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CESSATION OF ICAO 2012 FLIGHT PLAN BY 2034

(Presented by the Secretariat)

Draft FF-ICE Implementation and Transition Strategy

Developed as part of the

*Manual on Flight and Flow – Information for a Collaborative Environment (FF-ICE) (Doc 9965),
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VOLUME II

FF-ICE IMPLEMENTATION GUIDANCE

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APPENDIX I – FF-ICE Transition and Implementation Strategy

I-1. Introduction

I-1.1. Background

- I-1.1.1. The flight and flow information for a collaborative environment (FF-ICE) concept will catalyse a step change in global air traffic management (ATM) towards ICAO's vision of an integrated, harmonized and globally interoperable ATM system.
- I-1.1.2. FF-ICE flight plans and flight information sharing capabilities are built on the concept components and guided by principles laid down in the Global ATM Operational Concept (GATMOC, Doc 9854). Given its scalable nature, FF-ICE will eventually be the sole mechanism that global aviation will utilize for flight planning and related functions as ATM evolves, enabling ATM concepts such as trajectory-based operations (TBO).
- I-1.1.3. Taking into consideration the lessons learnt during the transition towards the current ICAO flight plan format, hereinafter referred to as "FPL 2012", this section of the document aims to lay down a strategy to guide ICAO Member States and regions in planning the implementation of FF-ICE services to reduce any potential challenges arising from mixed-mode operations, as well as to ensure a smooth, harmonized global transition to FF-ICE services.

I-1.2. Role of FF-ICE services in future ATM

- I-1.2.1. FF-ICE services, supported by a system-wide information management (SWIM) environment, act as an enabler for many of the features identified in the GATMOC. Flight information exchange using FF-ICE services will improve ATM stakeholders' decision-making process at both the individual and the network levels. Globally harmonized procedures in ATM planning using FF-ICE services will enable seamless and collaborative decision-making amongst ATM actors, bringing about an overall increase in system-wide ATM efficiency.
- I-1.2.2. The FF-ICE planning service and earlier submission of flight plans with trajectory information enable ATM services providers (ASPs) to accurately forecast traffic demand, analyze traffic patterns, and adjust traffic flow management plans and measures. Through negotiation mechanisms, ASPs and airspace users (AUs) work collaboratively to achieve optimal efficiencies for ATM systems and flight operations, taking into account varying airspace scenarios and AU preferences.

I-1.3. Benefits of FF-ICE

- I-1.3.1. The initial implementation of FF-ICE services in a pre-departure phase (FF-ICE/R1) will help to overcome many limitations of FPL 2012, allowing ASPs to optimize their resources and AUs to fly closer to their preferred trajectories. For example, FF-ICE services allow for a flexible information set that can accommodate extensive information needs, such as trajectory data, facilitating collaborative decision-making by allowing ASPs to balance their demand against capacity more accurately and facilitating AUs' adherence to their preferred trajectories as much as possible. By implementing the FF-ICE filing service, both ASPs and AUs will be able to share more detailed trajectory information and perform negotiations based on known constraints, thus offering opportunities to optimize flight operations earlier and more accurately. The use of SWIM technology with globally harmonized rules will allow consistent sharing of information to all relevant stakeholders in an efficient, accurate and timely manner.
- I-1.3.2. In addition to access to more information, FF-ICE/R1 introduces a new planning service that allows for the submission of flight intent in advance, via a preliminary flight plan, (potentially up to a year or more, depending on what is reasonably accurate and practicable). AUs will be able to notify ASPs of their flight intent while ASPs will be able to provide feedback on the restrictions and associated constraints applicable to that flight, hence allowing a collaborative and iterative planning process to optimize the flight plan for AUs. With the early availability of flight planning information, ASPs will also enjoy the flexibility to plan their resources such as airspace organization and availability, and staffing allocation accordingly. Requirements for the advanced submission of flight plan information will be balanced against the need to ensure the reliability of information; more detailed information would only be supplied closer to the day of operations.
- I-1.3.3. FF-ICE/R1 also brings about another value-adding service in the trial service. The trial service allows an AU to test out alternative trajectories without committing to them; with this, AUs will be able to assess the feasibility of alternative trajectories before submitting a change to their preliminary or filed flight plans. The trial service ensures stability and relevance of information held within the main ATM system since trial requests are not considered for ATM planning by ASPs.
- I-1.3.4. Subsequently, future releases of FF-ICE would support dynamic post-departure trajectory negotiations between AUs and relevant ASPs in real-time, as well as among ASPs and/or other relevant stakeholders. The sharing and management of flight trajectory information via FF-ICE services during all phases of flight facilitates TBO, a step towards achieving the ATM vision as described in GATMOC.

