that as FF-ICE develops beyond pre-departure, other events in the life cycle of a flight will be added.
 - An event would usually be a physical one related to the progress of the flight such as Off-Block, Airborne, Landed, etc., as opposed to a status which is usually specific to the local system.
- The information supports further processing of the flight within the ATM system
 - The provider of the information needs confirmation that the information has been received through a **Submission Response**, just as the filing of a flight plan receives a confirmation response.
- There are two events currently defined to be notified via the Notification service:
 - **Departure** notification, which equate to the ATS messages **DEP**
 - **Arrival** notifications, which equate to the ATS messages **ARR**.



5. FF-ICE Notification Service (Optional) – Data

- DEP:
 - Format – ***DEP message with GUF***
 - Information – Actual Departure Time
 - Wheels-Off time (Preferred)
 - Other timings such as Off-Block time (Not preferred. However, if this is used, the location on the aerodrome to which the reported departure time refers to, should be indicated in the message)
 - Receiving ASP Response – **Submission Response (ACK, REJ, MAN)**
- ARR:
 - Format – ***ARR message with GUF***
 - Information – Actual Arrival Time
 - Wheels-On time (Preferred)
 - Other timings such as In-Block time (Not preferred. However, if this is used, the location on the aerodrome to which the reported arrival time refers to, should be indicated in the message)
 - Receiving ASP Response – **Submission Response (ACK, REJ, MAN)**

