



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

Crystal Kim, Chief ATM, ICAO HQ/ANB

Abbas Niknejad, Regional officer ANS, ICAO EUR/NAT

**INTERNATIONAL
CIVIL AVIATION
ORGANIZATION**



SWIM Seminar, Tbilisi, 23-25 June 2026

Table of Contents

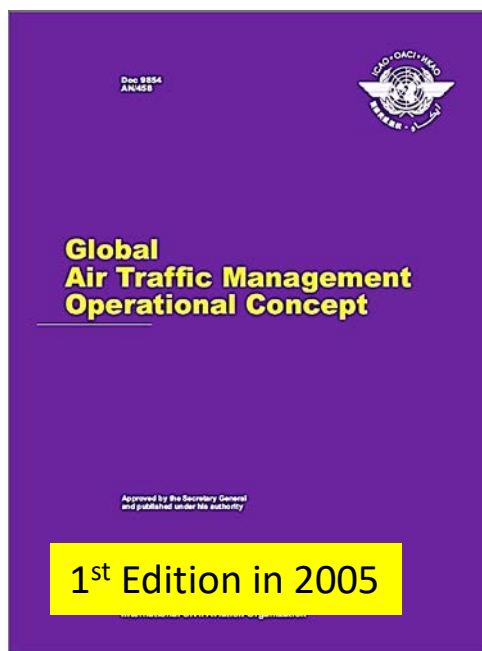
- 1 FF-ICE/R1 Concept and Provisions
- 2 Relationship between FF-ICE and SWIM
- 3 FF-ICE implementation Strategy
- 4 FPL2012 cessation & evolution to FF-ICE/R2
- 5 FF-ICE implementation in EUR/NAT

- 1 FF-ICE/R1 Concept and Provisions
- 2 Relationship between FF-ICE and SWIM
- 3 FF-ICE implementation Strategy
- 4 FPL2012 cessation & evolution to FF-ICE/R2
- 5 FF-ICE implementation in EUR/NAT

ICAO Framework

(Vision, Concept, Planning and Standardization)

01 vision



02 concept

Detailed concepts & performance framework

- CDM/ATFM (Doc 9971)
 - FF-ICE (Doc 9965)
 - SWIM (Doc 10039)
 - TBO (TBD)
 - Connected Aircraft (TBD)
- ATM System Requirements (Doc 9882)
 - Global Air Navigation System Performance (Doc 9883)