I-2. Key considerations for FF-ICE services implementation

- I-2.1. The less-than-desirable experience in the 'hard' cutover from the previous ICAO flight plan to the ICAO FPL2012 taught us that a better approach should be considered in phasing in FF-ICE services. Anecdotaly, for the transition to FPL2012, while States and ANSPs were given lead time to prepare for the cutover, changing their flight planning systems was not straightforward as some were strongly tied to their main ATC automation and processing system which required even longer lead time to prepare. Even for the ANSPs whose systems were ready to accept the FPL2012, the operational benefits that were supposed to have been brought about by the changes introduced in the FPL2012 might not have been fully realized as not all flight planning and/or ATC systems in the world were able to fully

harness and automate the flight planning processes to reap the intended benefits of FPL2012.

I-2.2. To avoid the undesirable effects experienced during the FPL2012 implementation, it may be worthwhile to consider the issues from the perspectives of key stakeholders and potential users of FF-ICE services. Broadly, two issues that might potentially hinder the acceptance of FF-ICE are the unavailability of FF-ICE provisions and guidance materials and the perceived notion that FF-ICE remains theoretical as there is no working example. For the former, the provisions to support the initial implementation of FF-ICE services were adopted and approved by the ICAO Council in March 2024 with the applicability date of 24 November 2024. These ICAO provisions and the implementation guidance contained in this document will provide the necessary references from which stakeholders can take guidance to ensure harmonized understanding and standardized implementation globally. Equally important is the need to have some working systems to demonstrate the feasibility of FF-ICE services, and to make apparent the positive opportunities offered by FF-ICE services. While not everyone may choose to implement FF-ICE services at the onset, it is conceivable that small group(s) of like-minded ATM actors can work together to implement FF-ICE services early. As time progresses, others would take the reference cases for their own assessment and may find FF-ICE services to be operationally beneficial. Likewise, for the industry, prospective vendors of related products should be on board to readily offer solutions that will support AUs and ASPs in their decision to implement FF-ICE services.

I-2.3. Other than the above, some additional considerations have to be taken into account for FF-ICE services implementation to be seamless worldwide. The following sections discuss these in greater detail.

I-2.4. FF-ICE availability

I-2.4.1. **Minimum Capability** – in FF-ICE/R1, there are a total of six FF-ICE services with two minimum services and the rest are structured and designed to be implemented independently. The implementation of the minimum services (Filing Service and Flight Data Request Service) could replace the current FPL2012 flight planning services and would be sufficient to support the end of FPL2012. The other four services (i.e. Planning Service, Trial Service, Publication Service, and Notification Service) could be implemented independently and incrementally depending on the needs of the ASPs and AUs. The incremental implementation would ease transition challenges and lower the risks of operational and system issues.

I-2.4.2. **Translation** – vendors will likely create translators to allow an ASP to accept an FF-ICE flight plan without changing their underlying system, and to allow an AU to generate a flight plan which would be sent in an FF-ICE format. While such translators may allow an earlier and quicker transition to an FF-ICE environment, the underlying operations remain unchanged and hence, would not reflect the full benefits of FF-ICE.

I-2.4.3. In addition, while translation works in the interim as some may use it to bring forward FF-ICE implementation, it is not ideal. Implementing FF-ICE using translators would run the risk of limited support for information exchange and management in subsequent operations (especially beyond FF-ICE/R1), such as in the processing of trajectory data which could potentially result in data loss or misrepresentation of flight intent which might lead to safety implications if information gaps are not satisfactorily mitigated. Instead of

translators, ASPs and AUs are encouraged to look ahead and, recognizing the full benefits of FF-ICE, work towards a more reliable and operationally sustainable solution.