5. FF-ICE Notification Service - Scenario Flow



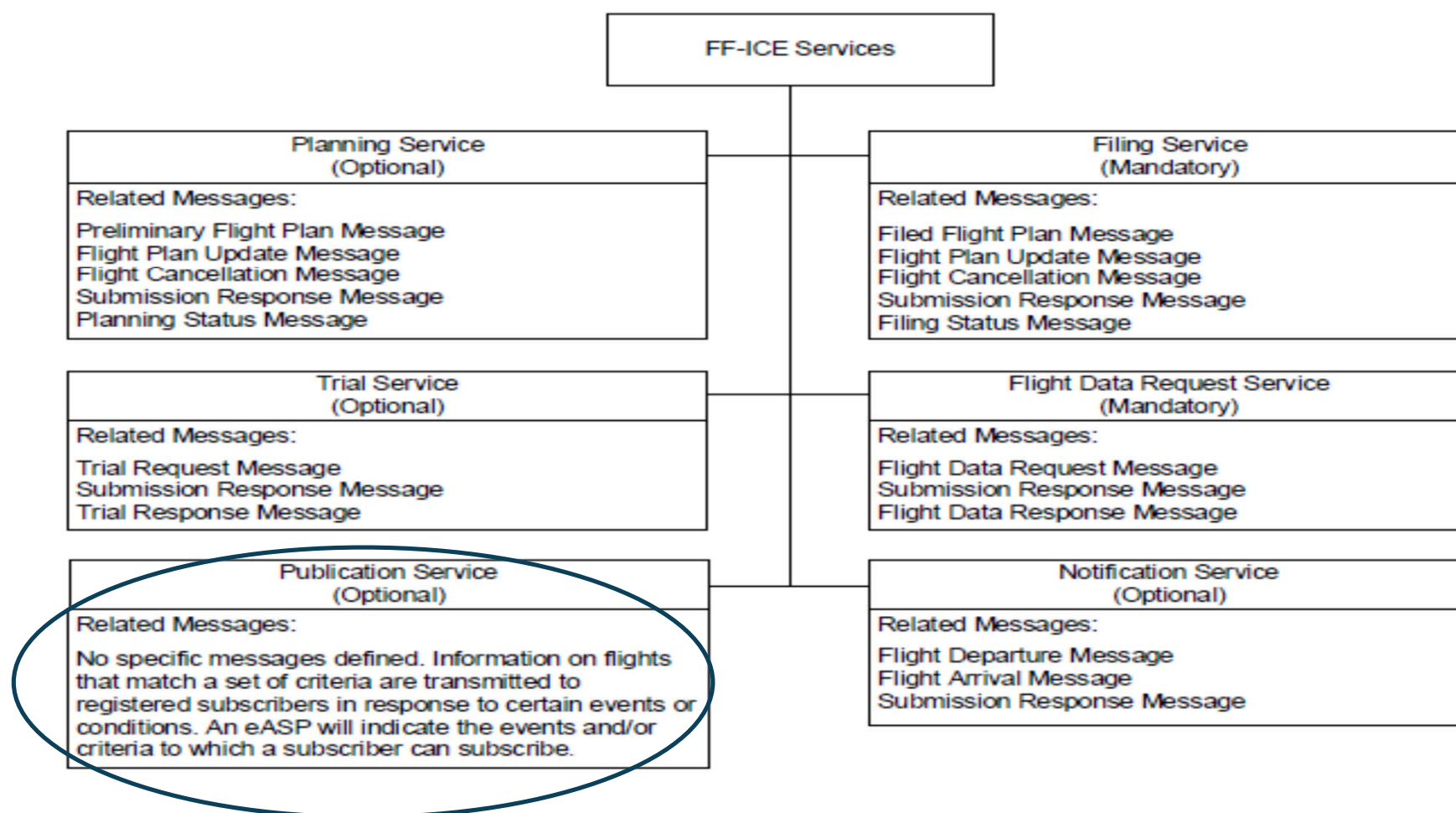


5. FF-ICE Notification Service (Optional) – Source

1. ICAO PANS-ATM (4444)
 - Chapter 11 – Section 11.4.2.2.6 Departure (DEP) Message and 11.4.2.2.7 Arrival (ARR) Message
 - Appendix 3 – Air Traffic Services Message
2. Volume II FF-ICE Implementation Guidance (9965)
 - Chapter 7 – Notification Service
 - Appendix G – GUF1 Construction



6. FF-ICE Data Publication Service (Optional)



6. FF-ICE Publication Service (Optional) – Overview

- Provides flight plan data using a subscription mechanism: information on flights that match a set of criteria are transmitted to registered subscribers in response to certain events or conditions.
 - Subscribers: airspace users, military authorities, ATM providers and aerodrome service providers such as aircraft maintenance and ground/gate service providers, general aviation fix-based operators, and other groups such as Customs and Immigration
 - An eASP should indicate the events and/or criteria to which a subscriber can subscribe.
- Leverage on the SWIM architecture and information services to support dissemination of flight information to multiple stakeholders in an efficient manner.
- Allows subscribers to maintain an awareness of changes to flight plan and trajectory information that will affect flights relevant to them.

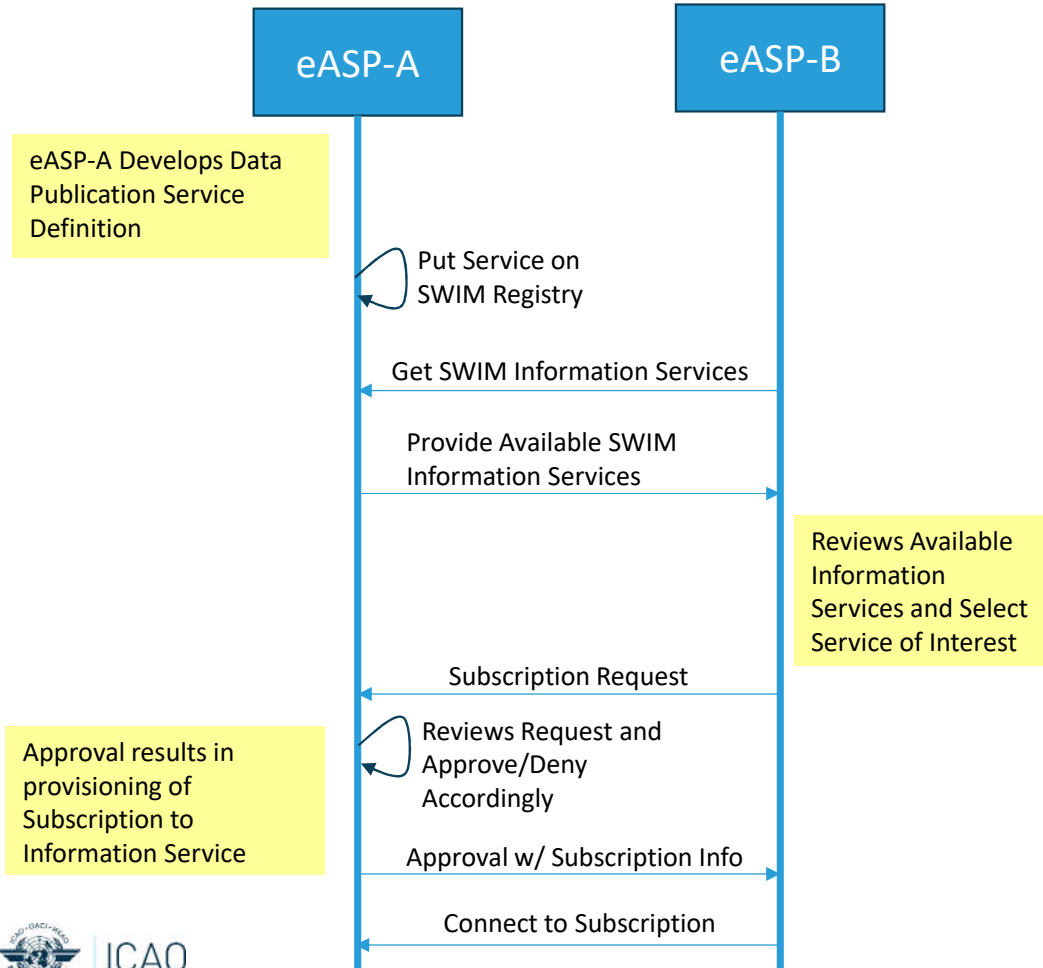
6. FF-ICE Publication Service (Nominal Scenario)

