Manual on FF-ICE Implementation Guidance

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

Volume I – Concept

Volume II – Implementation Guidance

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AMENDMENTS

Amendments are announced in the supplements to the *Publications Catalogue*; the Catalogue and its supplements are available on the ICAO website at www.icao.int. The space below is provided to keep a record of such amendments.

RECORD OF AMENDMENTS AND CORRIGENDA

AMENDMENTS		
No.	Date	Entered by

CORRIGENDA		
No.	Date	Entered by

FOREWORD

The Manual on Flight and Flow – Information for a Collaborative Environment (FF-ICE) consists of two parts:

Volume I – FF-ICE Concept

Volume II – FF-ICE Implementation Guidance

Volume I – *The FF-ICE Concept* has been developed with particular attention on achieving the vision outlined in the Global Air Traffic Management Operational Concept (Doc 9854) and with meeting the requirements outlined in the Manual on Air Traffic Management System Requirements (Doc 9882).

The FF-ICE concept illustrates information for flow management, flight planning, and trajectory management associated with ATM operational components. It will be used by the air traffic management (ATM) community as the basis from which ICAO Standards and Recommended Practices (SARPs) will be developed in order to ensure that the FF-ICE concept can be implemented globally and in a consistent manner. The air transport industry plays a major role in world economic activity and must maintain a safe, secure, efficient and environmentally sustainable air navigation system at global, regional and local levels. In order to achieve this, implementation of an ATM system is required to promote maximum use of enhanced capabilities provided by technical advances. Future ATM requires a collaborative environment with extensive information content.

Volume II – *The FF-ICE Implementation Guidance* has been developed in order to provide the necessary guidance an ATM Service Provider or Airspace User may require when implementing the SARPS related to flight planning evolutions in the pre-flight phase. While the document provides guidance and is therefore optional it is nevertheless of benefit for all concerned that FF-ICE related procedures are understood in the same way and implementation amongst different members of the ATM community is consistent and interoperable.

Future developments

Comments on this manual would be appreciated from all parties involved in the development and implementation of FF-ICE. These comments should be addressed to:

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PUBLICATIONS
(used in this manual)

ICAO documents

Annex 2 — Rules of the Air

Annex 11 — Air Traffic Services

Annex 15 — Aeronautical Information Services

Procedures for Air Navigation Services — Air Traffic Management (PANS-ATM, Doc 4444)

VOLUME I

FF-ICE CONCEPT

VOLUME II

FF-ICE IMPLEMENTATION GUIDANCE

TABLE OF CONTENT

TABLE OF FIGURES

TABLE OF TABLES

1 INTRODUCTION

1.1 BACKGROUND

1.1.1 The FF-ICE Concept document (Volume I of this Manual) was developed by the ATM Requirements and Performance Panel (ATMRPP) to enable in part the realization of the Global ATM Operational Concept and in doing so provide a mechanism to succeed the present-day ICAO flight plan.

1.1.2 The necessary changes to Annexes 2, 11, 15 and PANS-ATM were also developed by the ATMRPP to provide the provisions or framework within which FF-ICE should be implemented.

1.2 PURPOSE

1.2.1 This document has been created to provide the necessary assistance and information that may be required by an ATM Service Provider or Aircraft Operator in implementing the provisions related to FF-ICE in the pre-departure phase.

1.2.2 The FF-ICE provisions provide a high level description of the actions and responsibilities of members of the ATM community when working within an FF-ICE environment. The provisions describe ‘what’ should be done. This document is intended to answer the question ‘how’.

1.2.3 FF-ICE is a new working environment and as such it is normal that in the absence of experience some element of doubt or uncertainty will exist in terms of implementation detail. As a result, some flexibility is required enabling corrections or modifications to the guidance to be made in a timely manner. Early FF-ICE implementations will therefore assist in developing this document further by obtaining the necessary experience and proposing any changes that may be required.

1.2.4 This document is intended to be read by members of the ATM community who are engaged or plan to engage in operations using the FF-ICE operational environment.

1.3 SCOPE

1.3.1 This document addresses the first implementation release of FF-ICE. It is therefore primarily concerned with pre-departure data and procedures. However, some data used post-departure will be provided pre-departure.

1.3.2 The following operational concepts, as described in Volume I, have not yet been addressed:

a) Operator Flight Priority — indication of the relative priority of a flight within an operator’s set of flights (e.g., a fleet);

b) Operator Restrictions and Constraints — operator procedures and other operator-specific information that may impact manoeuvers and clearances they are unable to accept from ATC;

c) Operator Preferences — preferences on operator procedures and other operator-specific information impacting manoeuvers and clearances;

d) Movement Preferences — movement preferences submitted by flight planners for consideration by traffic flow automation in the event that a traffic management initiative becomes necessary;

e) Departure Surface Segment — the elements of the overall trajectory from the departure gate up to and including the departure runway;

f) Airborne Trajectory Tolerances — the type and bound of tolerance applied to each of the different dimensions;

g) Aircraft Intent — an unambiguous relationship to the trajectory of how the aircraft will execute the trajectory;

h) Formation Characteristics — provides information describing the relationship requirements and properties of formation flights;

i) Previous Flight GUFI — the identification of the arrival flight which will use the same aircraft, when it is known;

j) Next Flight GUFI — identification of the departure flight which will use the same aircraft, when it is known.

1.3.3 As FF-ICE is expected to be deployed within a SWIM operational environment (see section 2.4) the main procedures and processes are described in terms of services. This document therefore introduces the different flight planning related services, as illustrated in Figure 1 and describes their use within the pre-departure phase of flight.