I-2.4.4. **Systems Availability Timelines** – for customized systems, ASPs, and AUs would need to schedule changes and/or upgrades to support FF-ICE services implementation. A cost/benefits case would need to be investigated by the ASPs and AUs to determine the need for any near-term or off-cycle upgrades to their systems. Such analysis of the ASP or AU's unique cost/benefits position would then dictate when and what level of FF-ICE services would be implemented.

I-2.4.5. For vendor-provided commercial systems, ASPs and AUs would need to be aware of the readiness timeline for system capabilities to support various FF-ICE services to align these changes and upgrades to their FF-ICE implementation plans. If benefits do not justify an off-cycle upgrade, the system user will likely acquire the necessary capabilities at the time of the next upgrade of their system when the vendor has made FF-ICE services compatibility part of the standard offering.

I-2.5. SWIM Availability

I-2.5.1. It is strongly encouraged that FF-ICE/R1 be implemented via SWIM solutions. However, to implement FF-ICE on SWIM, AUs must have confidence that such communications capability would be available where they primarily operate. For ASPs, they would want to know that AUs in their airspace and the ASPs with whom data is being exchanged have access to the applicable SWIM services.

I-2.6. Phased Implementation Considerations

I-2.6.1. **Mixed Environment Considerations** – ASPs and AUs could adopt a phased approach to transition to FF-ICE in accordance with their needs and the reasonable availability of relevant systems. However, such an approach would mean that a mixed-mode environment where ASPs and AUs use both FF-ICE flight plan and FPL2012 at the same time, would likely persist for a while. This may lead to confusion amongst the ATM community, potentially resulting in AUs filing wrong flight plan formats to ASPs of different capabilities (some are FF-ICE capable, some are not). Consequently, flight planning process could be perceived as more cumbersome than before as AUs have to refile or go through additional processes, thus discouraging them and others to transitioning to FF-ICE fully. Actions should thus be taken to ensure that the transition from a mixed environment to FF-ICE is as seamless as possible, as such, the expected benefits can be achieved earlier in order to increase the adoption rate of FF-ICE.

I-2.6.2. Foreseeably, mixed-mode operations may persist for a long period of time depending on the rate of adoption of FF-ICE services. At the initial stage when FF-ICE services are introduced, it can be expected that ASPs and AUs may still want to be able to stay as close as possible to current processes for flight planning and filing. For example, AUs may want to continue filing FPL2012 flight plans while operating through airspace managed by an ASP that has already transitioned to FF-ICE. Conversely, ASPs that have yet to transition would want to be able to continue managing all flights using their existing flight planning system. However, prolonged mixed-mode operations would be undesirable if processes are not optimized and additional resources are incurred to support both modes of flight planning, which would impede the take-up rate of FF-ICE and possibly negate FF-ICE benefits. Additionally, clear communications would be required to ensure that FF-ICE

capabilities of ASPs and AUs are made known to other ASPs and/or AUs to prevent complications due to the filing of wrong flight plan formats.

I-2.6.3. The use of translators in the implementation of FF-ICE/R1 would mean that full trajectory information may not be available to either the ASP or AU (see para 2.4.2). Transition to FF-ICE should thus consider the downstream impact of FF-ICE/R1 implementation decisions. As there may be varying degrees of FF-ICE implementation (see Figure 33), the levels of FF-ICE services provided by all ASPs, as well as the data fields that are available for request, need to be specified clearly in the aeronautical information publication to facilitate proper flight planning processes and ensure consistency in expectations. If not managed carefully, the complexity of flight plan processing systems can reach an unmanageable level that can lead to erroneous flight plans shared by different parties, impacting ATM.