03 planning



04 standardization

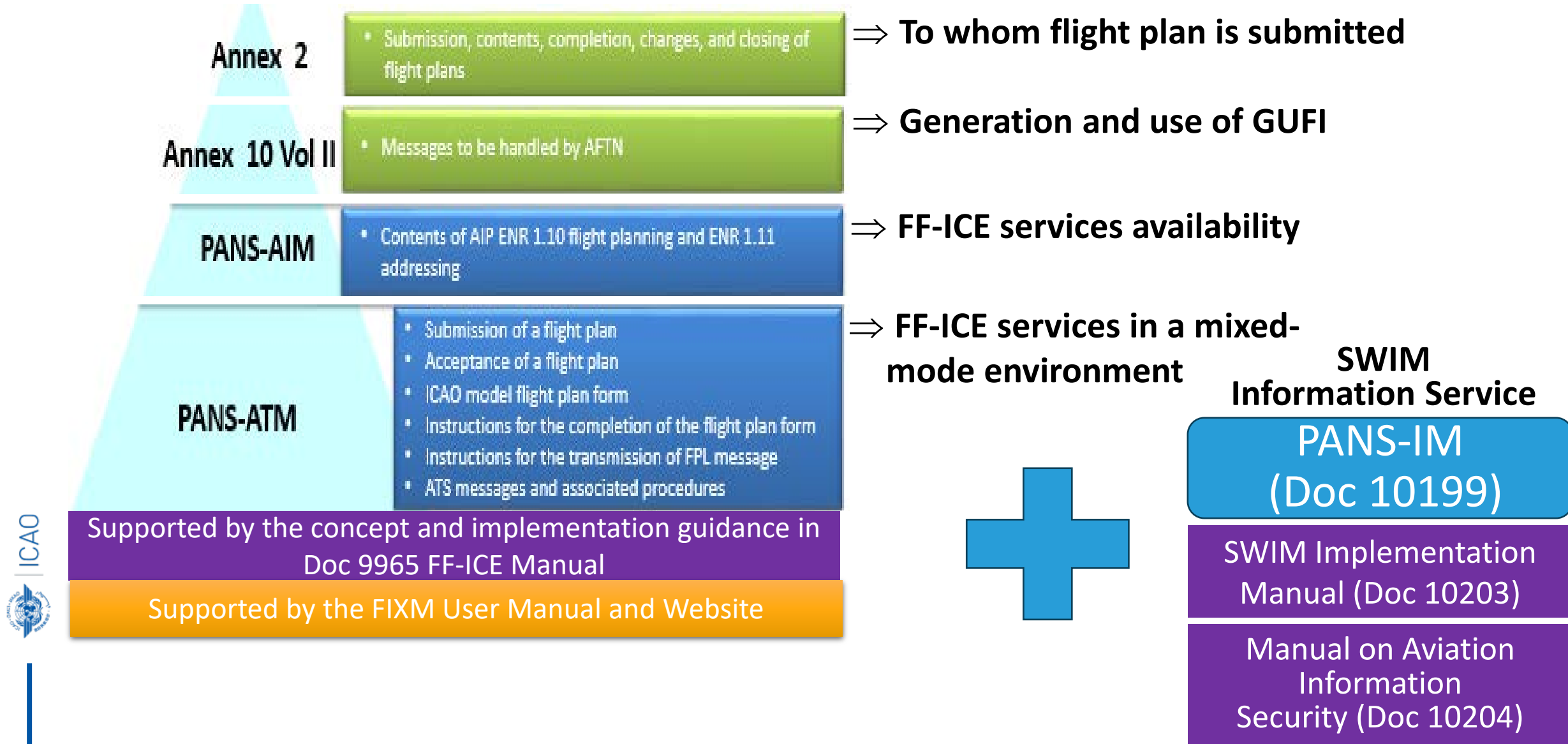


Applicability date
28 November 2024

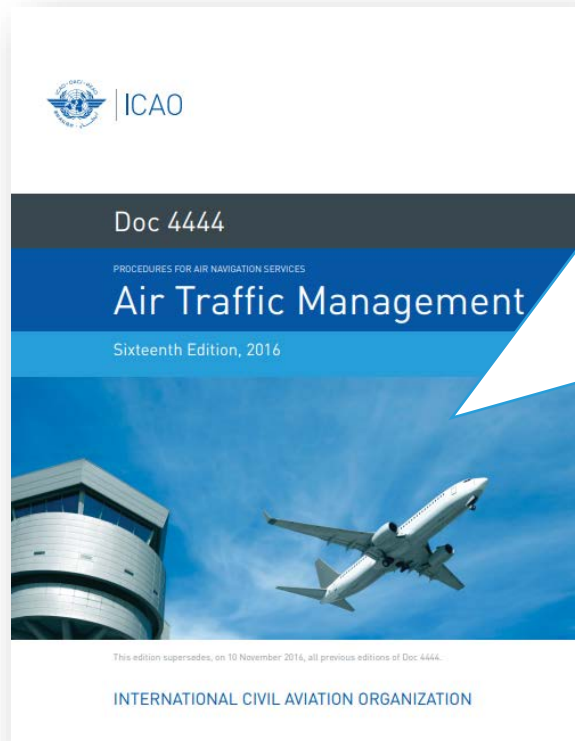
FF-ICE Release 1 – Pre-departure

Overview of Provisions and Guidance

5



FPL - eFPL



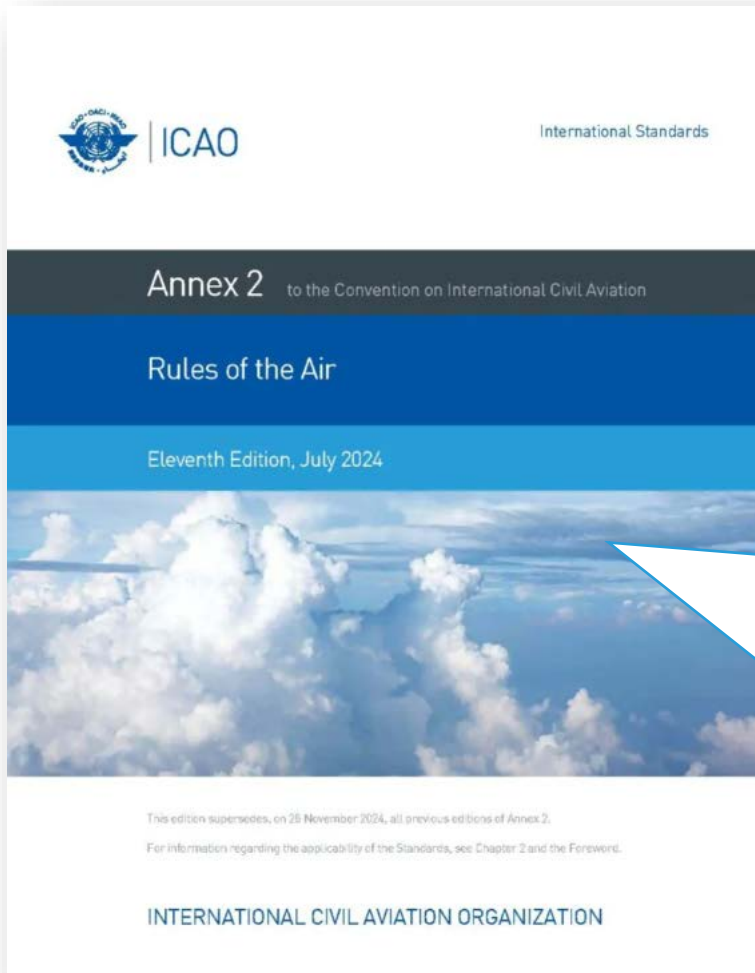
Filed flight plan (FPL or eFPL).

The **latest** flight plan as submitted by the pilot, an operator or a designated representative for use by ATS units.

*Note.— The **FPL** denotes a filed flight plan exchanged using aeronautical fixed service while **eFPL** denotes a filed flight plan exchanged using FF-ICE services. The eFPL allows for the exchange of additional information not contained within the FPL.*

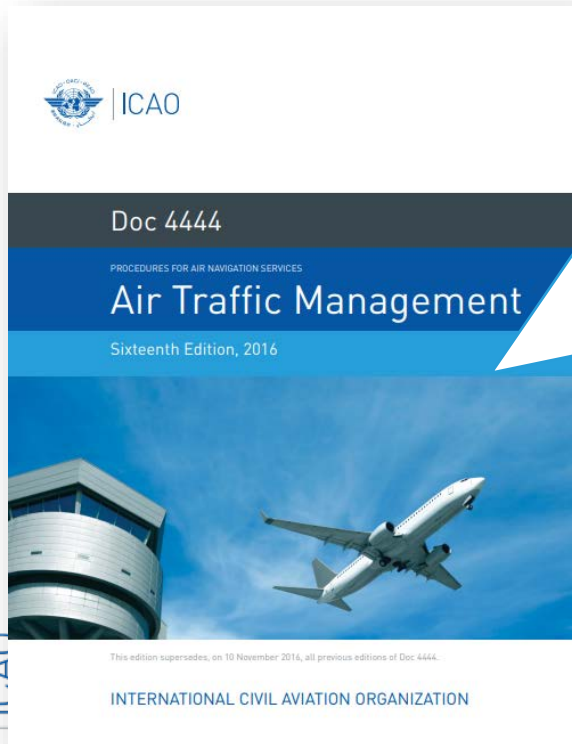
Flight plan submission/distribution - General

7



3.3.1.3 Unless otherwise prescribed by the appropriate ATS authority, a flight plan shall be submitted, before departure, to an air traffic services reporting office or, during flight, transmitted to the appropriate air traffic services unit or air-ground control radio station.

Flight plan message - origination

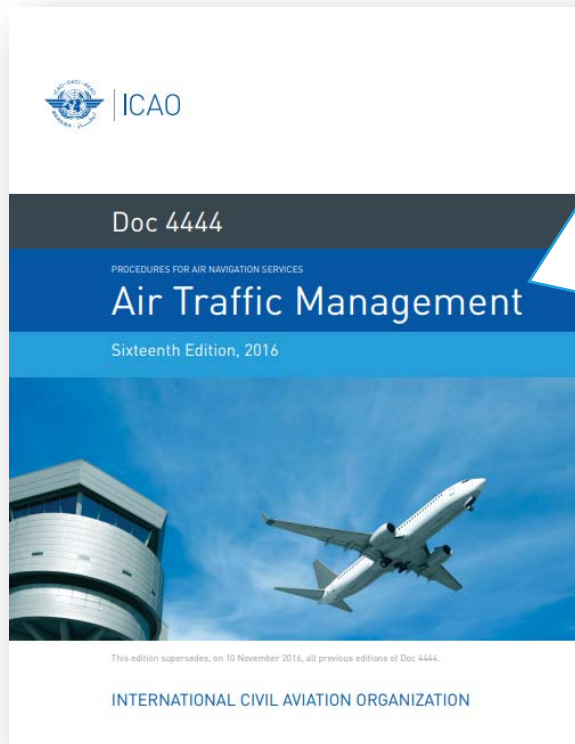


11.4.2.2.2.2 **An FPL message shall be originated** by the ATS unit serving the departure aerodrome or, when applicable, by:

- a) **a unit designated by the appropriate ATS authority** to serve the departure aerodrome;
- b) **the ATS unit** receiving a flight plan from an aircraft in flight; or
- c) **the pilot, the operator or its designated representative**, when so delegated in accordance with 11.2.1.1.1.

Flight plan submission/distribution – eFPL/FPL

9



17.4.3.2 Unless otherwise prescribed by the appropriate ATS authority, **an operator or its designated representative electing to use FF-ICE services shall submit:**

- a) an eFPL to each FF-ICE services unit; and
- b) an FPL to each ATS unit unable to process an eFPL....

*Note 1.— When so prescribed, the **FF-ICE service unit may optionally offer related functionality**, for example: an operator or its designated representative may submit an eFPL only to an FF-ICE services unit serving the departure aerodrome. The **FF-ICE services unit may assume responsibility for the provision of the flight plan information and changes thereto in an appropriate format to all relevant units** concerned along the route of flight, and for provision of appropriate responses back to an operator or its designated representative*

eFPL vs FPL (essential new information)

10

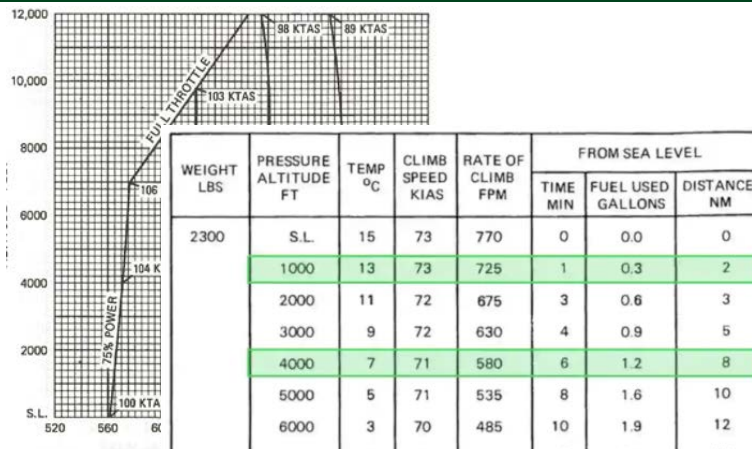
1) Global Unique Flight Identifier (GUFI)