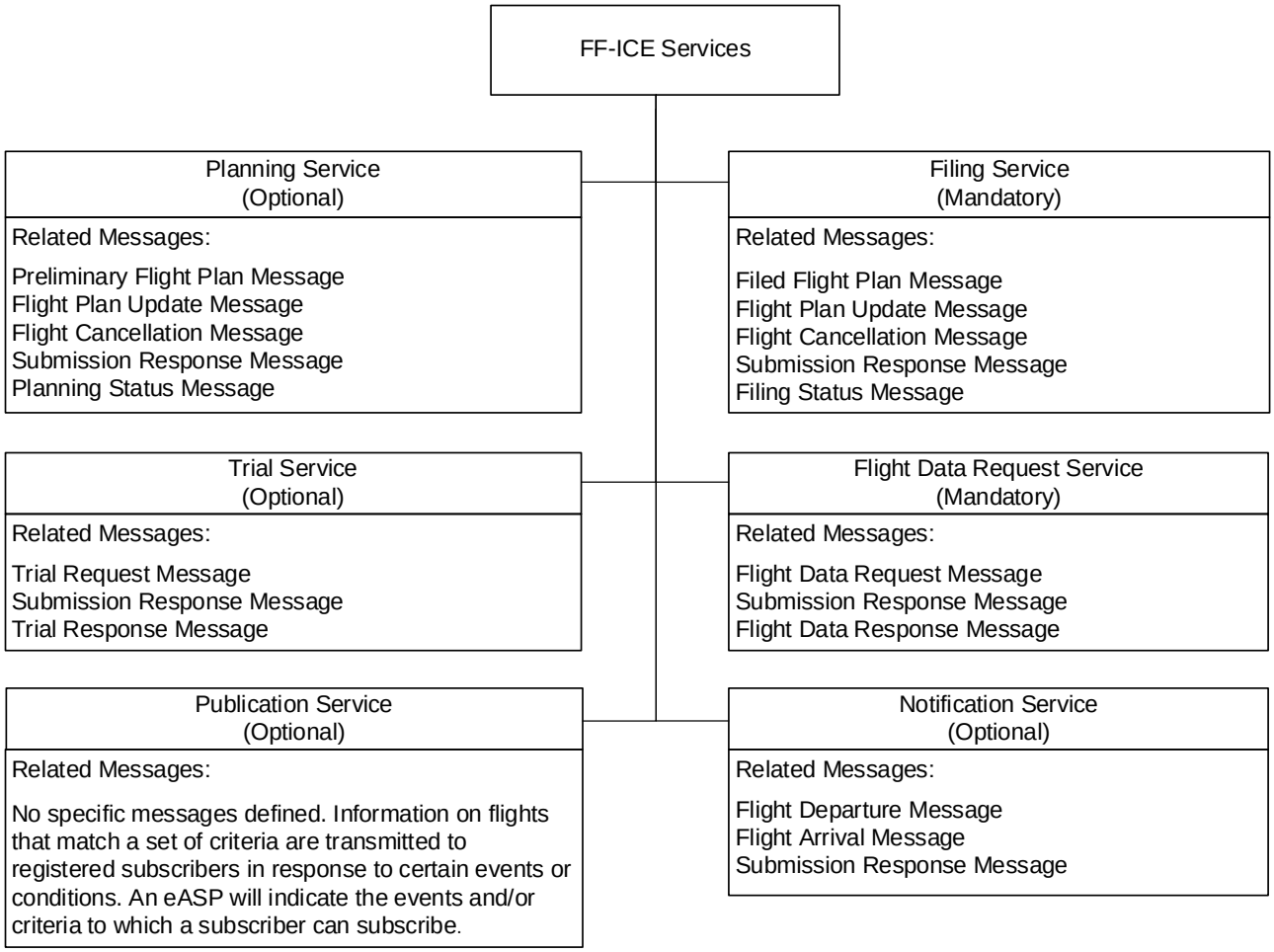

Figure 1: FF-ICE Services

1.3.4 It should be noted that while the Flight Data Request Service is mandatory for an eASP to provide, nothing prevents an operator from also providing a request service enabling an eASP to request relevant information concerning a flight.

1.3.5 FF-ICE services are expected to be highly automated. The CDM processes that FF-ICE services facilitate are expected to be performed via computer-to-computer links within a SWIM-compatible environment. The human in the loop should not experience an increase in workload as a result of FF-ICE implementation. Human intervention is only expected in terms of decision making when, for example, it is decided that business objectives may be better served by investigating or initiating, via the automation, a change. The frequency with which human intervention may be required will vary from one participant to another depending on the level of automation employed. See also section 2.4.

2 IMPLEMENTATION CONSIDERATIONS

2.1 IMPLEMENTATION DRIVERS

2.1.1 ATM Capacity and Performance Objectives — the growth in air traffic over the years and the need to achieve improved capacity and flight efficiency has given rise to the development of ever more sophisticated ATM systems and processes within a collaborative decision-making environment. This collaborative environment involves all actors concerned with the operation of a flight, as reflected in the Global Air Traffic Management Operation Concept (ICAO Doc. 9854) and in the Manual on Air Traffic Management System Requirements (ICAO Doc. 9882). These documents envision the need to exchange data which provides greater granularity and improved accuracy concerning the expected flight trajectory and its associated constraints. The exchange of such data will initially be used to enhance current procedures but will ultimately facilitate a full trajectory-based mode of operation. The key needs include:

a) Functionality — the implementation of new functionality and procedures such as A-RNP, Airport CDM, flexible use of airspace (FUA), direct or free route airspace (where adherence to specified routes, DCT segments and/or entry points may not be required), trajectory-based operations (TBO) and advanced Air Traffic Flow Management (ATFM) measures require the sharing of additional information through new exchanges not able to be supported by the current ATS messages.

b) Extensibility — the existing ATS messages (e.g., FPL) have been shown to be inadequate for providing the additional information needed. In 2012, some additional capabilities were added to the existing flight plan, and the cost to implement was very high. More importantly, the cost was incurred even for States that were not planning to use the new capability. This model will not support the continued incremental changes anticipated.

c) Capacity — the existing ATS messages that are exchanged via the Aeronautical Fixed Telecommunication Network (AFTN) have limits as to the maximum message size allowed. These limits have been propagated into limits on sizes of data elements within the flight plan and other messages. Already creating issues, these limits constrain the ability to keep adding information to the current messages.

d) Redundancy — as the implementation of FF-ICE becomes more widespread and progress is made towards post departure coordination and TBO, the complexities and costs associated with support for a mixed mode environment will become more difficult, whilst cost and effort to implement FF-ICE should at the same time improve.