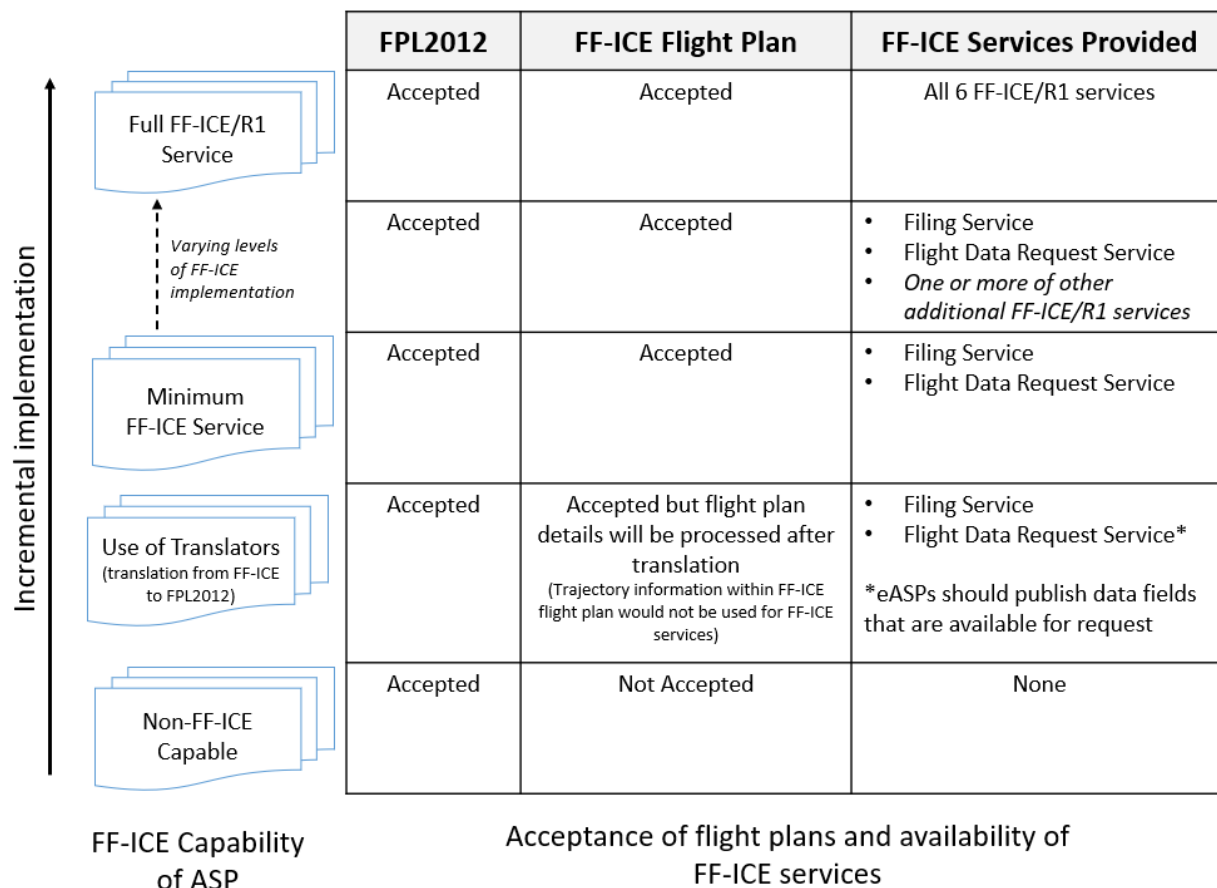


Figure 33 – Varying Degrees of FF-ICE Implementation

I-2.6.4. **Incremental Implementation Considerations** – FF-ICE services have been designed to be introduced and implemented based on national and regional needs and timelines, but in a standardized manner. The minimum service requirement for implementation would be Filing Service and Flight Data Request Service, which are envisioned to be sufficient to retire FPL2012 globally. It therefore indicates that the sooner these minimum capabilities are implemented globally, the earlier the sunset date of FPL2012 can be. Subsequent implementation of additional FF-ICE services such as Planning or Trial Services could be

decided separately, depending on national and/or regional needs. This incremental approach will ease the transition to FF-ICE and lower operational risks.