UUID	Namespace identifier	Timestamp
------	----------------------	-----------

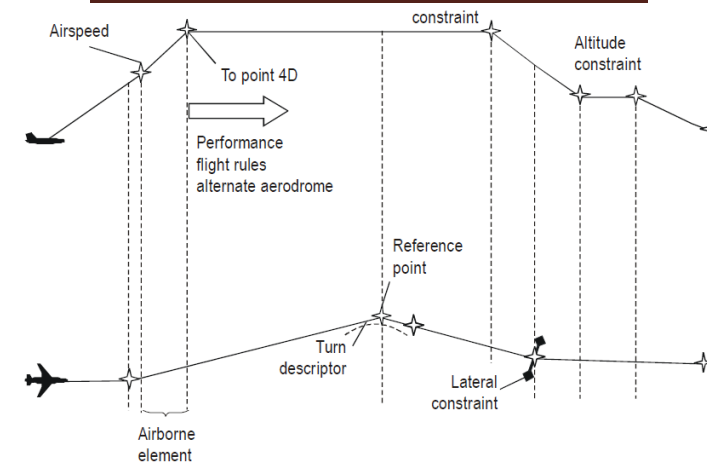
2. Flight plan version



3) Extended aircraft performance data (e.g. take-off mass, climb/descent speed)



4) 4D trajectory



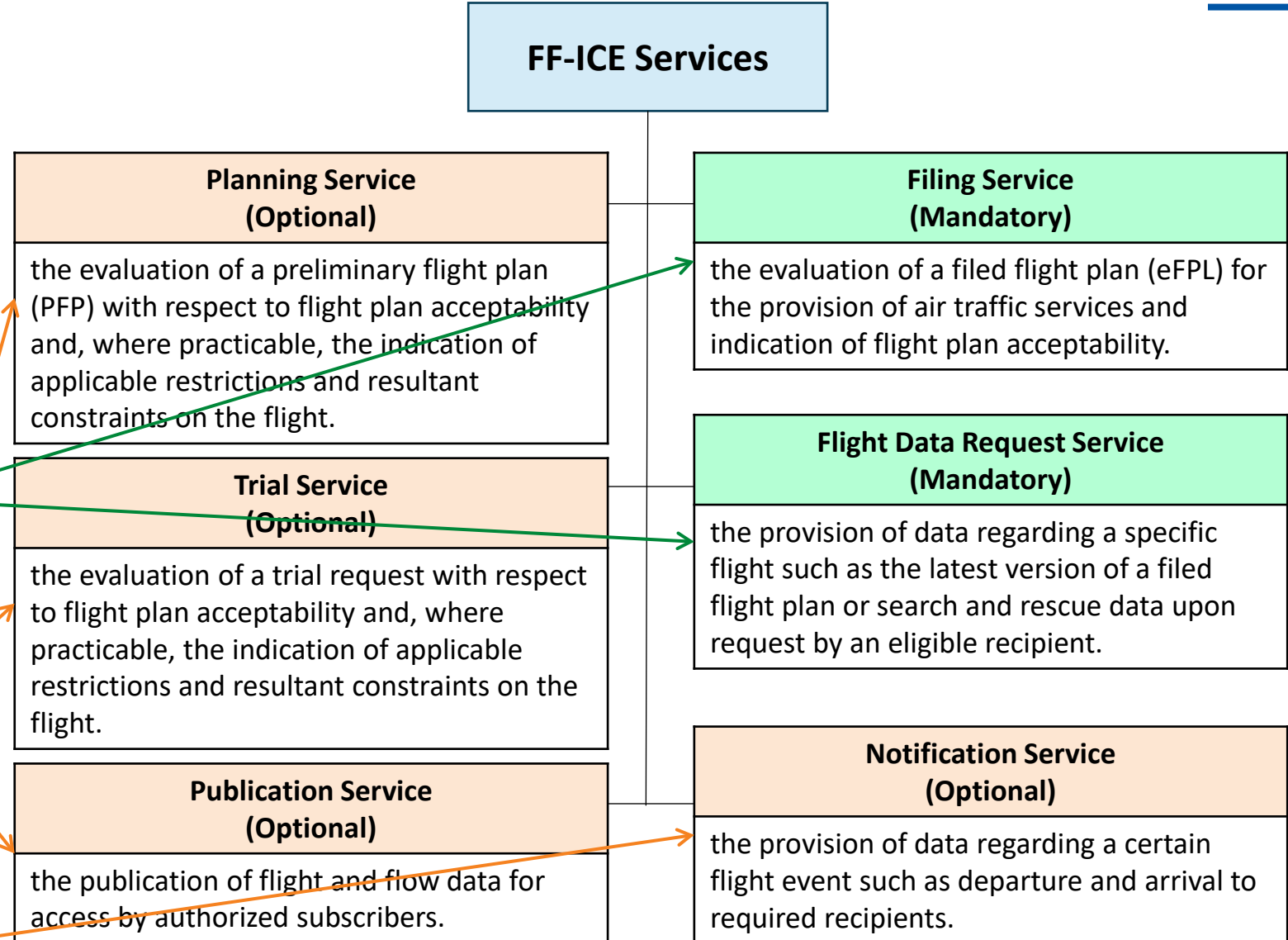
FF-ICE services

- A set of services established for the purposes of facilitating exchange of FF-ICE, accurate assessment of demands, appropriate resource planning, and optimizing flight planning and execution.

Required (minimum) capabilities which can replace some ATS messages (FPL, RQP, RQS)

Optional services that facilitate coordination and negotiation.

Optional service that can replace ARR and DEP message.