2.1.2 FF-ICE addresses two fundamental requirements:

a) The ability to exchange, between the operator and ATM, more flight and flow related information in a systematic manner which is both robust and expandable facilitating future requirements for both operator and ATM;

b) The provision of a systematic collaboration or negotiation procedure between the operator and ATM which facilitates the determination of an optimal route and trajectory.

2.1.3 FF-ICE requires a basic set of capabilities, and then permits selection of various advanced capabilities for implementation, so an operator or ASP can tailor to their environment and needs. Although an ASP may elect to implement FF-ICE services voluntarily as further explained in 2.4.1, for such an ASP the Filing and Flight Data Request services are mandatory while the other services are optional. The decision process is discussed further in sections 2.2 and 2.3 below.

2.1.4 The requirement expressed in 2.1.2 a) is expected to bring benefits for all operators and ASPs both in terms of operations (exchange of more data allowing implementation of improved functionalities) and in terms of costs related to system evolutions (robust and expandable format). ASPs with high traffic demand and operators who fly within such airspace would be expected to benefit the most and to be early in their deployment of FF-ICE. Those who operate in lower demand airspace where economic drivers may be less critical at first will find a gradual change in the economic balance as the factors described in b) become evident.

2.1.5 The provision of the Planning Service, as referred to in 2.1.2 b), is more beneficial in high demand and/or high complexity airspace. Nevertheless, even in low complexity airspace the ability for an operator to determine in advance that a proposed flight plan is acceptable to an eASP is a valuable service that can improve data quality, particularly in advance of an AIRAC cycle. In doing so it will also reduce the costs associated with any manual intervention that might become necessary later, either during flight plan filing or even later during flight execution.

2.2 OPERATOR DECISION TO IMPLEMENT FF-ICE

2.2.1 FF-ICE allows for a number of services and processes to be provided. Operators will have a choice to select which services, processes and data items will provide them meaningful benefits, as well as which are available from eASPs. The primary services or processes include:

a) Planning Service
   - with or without a re-evaluation process

b) Filing Service
   - with or without a re-evaluation process

c) Flight Data Request Service

d) Publication Service

e) Notification Service

f) Trial Service

2.2.2 Planning Service

2.2.2.1 The FF-ICE Planning Service permits an operator to submit information concerning the intention to operate a flight (a Preliminary Flight Plan) for evaluation by the eASP. Feedback is provided regarding restrictions and associated constraints that will be applicable to the flight, and it allows for a collaborative, iterative planning process to optimize the plan and reduce any surprises once a Filed Flight Plan is submitted.

2.2.2.2 An operator, having ascertained that the Planning Service will be available from the relevant eASP(s), should evaluate the value of receiving the feedback on restrictions and constraints and using it in their flight planning to optimize flights. They should also consider the benefits of increasing the likelihood that flights will be cleared as filed due to issues being worked out in the planning/feedback process. In general, the more complex the airspace, the more value there will be to the Planning Service.

2.2.2.3 Operators are encouraged to submit a Preliminary Flight Plan that contains more advanced information if relevant eASPs advertise that they will receive better assessment of the flight plan when provided. The additional information may include:

- Climb and descent performance data to allow more accurate and consistent calculation of Trajectories by the eASP.
- Operator-calculated Trajectory to allow understanding by the eASP of the operator expectations.

2.2.2.4 The re-evaluation process, when implemented by an eASP, is part of the Planning and Filing Service and provides, as a minimum, an indication of a change of status for a flight plan with respect to that eASP. A more advanced re-evaluation process may provide an indication of, for example, the addition or removal of a restriction or constraint without impacting the status of the flight plan, see 3.5.7 for more details. As restrictions, and any changes to them, are anyway published, operators should be aware of the changes and should not need the “reminder” that the re-evaluation process provides. However, not all operators have the ability to monitor the situation so closely. In addition, the re-evaluation process provides the operator with systematic information concerning the impact upon individual flight plans, as perceived by the eASP. This can be very useful information even for those operators and/or flight plan service providers with monitoring processes of their own.
It is also worth noting that the publication of information concerning restrictions is expected to be achieved in a manner that enables an automated consumption of the data (e.g., digital NOTAM).

2.2.3 Filing Service

2.2.3.1 FF-ICE will permit submission of a Filed Flight Plan using a standardised FF-ICE format in lieu of the teletype-format FPL used today. FF-ICE also provides feedback to the operator regarding whether the flight plan was successfully processed, and whether it is acceptable to the eASP.

2.2.3.2 Any operator implementing FF-ICE must be able to submit a flight plan in FF-ICE format containing at least the minimum required content which is equivalent to the information provided in the existing FPL (PANS-ATM Appendix 2), with some improvements such as richer set of capability information and a GUFI.

For example, emerging Performance Based Navigation, Required Surveillance Performance, and ADS-B applications will be consistently and more reliably represented in the flight plan.

2.2.3.3 To improve operations by benefiting from the new data made available through the Filing Service, Operators are encouraged to submit a Filed Flight Plan that contains additional, more advanced information if relevant eASPs advertise that they will receive better assessment of the flight plan when provided. The additional information may include:

- Climb and descent performance data to allow more accurate and consistent calculation of Trajectories by the eASP.
- Operator-calculated Trajectory to allow understanding by the eASP of the operator expectations.

2.2.3.4 The advantages of the re-evaluation process, when implemented by an eASP (see 2.2.2.4) will apply to the Filing Service as well as the Planning Service.

2.2.3.5 It would be natural for the Operator to assess the cost/benefit within the local environment or region(s) in which it operates.

2.2.4 Flight Data Request Service

2.2.4.1 FF-ICE will require an eASP to make available a query and reply service[1]. This service can potentially be extended by the eASP to allow an operator to verify, for example, the status of a flight previously submitted. While the normal FF-ICE exchanges would not make this necessary, it could be useful in certain non-nominal situations where there is uncertainty regarding the current status of a flight.

2.2.4.2 The decision for the operator to use the request service will depend on how relevant eASPs implement such a service, and the nature of the service they provide.