I-2.6.5. By taking the first step of accepting FF-ICE flight plans through the filing service, ASPs would gain access to more detailed trajectory information. This would be useful for strategic traffic flow management purposes, at the same time allowing ASPs to explore/develop other capabilities made possible by the additional trajectory information. ASPs will be able to gain experience in using the trajectory information and hence better build up their system capabilities for information processing, readying themselves for the provision of additional FF-ICE services incrementally.

I-2.6.6. A global transition plan would be necessary to consider the potential different stages of FF-ICE implementation across the regions to improve interoperability.

I-2.7. System Integration and Contingency Planning

I-2.7.1. Whether a standalone FF-ICE system had been developed, or with the use of converters/translators in the interim, consideration for its connectivity with other systems and associated contingency plans should be factored in, especially during the transition period when interim systems are used. Should the standalone FF-ICE system or the converter of a particular FF-ICE unit fail, especially during the initial deployment period, relevant contingency plans would need to be effected to revert to the use and transmission of FPL2012 flight plans in a mixed mode environment seamlessly.

I-2.8. Transition and Training

I-2.8.1. The traditional way of processing and handling flight plans would vastly differ under the FF-ICE concept. For FF-ICE/R1, relevant personnel (such as flight dispatchers of AUs or personnel of ASPs performing as little manual intervention as possible) who need to understand how FF-ICE services work are equally important as the powerful automation tools and systems set up. Additionally, while FF-ICE/R1 had been designed with automated flight plan processing as far as practicable, there could still be instances when manual, human-machine interactions would be necessary. It is therefore, essential for the relevant personnel to be trained on the automation of such FF-ICE/R1 services which would also enable them to attain a deeper understanding and greater appreciation of the various FF-ICE services and associated processes.

I-2.8.2. Sufficient time would have to be catered for this significant operational change, including having suitable change management practices to be put in place. In a similar manner, for subsequent releases of FF-ICE, time would need to be allocated for such transition and training activities to be completed.

I-2.9. Moving in Alignment with the Global Air Navigation Plan (GANP)

I-2.9.1. The economic, safety, and operational benefits of FF-ICE services would vary for different ASPs and AUs, depending on the characteristics of their operations and the features that had been planned to be implemented. All participants should be able to recognize and experience the immediate benefit of moving to a more capable and superior form of information exchange (in FF-ICE) in an XML-based format instead of the FPL2012, even if the participants may not yet require the feedback and negotiation features of FF-ICE. ASPs and AUs that can appreciate and plan to make the best of the FF-ICE features, such

as in the negotiation of flight trajectories, would be encouraged to adopt and implement these services early to kickstart the process and provide a positive demonstration for the rest of the world (see para I-3.2.4).

I-3. Approach to FF-ICE Implementation

I-3.1. Global Strategy

I-3.1.1. **Early engagements** – ICAO plays an important role in leading a global change in ATM. To achieve the wide adoption of the FF-ICE concept and FF-ICE/R1 services, ICAO could lead in spearheading awareness campaigns, technical briefings, and workshops. These would introduce the main features of FF-ICE/R1 and its benefits, the need for change in support of future ATM, and communicate ICAO's transition strategy towards FF-ICE and the aim of eventually retiring FPL 2012 in ICAO flight planning provisions. Such campaigns and briefings should reach out to a large audience of ASPs and AUs to allow the understanding and appreciation of FF-ICE/R1.

I-3.1.2. Similarly, technical symposiums would also be held for the industry to understand the changes expected for various FF-ICE/R1 services, so that the systems and their relevant features could be developed accordingly and be made available. Ideally, such symposiums should involve ASPs and AUs to facilitate discussions between the system vendors and their users, which also serves to bring in ASPs and AUs' earlier in their involvement in the design and development of systems by the industry. This can also be viewed as a form of risk mitigation as it facilitates the timely incorporation and integration of FF-ICE/R1 capable systems into the respective ASPs' ATM systems to minimize processing errors.