Elective Implementation of FF-ICE Services

PANS-ATM

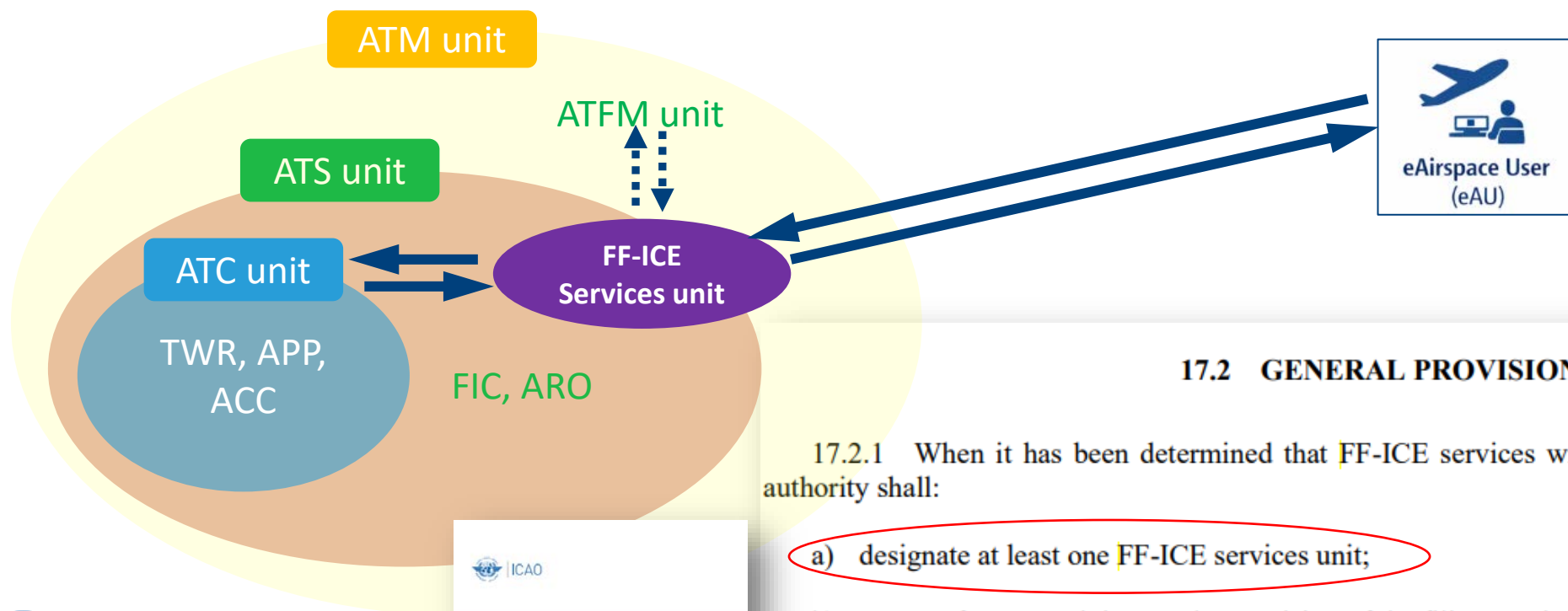
17.2 GENERAL PROVISIONS

17.2.1 When it has been determined that FF-ICE services will be provided, the appropriate ATS authority shall:

- a) designate at least one FF-ICE services unit;
- b) arrange for, as a minimum, the provision of the filing service and flight data request service;
- c) ensure that the FF-ICE services unit(s) maintains the ability necessary to exchange ATS messages with operators and ATS units that have not implemented FF-ICE services, in accordance with provisions in Chapter 11; and
- d) arrange for the promulgation of information on the availability of FF-ICE services, associated procedures and conditions in the Aeronautical Information Publications (AIP).

FF-ICE services unit

- A unit **designated by the appropriate ATS authority** for the provision of FF-ICE services.



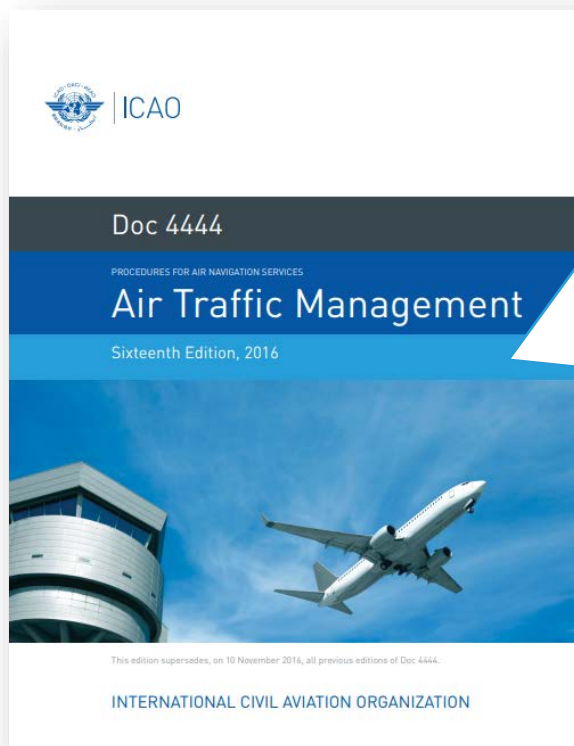
17.2 GENERAL PROVISIONS

17.2.1 When it has been determined that FF-ICE services will be provided, the appropriate ATS authority shall:

- designate at least one FF-ICE services unit;
- arrange for, as a minimum, the provision of the filing service and flight data request service;
- ensure that the FF-ICE services unit(s) maintains the ability necessary to exchange ATS messages with operators and ATS units that have not implemented FF-ICE services, in accordance with provisions in Chapter 11; and
- arrange for the promulgation of information on the availability of FF-ICE services, associated procedures and conditions in the Aeronautical Information Publications (AIP).



Technical and Interoperability Requirement

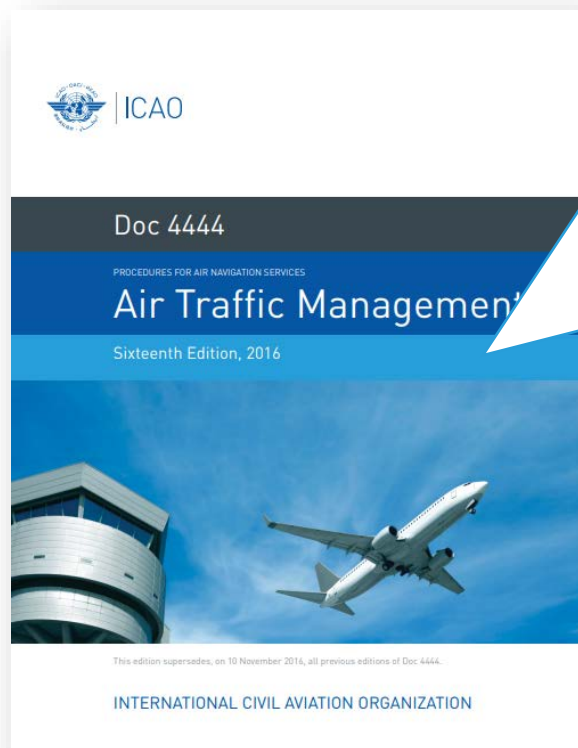


17.5.1 FF-ICE services shall make use of information services.

*Note 1. — In the context of system-wide information management, the information service addresses **machine-to machine interaction in a service-oriented architecture**.*

*Note 2. — Procedures on information services are contained in the Procedures for Air Navigation Services - Information Management (**PANS-IM, Doc 10199**).*

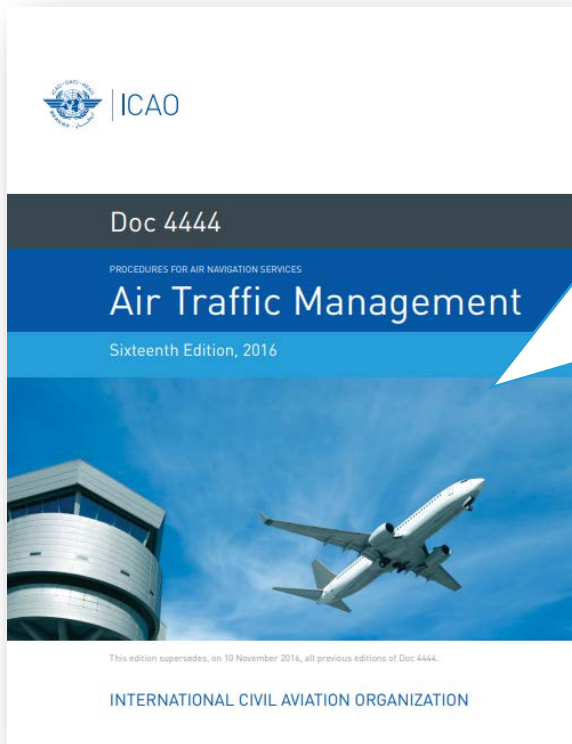
Technical and Interoperability Requirement



17.5.2 ... shall adopt an **information exchange model** that :

- a) **provides the structure and format** of the required flight and flow data elements,
- b) **enables the construction and exchange** of the standard FF-ICE messages
- c) **provides a mechanism** by which additional flight and flow data and/or FF-ICE messages can be used without affecting global interoperability.

GUFI & eFPL version – PANS-ATM



17.4.1.5 The originator of PFP, eFPL or Flight Plan Update messages **shall include flight plan version** information
....

17.4.3.3 **An eFPL message shall include**, as a minimum, **the GUF**I and the flight data items prescribed by the provisions in Annex 2, 3.3.2 and Appendix 2 of this document.