2.2.4.3 An operator also has the option of providing a query and reply service enabling an eASP to query the flight data. This may be useful in any situation in which the information currently held by the eASP is limited or of uncertain quality, but particularly useful in obtaining information which is only required on an ad hoc basis and/or is typically only available shortly before departure.

2.2.5 Notification Service

2.2.5.1 The Notification Service (see section 7) is an optional service currently foreseen for the notification of departure and arrival. However, it is anticipated that as FF-ICE develops beyond pre-departure other events in the life cycle of a flight will be added.

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[1] PANS-ATM chapter 11 describes use of the RQP and RQS messages for an ATS Unit to request a flight plan or specific information about a flight.

2.2.5.2 If the operator currently transmits DEP and/or ARR messages, by delegation of the concerned ASPs, then discussions regarding use of the FF-ICE equivalent messages should be evaluated so that an operator moving to FF-ICE would not have to use AFTN for this purpose after exchanging all other information about the flight via FF-ICE.

2.2.6 Trial Service

2.2.6.1 The Trial Service allows an operator to submit a “what-if” type of request to ascertain the acceptability/validity and possible ATM impact of a potential flight plan or the effects of a change being considered, without either creating a flight plan or changing the intended flight plan currently on file.

2.2.7 Publication Service

2.2.7.1 The Publication Service is an optional service that allows authorised subscribers (see section 9.1.1) to receive information concerning flights that are relevant to their operations in an efficient manner.

2.3 ASP DECISION TO IMPLEMENT FF-ICE

2.3.1 FF-ICE allows for a number of services or processes to be provided. ASPs need to decide which services and processes will provide meaningful benefits to operators and to their ATM operation. They include:

a) Planning Service
   - with or without a re-evaluation process

b) Filing Service
   - with or without a re-evaluation process

c) Flight Data Request Service

d) Notification Service

e) Trial Service

f) Publication Service

2.3.2 Planning Service

2.3.2.1 The FF-ICE Planning Service permits an eASP to provide restrictions and constraints applicable to a flight back to the operator, and obtain early flight intent information that will aid in demand assessment and resource planning. This assists the operator in their planning, and, overall, should reduce the workload in collaborative planning. The degree of benefit is commensurate with the traffic levels and restrictions in the airspace; i.e. the more congested the airspace the more valuable this service will be to the ATM service provider.

2.3.2.2 To provide the Planning Service an eASP needs at a minimum to be able to determine relevant restrictions and constraints applicable to a flight and feed them back to the operator. Considerations include:

- The guidance expects that restrictions have been published, generally via aeronautical information services, and in a manner that facilitates automated processing. The eASP should be prepared to identify which published restrictions are relevant to the flight.
- It may not be cost beneficial to evaluate every possible restriction; the eASP needs to decide what is feasible and cost beneficial to provide and be clear on what information is provided.

2.3.2.3 The eASP must also decide whether and how to take advantage of more advanced content provided by the operator. The decisions should be done through collaboration with users, since it makes no sense if one party implements and the other does not. A phased approach is also something to consider, where initial implementation processes the basic plan and additional processing of enhanced information is added on incrementally. This type of approach can allow maturation of each step before new capabilities are added.

- Climb and descent performance data to allow more accurate and consistent calculation of Trajectories by the eASP. This data may be usable with relatively minimal changes to existing algorithms (if performance data are already built in to the calculations).
- Operator-calculated Trajectory to allow understanding by the eASP of the operator's expectations. Incorporating operator trajectories into an ATM system is a bigger step, but could allow a more consistent picture for decision makers on both sides.

2.3.2.4 An eASP that supports Preliminary Flight Plans and provides feedback should also provide a "re-evaluation" process, updating the feedback to reflect changes to the ATM configuration, restrictions and constraints. The feedback provided by the eASP should be timely enough for appropriate action to be taken by the operator. The advantage to the eASP of providing such a service is an improvement in the quality of the flight plan data held by the eASP.

2.3.3 Filing Service

2.3.3.1 FF-ICE will permit an eASP to receive Filed Flight Plans using a standardised FF-ICE format in lieu of the teletype-format FPL used today. FF-ICE also allows the eASP to automate feedback to the operator concerning its ability to process the flight plan message and the resultant flight plan acceptability[2].

2.3.3.2 An eASP implementing FF-ICE must provide handling of the minimum required content commensurate with the processing of an FPL today, with the addition of the

[2] Flight Plan Acceptability is an assessment of a flight plan with regard to its compliance with established criteria and applicable flight plan restrictions and constraints.

requirements to provide a Submission Response and a Filing Status. The Submission Response is relatively simple as it reflects the acceptance, or not, of the received message. Provision of Filing Status implies potentially more processing in order to evaluate the acceptability of the flight plan.

2.3.3.3 The eASP must also decide whether and how to take advantage of more advanced content provided by the operator. The decision process is the same as that for the Planning Service, see 2.3.2.3.

2.3.3.4 The advantages of the re-evaluation process (see 2.3.2.4) will apply to the Filing Service as well as the Planning Service.

2.3.4 Flight Data Request Service

2.3.4.1 An eASP implementing FF-ICE must at a minimum support flight plan data requests that replicate the function of the RQP and RQS messages and allow another eASP to request an FF-ICE flight plan, or supplementary information about a flight in FF-ICE format.

2.3.4.2 Optionally, the eASP can choose to allow queries of additional information, such as the status of the flight or the applicable restrictions/constraints. Note that this capability is meant for use with single flights and is not meant to serve as a general publication service.

2.3.4.3 The eASP can also consider whether to provide the service to operators, with appropriate controls regarding which flights may be accessed by a particular operator.

2.3.5 Notification Service

2.3.5.1 If currently receiving DEP and ARR messages from operators or other eASPs, these stakeholders should be consulted to determine whether using the FF-ICE equivalents would make sense (and allow all exchanges to be via FF-ICE rather than revert to AFTN for DEP and ARR).

2.3.6 Trial Service

2.3.6.1 The Trial Service enables an operator to determine the acceptability/validity and possible impact of a potential flight plan, or an alternative to an existing flight plan, without actually creating or modifying a flight plan (Preliminary or Filed). The trial service can therefore assist in ensuring the stability and relevance of information held within the main ATM system. In addition its use by operators will improve the quality of information submitted to the planning or filing service.