I-3.1.3. **Ending Support to FPL 2012 Flight Planning Procedures** – while a phased approach would be adopted for the transition to FF-ICE, it is envisaged that there will be an end date when mixed environment operations would cease. Sufficient time ought to be provided to ASPs and AUs to effect the transition to having the minimum services of FF-ICE/R1 implemented (i.e. the implementation of Filing Services and Flight Data Request Service). To support this, once FF-ICE/R1 is ready and its application has begun, all future amendments to ICAO FPL 2012 provisions will no longer be accepted except for amendments required to ensure aviation safety. The sunseting of FPL2012 will therefore be expected (see Section 4 for more details).

I-3.1.4. **Minimal FF-ICE/R1 Capabilities by System Design** – to facilitate early implementation of minimum services of FF-ICE/R1, ASPs and AUs could use translators. However, using such nominal capability limits the experience of the benefits that FF-ICE/R1 can bring about, and could work against the move towards full FF-ICE implementation. Vendors should therefore consider the inclusion of other additional capabilities to enable users to experience the full suite of FF-ICE benefits, providing a more favorable and attractive proposition for stakeholders to consider implementing more of the FF-ICE services. Notwithstanding, it is recognized that operational need varies from region to region. Provision of commercially available system capabilities should therefore be made available in a flexible fashion, such as in the form of scalable modules depending on varying needs. This would then reduce the barrier to entry and implementation inertia for many, paving the way for more to get on board.

I-3.2. Regional Strategy

- I-3.2.1. ***Need for Regional Implementation/Transition Plan*** – ATM is transboundary in nature. A regionally harmonized approach to FF-ICE implementation would be necessary to maximize benefits to all ATM stakeholders. Ubiquitous information sharing using FF-ICE/R1 services in ATM networks would enable advanced planning, better allocation of resources, increased trajectory predictability, and more, all leading to improved ATM system capacity and flight efficiency.
- I-3.2.2. While it would be ideal to have all ASPs in a region commit to and embark on FF-ICE implementation and transition at the same time, it is not realistic. As needs and capabilities differ from one to another, a coordinated approach to transition would be more palatable overall. Time and again, as demonstrated across different regions in the past, it can be an effective strategy to have groups of like-minded ASPs and stakeholders come together to start on an initiative, thus encouraging others to join in later. Regional implementation plans should be developed to take that into account, laying down incremental steps for States' planned transition to FF-ICE/R1. As this may take place over several years, regions should also develop a tracking mechanism to allow States to reflect their implementation progress of FF-ICE/R1 as the region progresses towards seamless ATM through enhanced flight planning.
- I-3.2.3. To facilitate harmonized and coordinated implementation of FF-ICE/R1, regions should consider identifying the sub-regions or groups and set transition dates based on these groups' readiness. In setting transition dates, the sub-regions / groups would need to take into consideration the system development plans of the respective ASPs in the group. As ATC system upgrades typically occur once every 10-15 years, ASPs would thus require a long lead time to allow phasing in FF-ICE/R1 requirements in subsequent system upgrades. Nonetheless, implementation of FF-ICE/R1 at the minimal level may be achievable without incurring significant changes to the core ATC system.
- I-3.2.4. ***In-depth regional engagements and demonstrations*** – Unlike global engagements, regional engagements should have more in-depth and practical discussions, workshops and demonstrations where States, ASPs, AUs, industry and all other relevant stakeholders are strongly encouraged to lead or participate actively. Such discussions, done at the regional level, will allow for a better assessment of the benefits for the region. More table-top exercises, demonstrations and trials should be held especially for ASPs and AUs that wish to gain experience in FF-ICE before implementing. The demonstrations and trials could be planned and incorporated into regional implementation and transition plans to facilitate groups of ASPs working together closely and moving from trials to implementation in a coordinated manner.
- I-3.2.5. ICAO regional task forces could also be set up to provide guidance at the demonstrations and trials and keep track of regional progress. Engagements between the task forces between regions would be required to ensure harmonized implementation across neighbouring regions.
- I-3.2.6. Within a region, sunset dates for FPL 2012 provisions could also be determined for a more harmonized transition towards FF-ICE/R1 implementation.