GUFI provisions – Annex 10



3.9 Globally unique flight identifier

3.9.1 The originator of a preliminary flight plan (PFP) or eFPL **shall assign a single GUF**I to a flight for which the flight plan is to be submitted.

3.9.2 The originator of a PFP or eFPL shall ensure that **all FF-ICE messages** submitted for a flight are **identified by the same GUF**I.

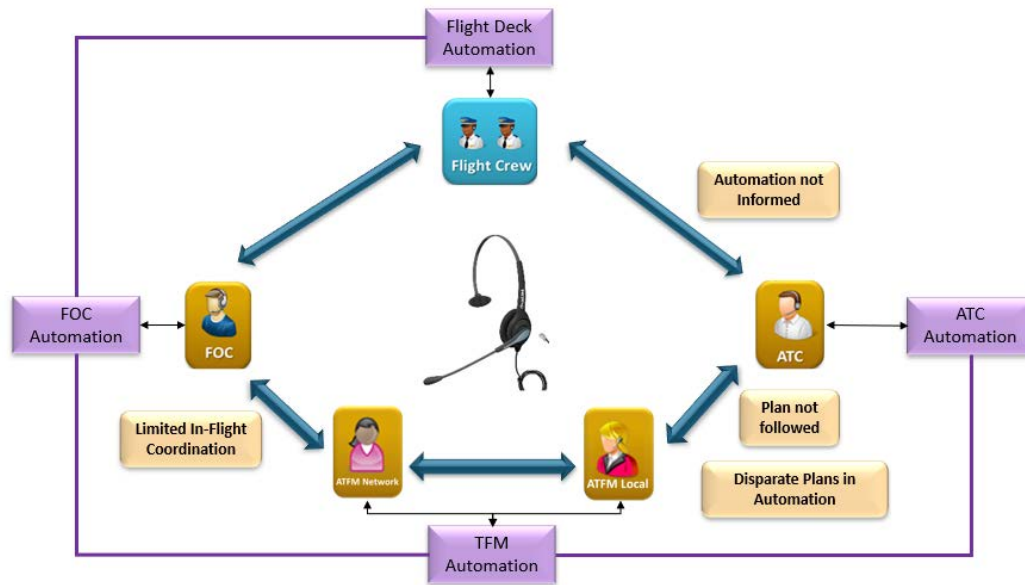
.....

- 1 FF-ICE/R1 Concept and Provisions
- 2 Relationship between FF-ICE and SWIM
- 3 FF-ICE implementation Strategy
- 4 FPL2012 cessation & evolution to FF-ICE/R2
- 5 FF-ICE implementation in EUR/NAT

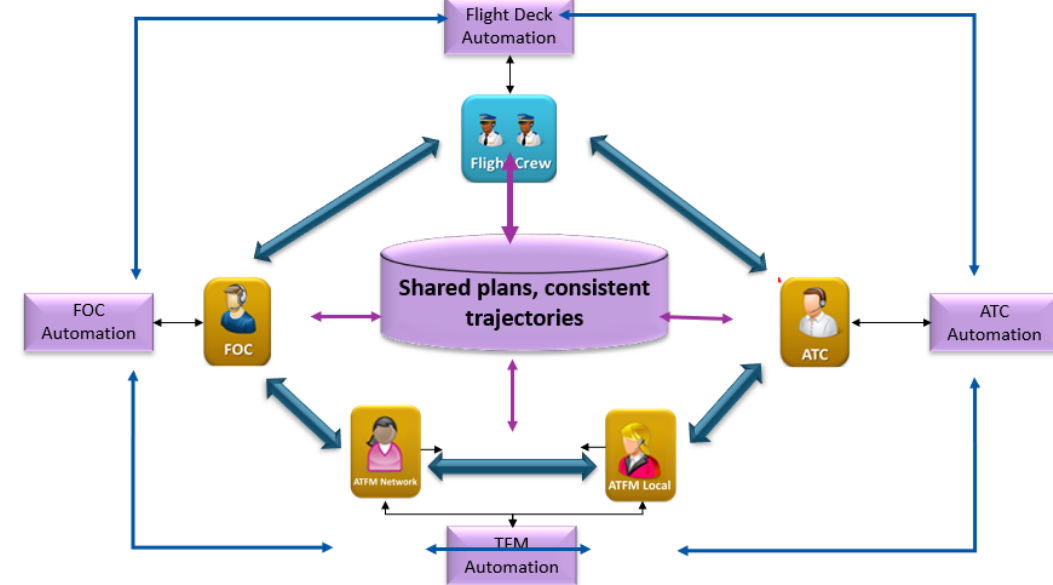
Evolution to FF-ICE in a SWIM environment

19

ATM Environment Today with Limitations



Full TBO Environment in the Future



SWIM – FF-ICE Relationship



1. Conceptual Framework: Application vs. Infrastructure

- **SWIM as the Enabler:** Provides the global technical infrastructure and standards.
- **FF-ICE as the Application:** Acts as the operational tool enabling Trajectory-Based Operations (TBO).

2. Architectural & Technical Intersect

- **Data Standardization:** FF-ICE uses FIXM formats, which map directly into SWIM's global framework.
- **Service-Based Architecture:** FF-ICE replaces legacy AFS-based text messages with modern SWIM-compliant services.
- **Modernized Network:** Transitions from rigid teletype grids to an open cloud architecture.

SWIM – FF-ICE Relationship – Cont'd



3. Procedural & Operational

- **Real-Time Negotiation:** SWIM provides the pipeline needed for rapid trajectory trials.
- **GUFID Cross-Referencing:** Universal flight IDs in compliance with SWIM.
- **Unified Source:** Ensures airlines, airports, and ANSPs collaborate on identical data.

4. Governance

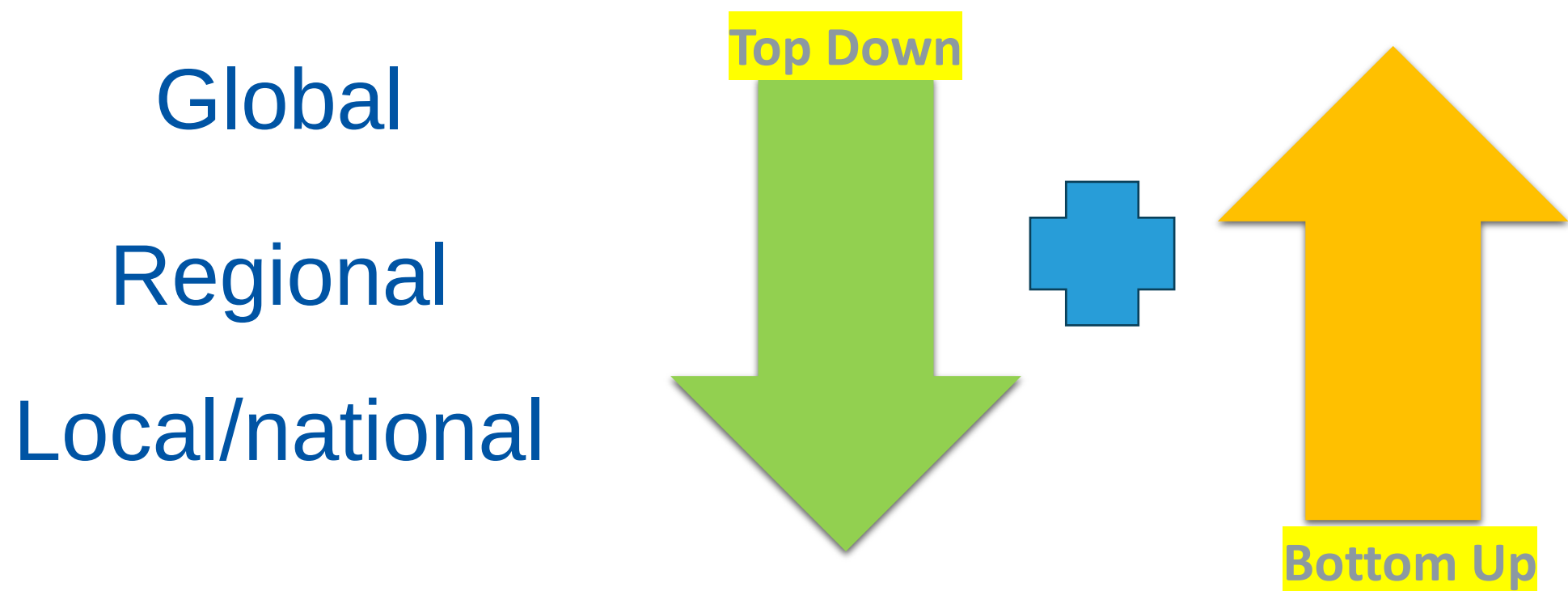
- FF-ICE relies on SWIM's infrastructure for access control and authentication.