2.3.6.2 The Trial Service could also be used by an eASP to assess the impact upon a flight(s) of a proposed change to the ATM configuration.

2.3.7 Publication Service

2.3.7.1 An eASP may optionally provide a Publication Service that enables subscribers (see section 9.1.1) to obtain information about flights relevant to their operations.

2.3.7.2 An eASP can subscribe to the Publication Service(s) provided by other eASP(s), typically those that generate most of its traffic. In doing so it can automatically obtain the latest information concerning, for example, the route/trajectory of flights which are due to enter its airspace.

2.4 IMPLEMENTATION STRATEGY

2.4.1 The implementation of flight and flow information for a collaborative environment (FF-ICE) is a step change as air traffic management (ATM) stakeholders gear up towards the global ATM vision. As it is a voluntary based implementation, subject to the needs and requirements of the individual State or organisation, and to avoid a "big-bang" approach previously employed during the transition to the current ICAO flight planning system (also known as "FPL2012"), a phased approach to implementation is proposed to ensure a smooth, harmonised transition towards FF-ICE.

2.4.2 The Implementation Strategy provided in APPENDIX I – FF-ICE Implementation Strategy aims to guide ICAO, regions and States in planning the implementation of FF-ICE to reduce any potential negative impact arising from mixed mode operations, as well as to ensure a smooth, harmonised transition to FF-ICE globally.

2.5 INFORMATION MANAGEMENT

2.5.1 SWIM requirements and guidance

2.5.1.1 The PANS-IM provides the generic SWIM requirements applicable to all information domains, including the FF-ICE information domain. These requirements are organised as follows: General requirements on SWIM (including Quality Management), Governance, Information, Information Services, and Technical Infrastructure.

2.5.1.2 The Manual on SWIM Implementation (Doc 10039 Volume II) contains guidance for information service providers and consumers implementing SWIM. This guidance is applicable when implementing the information services used by the FF-ICE Services in accordance with the PANS-IM requirements.

Note: FF-ICE Services are defined as a function from a business perspective in a consistent manner with the definition of other services in Annex 3 (MET service), 11 (Air traffic services) and 15 (Aeronautical information services). In order to fulfil the part of the function related to the exchange of information, FF-ICE Services make use of one or more of information services, defined as "A type of service in a service-oriented architecture that provides an ATM information sharing capability.", in accordance with the PANS-IM requirements.

2.5.1.3 SWIM enablers[3] satisfying the PANS-IM requirements are available in order to support the gradual implementation and use of the information services used by the FF-ICE Services. More information on the SWIM enablers relevant to FF-ICE is provided in sections 2.5.3, 2.5.4 and 2.5.5.

Note: The experience and community knowledge gained while providing and consuming the information services used by the FF-ICE Services may lead to concrete improvements to these enablers, or may lead to the creation of additional enablers, as appropriate.

2.5.2 Quality management for FF-ICE

2.5.2.1 Doc 10039 Volume II provides guidance on the establishment of a Quality Management System for achieving the required quality of information and quality of information services used by the FF-ICE Services.

2.5.2.2 Appendix C of Doc 9965 Volume II specifies the requirements on the quality of Information exchanged by FF-ICE Services in terms of data completeness, by identifying those data elements which are mandatory in each FF-ICE Message.

2.5.2.3 The PANS-IM specifies requirements on the provision of information about Quality of Service as part of the Information Service Overview. Guidance on how to satisfy these requirements is provided in Doc 10039 Volume II Chapter 5.

2.5.2.4 For FF-ICE, information about Quality of Service is expected to cover, among others,

a) Performance considerations, such as the volume of FF-ICE messages that will be supported. A service provider should ensure that a single user is unable to monopolise a service or to degrade it below agreed service levels for other users.

b) Reliability considerations. It should be noted that for the FF-ICE Services provided by eASPs such as the FF-ICE Planning and Filing Services, the reliability requirements will depend on a number of factors that can vary by eASP, so each ASP implementing FF-ICE should assess their situation. Examples of relevant factors include:

- The number of flights per hour handled;
- The backup strategy to be employed — for example, will the service have completely redundant computer systems or will it revert to more basic support such as filing an FPL over AFTN or verbally coordinating FPL content?
- The number of flights likely to be delayed significantly by a loss of the service.

[3] SWIM enablers are resources that FF-ICE Participants can practically implement or use, such as FIXM. The Manual on SWIM Implementation provides a list of SWIM enablers that address various aspects of interoperability in accordance with the SWIM concept components.

Likewise, the reliability requirements for Flight Data Request Services provided by eAUs (see chapter 2.2.4.3) may vary by eAU, so each eAU should equally assess their situation. Examples of relevant factors include:

- The number of own flights per hour;
- The backup strategy to be employed.

2.5.2.5 An implementer could consider separate Quality of Service requirements and strategies for the different FF-ICE Services. For instance, the Planning & Trial Services could implement less stringent Quality of Service requirements compared to e.g. the Filing & Notification Services.

2.5.3 Exchanged Information

2.5.3.1 The implementation of SWIM entails service orientation and business process modelling to identify information exchange requirements leading to the definition of information services. Doc 9965 Volume II (this document) specifies the common procedures and processes that organizations participating in FF-ICE will implement to achieve integrated business processes. Consequently, the FF-ICE Services described in Doc 9965 Volume II are the result of a collaborative analysis of the processes and information exchanges involved in FF-ICE operations.

2.5.3.2 The Information Exchange Requirements for FF-ICE are specified in Appendix B and Appendix C of Doc 9965 Volume II. Appendix C provides the description of the FF-ICE Messages exchanged by the information services used by the FF-ICE Services, including the business rules addressing the presence of fields in each message. Appendix B provides the data convention that applies to the constituent fields of the FF-ICE Messages.

2.5.3.3 Whilst Doc 9965 Volume II remains applicable for global FF-ICE harmonisation, the Information exchanged by FF-ICE Services may be supplemented to address local or regional supplementary procedures, as appropriate.