I-4. FPL 2012 Sunset Dates

- I-4.1.1. It would be unrealistic to assume that, as traffic grows, the global ATM system can continue to support both new additional requirements as well as legacy ones. Instead, it

should be recognized and decided at an earlier stage that appropriate efforts and resources can be better channelled more pragmatically to accelerate the advancement of FF-ICE services implementation, which will benefit global ATM in the long run.

- I-4.1.2. As FF-ICE provisions, the concept document and implementation guidance are made available in 2024, regions could start developing implementation and transition plans which should include workshops, table-top exercises, demonstrations and/or trials.
- I-4.1.3. At the same time as regions develop their plans, States, ASPs and the industry may work concurrently to specify and finalize their respective system requirements to incorporate FF-ICE capabilities. Following this, prototypes or even developed systems could be made available for use in the planned table-top exercises, demonstrations and/or trials.
- I-4.1.4. It is estimated that it would take about three years for States and stakeholders to become familiar with and gain confidence in FF-ICE. By the end of 2027, States would have had sufficient lead time to gain the necessary experience and be able to formulate their plans for implementing FF-ICE.
- I-4.1.5. In line with the timelines mentioned above and for the purpose of channelling focus towards FF-ICE implementation across all regions, ICAO will cease amendments to provisions concerning the FPL 2012 by the end of 2027. To align States on a harmonized transition plan and to minimize the duration of mixed-mode operations, all regions should consider setting a sunset date for FPL 2012 by the end of 2032. Regions are strongly encouraged to incorporate this sunset date into their regional air navigation plans. The global sunset date for FPL2012 that is considered within the present implementation strategy is 2034 considering additional lead time from the target year of regional sunseting (refer to Figure 34 for an overview of the transition strategy to FF-ICE and the indicative timelines). The timelines will need to be reviewed to consider the transitions made by regions and to adjust the global sunset date for FPL2012 where necessary.
- I-4.1.6. To reap the full benefits of FF-ICE and to step closer towards the vision of the GATMOC, all States should be encouraged to implement FF-ICE services beyond the minimum level. To optimize the use of resources and to advance ATM developments, regions and States should also consider reviewing the requirements of other FPL 2012-related services, and consider planning the cessation of these services once FF-ICE services and other supporting means are in place.

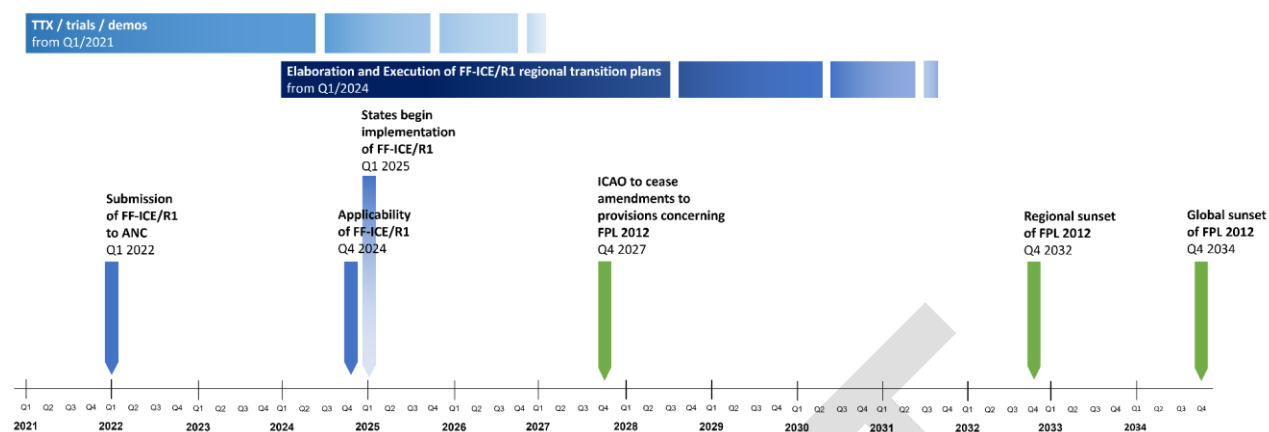


Figure 34– Overview of Implementation Strategy of FF-ICE

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