5. Future Evolution

- **Air-Ground Roadmap:** Ground-based SWIM enables Release 1; airborne SWIM will unlock Release 2.
- **Global Harmonization:** SWIM governance ensures cross-border data readability and compliance.

- 1 FF-ICE/R1 Concept and Provisions
- 2 Relationship between FF-ICE and SWIM
- 3 FF-ICE implementation Strategy**
- 4 FPL2012 cessation & evolution to FF-ICE/R2
- 5 FF-ICE implementation in EUR/NAT

Transition Strategy Development



Transition Strategy Development

Top Down

- Engage and raise awareness
- Deliver ICAO provisions and guidance both for FF-ICE and SWIM
- No more changes to FPL2012 requirements
- Set the global target date for sunseting FPL2012

Bottom Up

- In-depth national/regional engagements and demonstrations/tabletop
- National/regional Implementation/transition plan

AN-Conf/14 REC 3.2/2 (Up to 2034)



**Determine
an ultimate
cut-off date**

- **amend relevant ICAO provisions and guidance material** to enable the 2034 global cessation of the ICAO flight plan and associated air traffic services messages;
 - **conduct a periodic assessment and report on the readiness** of the global air traffic management community for the 2034 global cessation of the ICAO 2012 flight plan.
-
- **develop national and regional plan(s)** to transition to FF-ICE services along with industry stakeholders
 - **establish regional focus groups** for coordinating the planning and implementation of FF-ICE services and providing necessary support throughout the transition period
 - **facilitate inter-regional collaboration** for a harmonized implementation of and transition to FF-ICE services;

Regional Planning Considerations



26

✓ FF-ICE Services Unit

- Cross-Regional, Regional, Sub-regional, National
- Separate, or combined with other functions

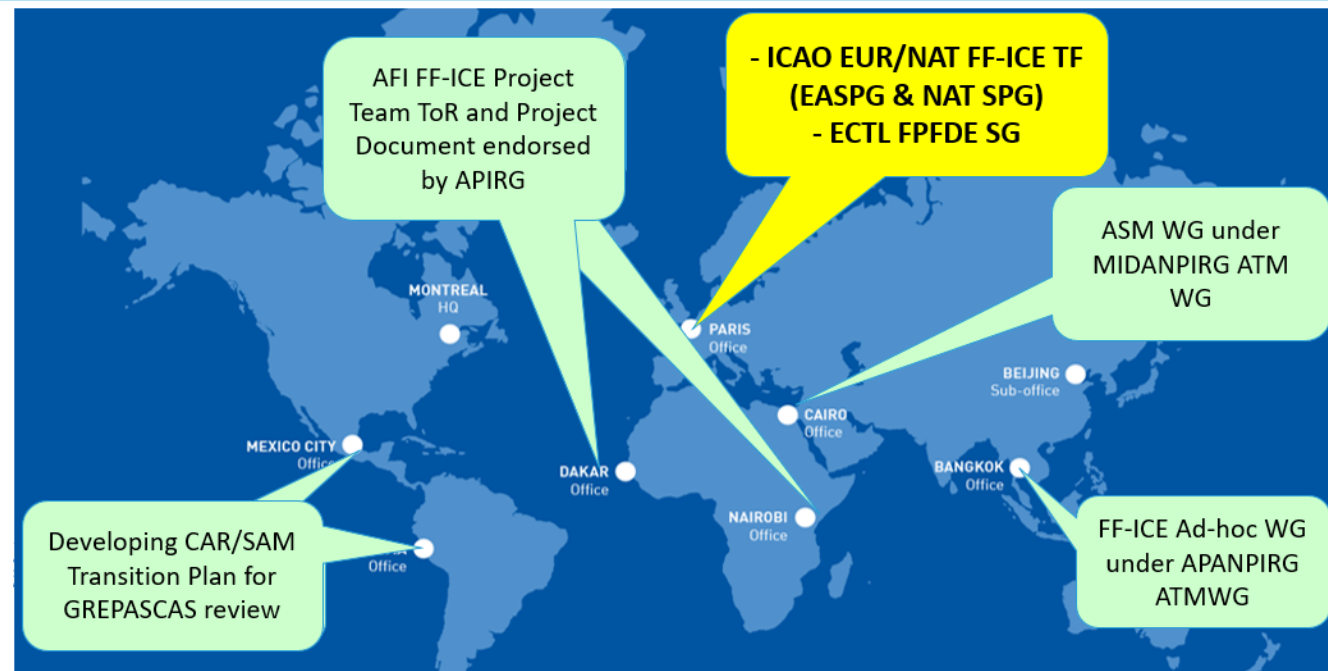
✓ Involve airspace users and their services providers from the get-go

✓ Interfaces and interaction between FF-ICE services unit and ATS units

✓ Technical and operational standardization on global or regional levels

✓ Strategy and timeline to use **translation and conversion capabilities**

✓ Funding and timelines to **upgrade relevant systems**



- 1 FF-ICE/R1 Concept and Provisions
- 2 Relationship between FF-ICE and SWIM
- 3 FF-ICE implementation Strategy
- 4 FPL2012 cessation & evolution to FF-ICE/R2**
- 5 FF-ICE implementation in EUR/NAT

Two Streams of Activities for FF-ICE Provision Update

(Ongoing within an ICAO expert group – ATMRPP)



28

Cessation of FPL2012

- Refine FF-ICE/R1 provisions based on the lessons learned, as necessary
- Define the mandatory services to enable cessation of FPL2012
- Remove the requirements related to mixed mode operations

Post Departure FF-ICE Services (FF-ICE/R2)

- Identify the need for changes to the FF-ICE services or messages
- Determine the level of standardization required (right balance between flexibility vs uniformity)

**Aimed for the finalization of Recommendation at
ATMRPP/7 in Q2/2028**

Cessation of FPL2012 – Guiding principles (ATMRPP)

(ICAO)

1. After 2034, the use of Repetitive Flight Plan is decommissioned.
2. After 2034, exclusive use of FF-ICE R1 services and eFPL format means that:
 - i) FF-ICE service units are designated by all Member States and information related to those services are published in State's AIPs.
 - ii) Those designated FF-ICE service units have implemented the following list of FF-ICE R1 services as a minimum (**Filing Service, Flight Data Request Service, and Notification Service**).
 - iii) Current flight plan format (FPL2012) is decommissioned.
 - iv) FF-ICE R1 services implementation (e.g. message exchanges between, eAU and FF-ICE services unit) have been thoroughly tested, including degraded and error modes.
3. Impact of FPL2012 cessation on ATS messages:
 - i) Notification Service provisions are upgraded to convey ALR and RCF information.
 - ii) FPL, CHG, CNL, DLA, RQP, RQS, SPL, DEP, ARR, ALR and RCF have equivalence in FFICE R1 services and are decommissioned.
 - iii) CPL, EST, CDN, ACP, LAM and other AIDC messages don't have equivalence in FF-ICE R1 services and need to remain in operational use, together with current supporting systems.