2.5.3.4 Appendix B and Appendix C of Doc 9965 Volume II also cover the PANS-IM requirements on the collection of metadata on information. These appendixes include requirements on “Message Information”, i.e. requirements on metadata for the FF-ICE Messages. “Message Information” covers, for instance: Identifier the FF-ICE Message, Type of FF-ICE Message, Originator of the FF-ICE Message, Sending time of the FF-ICE Message, Operator Flight Plan Version (for some FF-ICE Messages only), etc.

2.5.3.5 Chapter 3.8 provides additional guidance on how to use some of these metadata fields in order to manage versioning of, and referencing to, the information exchanged by FF-ICE Services.

2.5.3.6 FIXM, the Flight Information Exchange Model, is an information exchange model capturing Flight and Flow information that is globally standardised. FIXM is the

recommended domain specific Information Exchange Model for implementing FF-ICE information exchanges in accordance with the PANS-IM requirements on information[4].

2.5.3.7 FIXM comprises 'FIXM Core' that provides harmonised flight data structures and the FIXM 'FF-ICE Message' Application that builds on FIXM core and that provides the individual FF-ICE message templates, i.e. the individual exchange schemas for the FF-ICE Messages. Altogether, these FIXM components satisfy the information exchange requirements for FF-ICE described in chapter 2.5.3.2 and the requirements on Metadata for FF-ICE described in chapter 2.5.3.4.

2.5.3.8 FIXM implements an extension mechanism that can be used to support local or regional supplements to the Information exchanged by FF-ICE Services, as explained in chapter 2.5.3.3.

2.5.3.9 The website www.FIXM.aero is the authoritative source for downloading FIXM. The website also includes information about the applicable FIXM change management process and FIXM community membership rules, and the link to the FIXM User Manual which captures community knowledge and recommended practices about the implementation of FIXM and its further evolution.

2.5.4 **Information Services used by the FF-ICE Services**

2.5.4.1 Information Service Overviews capturing metadata about the information services used by the FF-ICE Services need to be provided in order to enable FF-ICE Participants to discover the information services being provided and to assess their fitness for purpose.

2.5.4.2 The PANS-IM lists the constituent fields of Information Service Overviews. Doc 10039 Volume II Chapter 5 provides general guidance for the completion of Information Service Overviews. FF-ICE-specific guidance on the development of Overviews for the information services used by the FF-ICE Services is provided hereafter:

- For fields 'Information service name', 'Brief description of the service' and 'Information service function', consider leveraging the description of the individual FF-ICE Services from Doc 9965 Volume II, as appropriate.
- For field 'Information category', specify *Flight information; Capacity, demand and flow information.*
- For field 'Information Exchange Models', specify *FIXM "FF-ICE Message" Application [version]* (if this SWIM enabler is used). Also indicate the name of any extension(s) to FIXM used by the service, if applicable.

  Note: the FIXM "FF-ICE Message" Application is explicitly mentioned here as it provides the recommended exchange schemas for the FF-ICE Messages and ensures

[4] When a particular implementation of FF-ICE is not based on the use of FIXM, the alignment with the AIRM is recommended and the exchange schema must be standardized. See Doc 10039 Volume II Chapter 4 for more information.

common understanding of the FF-ICE exchange schemas used.

- For the other fields, refer to the guidance provided by Doc 10039 Volume II Chapter 5.

2.5.4.3 Information where to retrieve the Overviews of the information services used by the FF-ICE Services needs to be published in the State AIP, as further explained in chapter 2.10.2.

2.5.4.4 SWIM Service Registries can be used for publishing the Overviews of the information services used by the FF-ICE Services. SWIM Service Registries enable providers of FF-ICE Services to publicize the related information services and enable consumers to discover the operational information services that are available for consumption, or that will be available for consumption at a certain date, and to plan the consumption of these services accordingly.

2.5.4.5 SWIM Service Registries provide details about the geographic coverage of the information provided by the registered services, therefore helping FF-ICE Participants select the services being relevant to their areas of interest.

Note: An FF-ICE Participant may have to query several SWIM Service Registries in order to get an exhaustive list of available information services being relevant to its area of interest.

Note 2: Examples of operational SWIM Service Registries are:

- *European SWIM Registry: https://eur-registry.swim.aero/home*
- *US NAS Service Registry/Repository: https://nsrr.faa.gov/*
- ...

2.5.5 Technical Infrastructure used by FF-ICE

2.5.5.1 The interface bindings to be used for implementing the information services used by the FF-ICE Services need to conform to the requirements on interface bindings of the PANS-IM Chapter 6.

2.5.5.2 During the early implementation phase of FF-ICE/R1, there is no additional FF-ICE requirement on the selection of interface bindings beyond the applicable technical infrastructure requirements from the PANS-IM. This allows the selection of interface bindings that are best suited to the implementation context, taking into account possible regional or local SWIM and/or FF-ICE requirements.

Note: FF-ICE Messages are agnostic to the selected interface and network bindings and are therefore not affected by this selection.

2.5.5.3 Doc 10039 Volume II Chapter 6 provides examples of consolidated, and commonly defined and agreed upon, SWIM TI interface bindings that can be used for implementing the information services used by the FF-ICE Services.

2.5.6 Governance for FF-ICE

2.5.6.1 Fostering collaboration between FF-ICE Participants is important:

- To ensure harmonised implementation of the FF-ICE procedures;
- To agree on a harmonised technical representation of the FF-ICE Messages and associated flight data structures exchanged by the information services used by the FF-ICE Services;
- To establish synergies, share information service implementation experience, and agree on common information service implementation practices, as appropriate;
- To address specific regional FF-ICE arrangements and implementation considerations, as needed.

2.5.6.2 Doc 10039 Volume II Chapter 3 provides general guidance for facilitating the implementation of information services and ensuring interoperability in a collaborative manner.

2.6 COMMUNICATION INFRASTRUCTURE FOR FF-ICE

2.6.1 IP-based networks for FF-ICE

2.6.1.1 Through SWIM, FF-ICE leverages IP-based communication infrastructures, in line with the PANS-IM, Chapter 6. Therefore, the information services used by the FF-ICE Services can be provided via IP-based networks, such as Internet or ATN/IPS TCP/IP-based network.