1. eASP-A publishes, on the SWIM registry, the information service for flight-depart-aerodromeX
2. eASP-B (i.e. nearby eASP) review the SWIM registry and discovered the information service for flight-depart-aerodromeX
 1. eASP-B requests subscription to the service
 2. eASP-B is approved for subscription and connected to the service
3. eAU files flight plan to eASP-A and is accepted
 1. eASP-A makes the departure information (from the flight plan) available through the flight-depart-aerodromeX service
4. The departure information matches the eASP-B subscription,
 1. Information is received by eASP-B through the subscription
5. In the event that the eAU makes change to the filed flight plan and change has been accepted, the updated departure information is then published and made available to eASP-B per its subscription

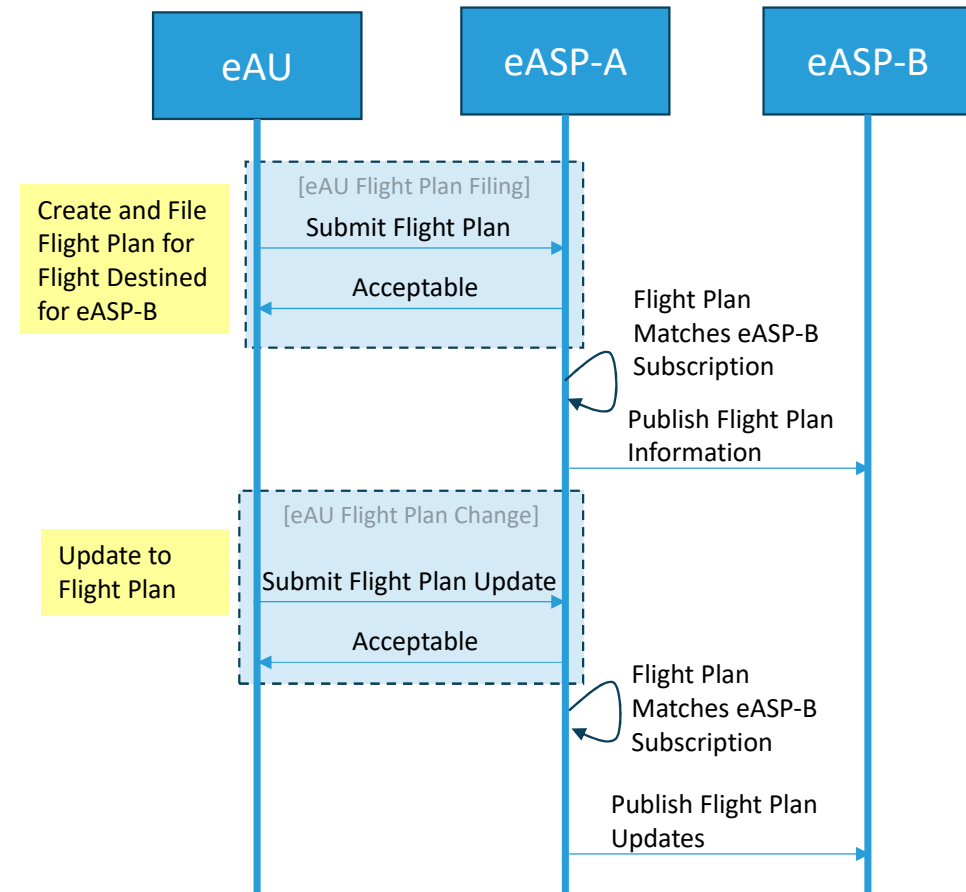
6. FF-ICE Publication Service (Nominal Scenario)

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1. Discovery and subscription of Information Service



2. Information Service Subscribed





6. FF-ICE Publication Service (Optional) – **Source**

1. ICAO PANS-ATM (4444)
 - Chapter 17 – Section 17.4.10 – To be Develop
2. Volume II FF-ICE Implementation Guidance (9965)
 - Chapter 9 – Publication Service
3. ICAO PANS-IM (10199)
 - Chapter 5 – Section 5.3 – Information Service Overview Publication

FF-ICE Services Required to Sunset FPL2012

Three FF-ICE/R1 Services are required to support the sunset of FPL2012

1. Filing Service
2. Flight Data Request Service
3. Notification Service



Thank You