Examples of changes under consideration (1/6)

Air traffic services reporting office. A unit established for the purpose of receiving reports concerning air traffic services ~~and flight plans submitted before departure.~~

Repetitive flight plan (RPL). ~~A flight plan related to a series of frequently recurring, regularly operated individual flights with identical basic features, submitted by an operator for retention and repetitive use by ATS units.~~

Examples of changes under consideration (2/6)

Filed flight plan (~~FPL~~ or ~~eFPL~~). The latest flight plan as submitted by the pilot, an operator or a designated representative for use by ATS units.

Note. — ~~The FPL denotes a filed flight plan exchanged using aeronautical fixed service, while eFPL denotes a filed flight plan exchanged using FF-ICE services. The eFPL allows for the exchange of additional information not contained within the FPL.~~

Examples of changes under consideration (3/6)

Annex 11, New Section for FF-ICE Services

2.35 Flight and flow — information for a collaborative environment (FF-ICE) services.

Some provisions from the PANS-ATM will be elevated to Annex 11, and scope of such elevation still under discussion

Examples of changes under consideration (4/6)

PANS-ATM (Doc 4444), Chapter 17

17.1.2 ~~When any of the FF-ICE services in 17.1.1 are to be implemented, t~~The provision and use of such services shall be effected in accordance with the provisions of this chapter.

Examples of changes under consideration (5/6)

PANS-ATM (Doc 4444) Chapter 17

17.4.3.2 ~~Unless otherwise prescribed by the appropriate ATS authority, a~~ An operator or its designated representative electing to use FF-ICE services shall submit:

- a) an eFPL to each FF-ICE services unit concerned along the route of a flight; ~~and~~
- b) ~~an FPL to each ATS unit unable to process an eFPL, as directed by the AIP relevant to each airspace the flight is expected to traverse.~~

Examples of changes under consideration (6/6)

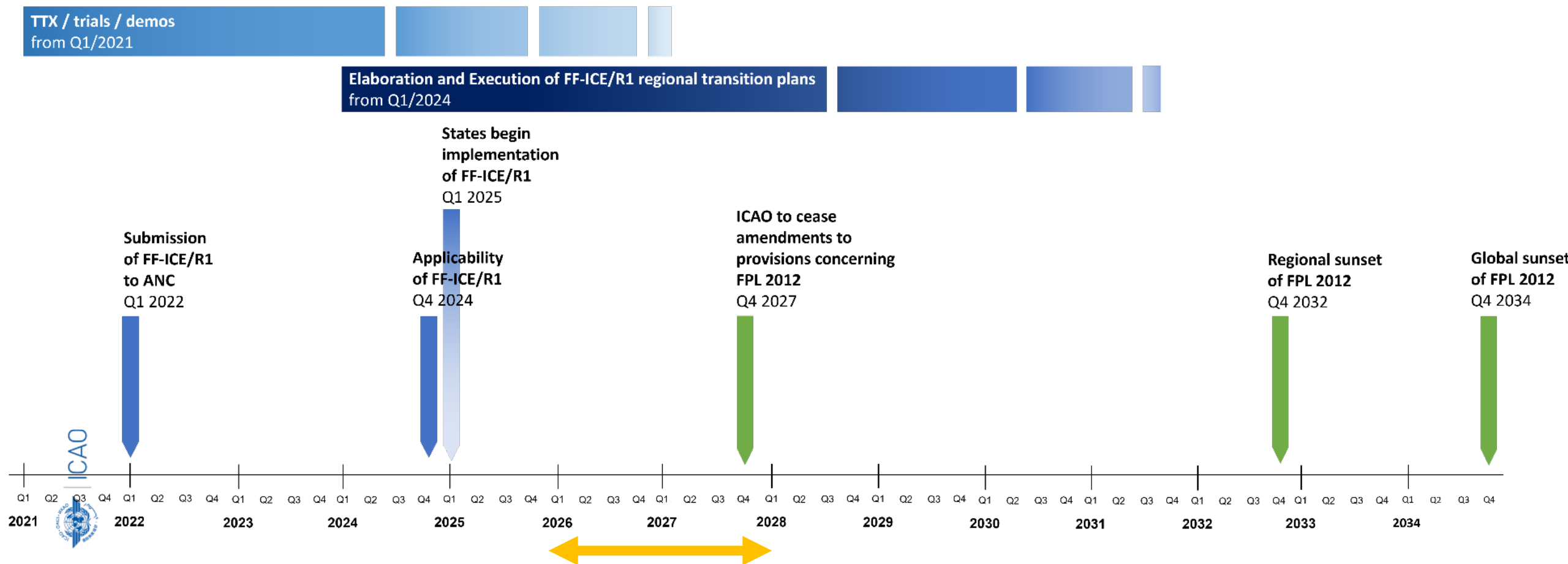
PANS-ATM (Doc 4444) Chapter 17

~~17.3.3 The content of an FF-ICE message shall allow for translation to a corresponding ATS message when necessary to meet the requirements of Chapter 11. This includes the translation of:~~

- ~~a) — an eFPL message to an FPL message;~~
- ~~b) — a Flight Plan Update message to a CHG or DLA message; and~~
- ~~c) — a Flight Cancellation message to a CNL message.~~

Indicative Timelines

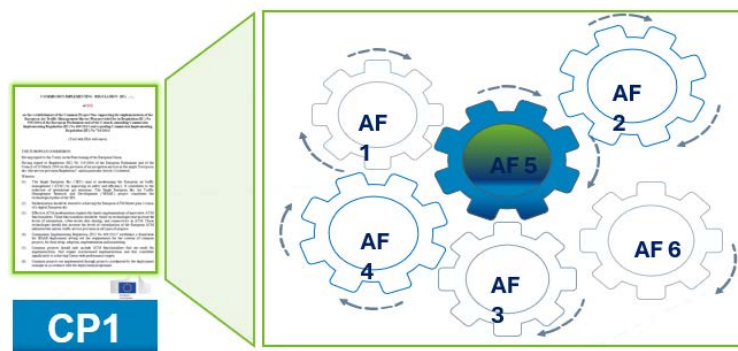
36



- 1 FF-ICE/R1 Concept and Provisions
- 2 Relationship between FF-ICE and SWIM
- 3 FF-ICE implementation Strategy
- 4 FPL2012 cessation & evolution to FF-ICE/R2
- 5 FF-ICE implementation in EUR/NAT