2.6.1.2 Network performance and capability considerations including, security, availability, incident detection, etc. are important when choosing the IP-based network over which to provide the information services used by the FF-ICE Services.

2.6.2 Role of AMHS in support of FF-ICE

2.6.2.1 FF-ICE/R1 is the first step towards full FF-ICE deployment and initiates the transition to the new types of information exchanges required by TBO and enabled by SWIM. ASPs and operators are expected to implement FF-ICE Services on a needs basis, via cost benefit analysis or as may be prescribed by local or regional regulations. The future releases of FF-ICE will be entirely enabled by SWIM.

2.6.2.2 AMHS is technically able to transmit XML-based messages. However, the ability of AMHS to support some Message Exchange Patterns (MEP) natively supported by the SWIM Technical Infrastructure such as the Publish/Subscribe MEP (that some information services used by some FF-ICE Services implement) has not been demonstrated.

2.6.2.3 States considering the use of AMHS for FF-ICE/R1 information exchanges should consider the following aspects:

- Their local status of deployment of AMHS and transition plan towards SWIM;

Note: For instance, a State having no AMHS capability could opt for a direct introduction to SWIM, as further explained in Doc 10039 Volume II Chapter 7 (SWIM Uptake cases).

- Any applicable requirements or regulations at local or regional levels that may complement global requirements for SWIM, and/or that may steer their implementation of FF-ICE Services;
- The availability of technical studies demonstrating the feasibility of using AMHS in support of FF-ICE/R1 exchanges. Such technical studies should include demonstrating the exchanges via the Publish/Subscribe MEP;

  Note: Doc 10039 Volume II Chapter 7 elaborates on the SWIM - AMHS bridges.
- If this technical feasibility is demonstrated, a cost benefit analysis covering, among others, the costs of the required AMHS evolution to meet the FF-ICE requirements, and the costs of deferring the evolution to the new interface bindings of the SWIM Technical Infrastructure required by the future releases of FF-ICE.

2.7 MIXED MODE ENVIRONMENT DURING TRANSITION

2.7.1 Overview

2.7.1.1 When migrating from the current environment, using the ATS message format as defined in PANS-ATM Appendix 3 (FPL, CHG, etc.), to the FF-ICE environment using services, actors will operate within a “mixed mode” environment; i.e. one in which both current ATS messages and their associated procedures will apply, in addition to FF-ICE messages and associated procedures.

2.7.2 Information distribution in a mixed-mode environment

2.7.2.1 FF-ICE participants operating in a mixed-mode environment still have to ensure the information that is operationally required is distributed appropriately. This implies appropriate management of the information distribution.

2.7.2.2 For example, an eAU operating in a mixed mode environment would need to manage its flight plan information distribution in order to ensure:

- the relevant eASPs duly receive the required filed flight plan information, exchanged using FF-ICE services (eFPL);
- the relevant aASPs duly receive the required filed flight plan information, exchanged via aeronautical fixed services (FPL);
- an eFPL and an FPL are not submitted to the same eASP.

Note: A coordinated migration to FF-ICE is preferable to keep the mixed-mode environment duration to a minimum to limit the burden of having to support two formats for the eAU and the eASP.

2.7.2.3 The information distribution in a mixed-mode environment may be supported by bridges, as appropriate. For instance, an eASP providing the 'translate and delivery' process would act as a bridge facilitating the distribution of flight plan information.

2.7.2.4 Doc 10039 Volume II Chapter 7 provides further guidance about the transition to information services and in particular about the information distribution in a mixed-mode environment.

2.7.3 Limiting the mix of message formats for the same flight

2.7.3.1 The coexistence of traditional movement messages exchanges and FF-ICE Services in a mixed-mode environment may imply that for the same flight, relevant information is received both as ATS messages and as FF-ICE Messages. Given that operators will have different capabilities, the reception by an eASP of both formats is inevitable.

2.7.3.2 The submission of different format messages to the same eASP(s) for the same flight should be avoided whenever possible. If an eAU is not performing direct distribution and has been obliged to submit a FPL via the departure ASP then subsequent messages should also be submitted in the same way using ATS message format. Therefore the reception of different format messages for the same flight should not normally happen when the messages are being originated via the operator's flight planning system. However, under certain circumstances (e.g. when the subsequent messages are being originated by a remote operator site), it may occur for an eFPL to be updated by ATS messages.

2.7.3.3 Mixed mode operations and the consequences outlined above mean that the capabilities of the different participants, particularly the Operator whose capabilities are not published, cannot be assumed on the basis of the message format. While the response to an individual message may be via the same format/communication channel it is nevertheless important for participants to know which set of provisions, and therefore procedures, are being applied. The tools introduced in mixed mode, therefore, should be specifically designed to promote user awareness of the procedures and information context for each message.

2.7.3.4 An operator that chooses to use FF-ICE services, through the submission of Preliminary (PFP) and/or Filed (eFPL) Flight Plans, is capable of using the corresponding information services, such as the reception and use of the appropriate response messages, provided by the eASPs.

2.7.3.5 While an individual operator having transitioned to FF-ICE and operating entirely within airspace where FF-ICE is supported may be able to remove its ability to support the current ATS messages, an eASP will not. For a significant period of time it will be incumbent upon eASPs to ensure their ability to work with both formats *(see Appendix I for expected FPL2012 sunset date).*

2.7.4 eASP interfaces with legacy systems

2.7.4.1 An eASP will need to consider interfaces with its neighbours. As FF-ICE/R1 concerns pre-departure, the use of FF-ICE for post-departure coordination has not yet been developed. It is therefore assumed that existing arrangements will continue to exist and

will require the relevant FF-ICE data items to ensure legacy information exchanges can occur.

2.7.5 Specific guidance on additional FPL information

2.7.5.1 During the transition period, ICAO's assessment of new flight plan information needs will be based on:

- the operational requirements on a global level (i.e. How are ATS personnel or automation systems expected to interact with the information),
- the necessity to address a short-term critical safety risk, and
- the principle that amendments do not generate unjustifiable financial impact on ANSPs and operators.