EU SWIM Implementation

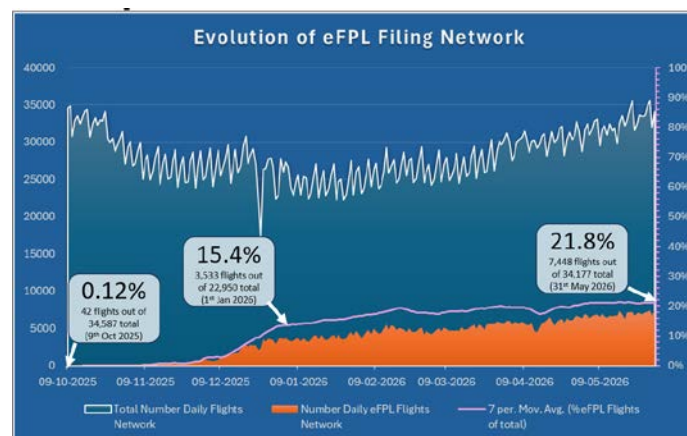
38



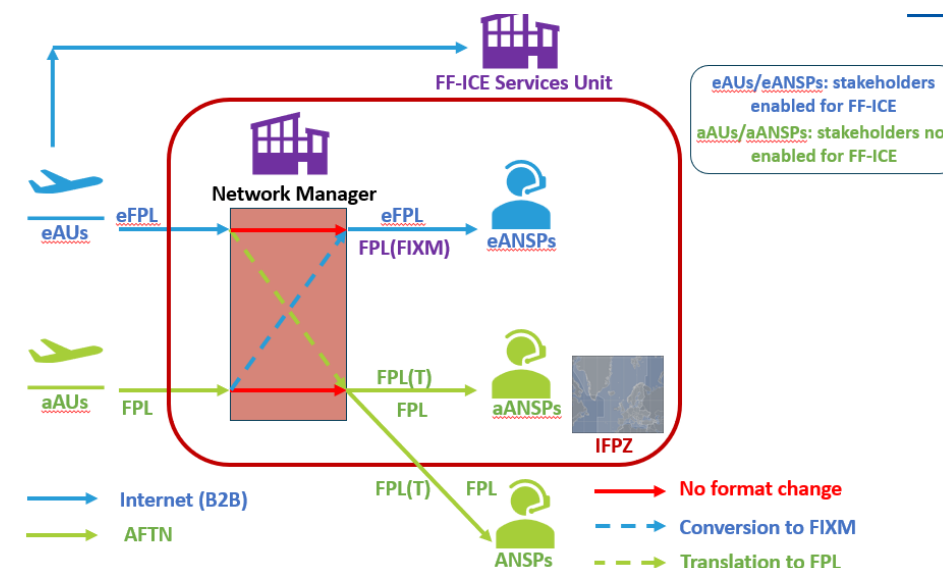
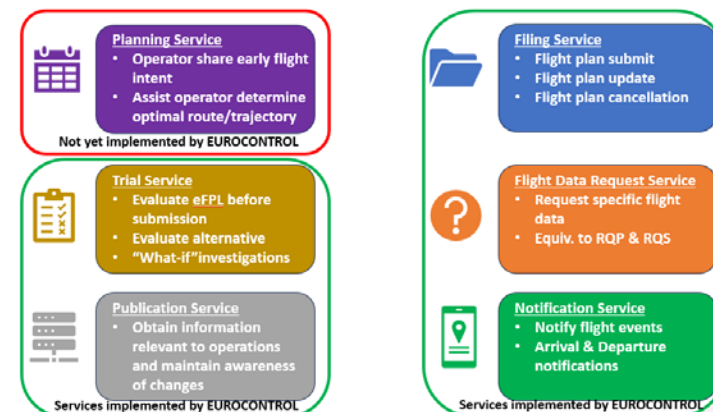
sesar
DEPLOYMENT MANAGER



Effective: 31 December 2025



FF-ICE Services



ICAO EUR/NAT FF-ICE Task Force

39

Flight and Flow – Information for a Collaborative Environment (FF-ICE) Task Force (TF)

Establishment 2026 – EASPG Conclusion 8/x & NAT SPG Conclusion 62/x

Objective

The ICAO EUR/NAT FF-ICE TF is established by the European Aviation System Planning Group (EASPG) and North Atlantic System Planning Group (NAT SPG) with the primary objective to support the planning for implementation of Flight and Flow – Information for a Collaborative Environment (provision and consumption). The ICAO EUR/NAT FF-ICE TF will work in close collaboration with the EUROCONTROL Network Manager Flight Plan and Flight Data Evolutions Sub-Group - FPFDE SG).

The Task Force aims to ensure regional interoperability, harmonization, and alignment with the ICAO Global Provisions, as well as coordination with EUROCONTROL, SESAR Deployment Manager (SDM), EASA, and other Regions for FF-ICE implementation and to meet the target date of 2034 for the Global cessation of the ICAO 2012 flight plan.

Terms of Reference

- Monitor developments in ICAO global provisions related to FF-ICE and keep abreast of the developments in FF-ICE implementation in other regions (i.e. APAC, AFI, MID, etc.).
- Work in close collaboration with the EUROCONTROL Flight Plan and Flight Data Evolution Subgroup (FPFDE SG), SDM and other relevant European bodies/groups to ensure a harmonized approach to FF-ICE implementation in the EUR and NAT Regions.
- Through a common initiative with the FPFDE SG, maintain the EUR/NAT regional roadmap for FF-ICE implementation.
- Monitor and assist the FF-ICE TF Members, in developing national FF-ICE implementation plans, ensuring alignment with the regional roadmap.
- Address interoperability issues within the EUR Region and with other ICAO Regions (APAC, AFI and MID) through joint workshops, as necessary.
- Foster collaboration among FF-ICE TF Members (ANSPs, airspace users (AUs), and other stakeholders) to ensure coordinated implementation.
- When needed, recommend updates to the ICAO EUR and NAT Supplementary Procedures (Doc 7030) and the Regional Air Navigation Plans (ANP) and/or develop new regional documentation/guidance to complement the work of the FF-ICE TF.
- Regularly review implementation progress of the FF-ICE by the EUR/NAT States, identify challenges, and propose corrective measures to ensure the regional roadmap is on track.
- Ensure that FF-ICE implementation supports and aligns with the ICAO Trajectory-Based Operations (TBO);
- Ensure timely development and implementation of System-Wide Information Management (SWIM) in support of FF-ICE services; and
- Facilitate knowledge-sharing and when required, plan and support Regional and Interregional workshops, seminars and training to promote and foster FF-ICE implementation.

Working Arrangements

The Task Force will conduct its work by consensus.

Meetings will generally be held twice annually, with additional meetings or teleconferences arranged as needed. The meetings will be held conjointly with the EUROCONTROL Network Manager FPFDE SG, when needed, to ensure consistency.

Temporary project teams may be established by the Task Force, if needed, to address specific tasks, with defined timelines. These teams will be dissolved upon completion of their work.

The Chairperson of the FF-ICE TF will be elected according to EASPG and NAT SPG guidelines.

The Task Force will report to the /EASPG/PCG and NAT SPG/IMG, providing regular updates on progress, challenges, and recommendations for FF-ICE implementation.

Composition

Experts nominated by relevant EUR and NAT States (Albania, Algeria, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Canada, Denmark, France, Georgia, Iceland, Ireland, Israel, Kazakhstan, Kyrgyzstan, Moldova, Montenegro, Morocco, North Macedonia, Norway, Portugal, Russian Federation, Serbia, Tajikistan, Tunisia, Turkiye, Turkmenistan, Ukraine, United Kingdom, United States and Uzbekistan), Organizations (SESAR Deployment Manager (SDM), EUROCONTROL, EASA, IATA, CANSO), Data Houses (Lufthansa Systems, Jeppesen and NAVBLUE) and other relevant stakeholders.

EUR/NAT FF-ICE Workshop conducted Feb. 2026
TF Endorsement by EASPG and NAT SPG - ongoing
TF kick-off: early 2027

EUR/NAT FF-ICE TF - next steps

- Discussion on the outcomes of the FF-ICE Workshop by the relevant EASPG and NAT SPG contributory bodies (*Ongoing*);
 - EUR ANSISG, EASPG PCG
 - NAT Vision Workshop/NAT IMG, POG and TIG
 - Interregional EUR/NAT and MID SWIM Seminar (Tbilisi, 23-25 June 2026)
- Keeping pace with the upcoming global developments-ATMRPP on FPL2012 sunset and FF-ICE/R2
- When appropriate, State Letter on National Plans of FF-ICE implementation to EUR and NAT States
- Continued collaboration with EUROCONTROL Flight Plan and Flight Data Evolution Subgroup (FPFDE SG)
- Endorsement of the joint EUR/NAT FF-ICE TF by the EASPG and NAT SPG
- Kick-off the ICAO FF-ICE TF in 2027, when initial steps are mature

Thank You



Presentations of the ICAO EUR/NAT FF-ICE Workshop (Paris, 17-19 February 2026)

<https://www.icao.int/EURNAT/meetingdocs?fid=15804>