No changes would be introduced to the existing FPL fields unless they meet the three criteria above. However, certain capabilities that have clear and urgent operational needs may be required by the appropriate ATS authority in the free text fields of Item 18 (e.g., NAV/, SUR/), as this is assumed to be done without major financial impact.

The appropriate ATS authority, when prescribing new capabilities as a flight planning requirement for provision of ATS, must select the appropriate code as provided in paragraph 2.7.5.2. These codes are recommended to support global implementation and alignment in order to reduce possible conflicting use.

Note: the codes are developed by ICAO based on the following principles:
1) capabilities should be 2 characters of the letter-digit form
2) capabilities should be concatenated with/without spaces
3) no need for the use of a prefix
4) order of codes should never matter

2.7.5.2 Recommended codes

Item18-NAV/

Code	Capability	Reference	Notes
M1	RNP 2 Continental	Doc 9613 Vol II, Part C, Implementing RNP 2	The navigation specification has two distinct parts – RNP 2 Continental requires lower continuity and is therefore separated from RNP 2 Oceanic.
M2	RNP 2 Oceanic	Doc 9613 Vol II, Part C, Implementing RNP 2	Some states mandate the use of "RNP2" code in NAV/. It is recommended that States and operators adjust to using M1 or M2 codes.
Z1	RF Leg capability	Doc 9613, Vol II, Part C, Appendix 1	This optional code would be associated with RNP 1, RNP APCH and RNP 0.3 to indicate an additional approval to operate on procedures including RF legs

Z2	Fixed Radius Transitions	Doc 9613, Vol II, Part C, Appendix 2	
R1	RNP 0.3	Doc 9613 Vol II, Part C, RNP 0.3	

Item 18- SUR/

Code	Capability	Reference	Notes
A0	ADS-B Out, version 0 or 1 system.	Manual on Technical Provisions for Mode S Services and Extended Squitter (Doc 9871)	The information will be used to determine whether or not the aircraft is expected to qualify for ATC separation services based on ADS-B information and to comply with 14 CFR 91.227 for operations in the US, or EU Regulation 1207/2011 for operations in the EU.
A2	ADS-B Out, version 2 system.		
I1	Flight Deck based Interval Management for Spacing (FIM-S)	Manual on Airborne Surveillance Applications (Doc 9994)	RTCA DO-361 / EUROCAE ED-236
I2	Advanced Interval Management (A-IM)		RTCA DO-361A / EUROCAE ED-236A
P1	Paired Approach (PA)		

2.8 SUPPORTING SYSTEMS / SOFTWARE APPLICATIONS

2.8.1 Computer System/Software

2.8.1.1 The original ATS FPL message was designed for a network of teletypes, and messages were consequently short and capable of being handled manually if necessary. In contrast, the processing of FF-ICE messages is expected to be automated; direct manual handling or editing of an FF-ICE message will not be possible due to the length and complexity of the data expected.

2.8.1.2 An FF-ICE participant should expect to have a flight planning system or flight data processing system that can process the FF-ICE exchanges in a service-oriented

manner. Automated validation, route processing, and evaluation against restrictions/constraints are necessary features of the software.

2.8.1.3 Compared to today, flight plan construction will use more information that is provided by a computer and database than is provided directly by a person. For example, trajectory information will be automatically generated based on calculations done by the flight planning system. Note that today's flight planning systems generally have most or all of the information required. Generating the content for an FF-ICE flight plan is expected to be more a composition of the FF-ICE message from existing information rather than generation of new information.

2.8.2 Flight Planning Support Tools

2.8.2.1 As noted in para 2.8.1.1 above, FF-ICE exchanges are not directly "human consumable". The titles used within this document to name the individual data elements, as described in Appendix B, may never be seen by a human. Therefore, an essential part of any FF-ICE implementation will be the User Interface through which operational personnel will work with the flight plan.

2.8.2.2 Note that even today, most flight plans are entered using a human-computer interface that assists or automates significant portions of the form, for example:

a) The system may suggest one or more routes based on operator preferences or observation of routes being commonly filed and approved;

b) Aircraft information, equipment and capabilities, operator identification and other standard information can be stored and automatically inserted by the system; and

c) Automated forms can include drop-down lists, check boxes, and explanatory text that simplify entries and remove the need to memorize or look up obtuse codes.

2.8.2.3 FF-ICE should ideally require little if any additional information from the operator or dispatcher, with automation able to supply the information. The user interface does not need to be vastly different from today; all of the existing information in the flight plan is still used.

2.9 OTHER INTEROPERABILITY ASPECTS

2.9.1 FF-ICE and TBO brings the domains of ATM, airport and aircraft operations ever closer in terms of data exchanges and related information needs and standards. This implies that interoperability between these domains has to be managed appropriately, for the subjects that are cross-cutting.

2.9.2 As explained in chapter Doc 10039 Volume II Appendix A, interoperability has many aspects and can be addressed at organisational, information and technical levels, depending on the needs. Various activities may be therefore envisaged in order to align practices, vocabularies and technical enablers between these domains, or to establish or facilitate appropriate correlations whenever required by the operations.

2.9.3 For instance, it could be envisaged to align or to establish correspondences between overlapping vocabularies used in ATM and in aircraft operations. As an example, the ATM notion of Flight corresponds to what aircraft operations call a 'Flight Leg'. Or, in other terms, from an aircraft operations' perspective, a given flight is a series of 'ATM' flights.

2.9.4 Facilitating the correlation between aircraft & flight identifiers is another example of activity that could be envisaged. The ATC aircraft identifier as provided in the flight plan (ICAO) is different from the operator commercial flight identifier (IATA). This difference is exacerbated by the increasing need to prevent callsign similarity confusion which can result in an ATC flight plan identifier which is significantly different to the commercial identifier which is commonly used in operator and airport related exchanges.

2.9.5 There is a practical need to facilitate interoperability between information exchanged via FF-ICE and related IATA information as may be exchanged, for example, via AIDX. FF-ICE related data exchanges should therefore facilitate interoperability between the different domains by including the ability, where necessary, to add the IATA representation of relevant information.

2.9.6 FF-ICE strives to enable these correlations by including the ability, where necessary, to add the IATA representation of relevant information. In particular:

- The FF-ICE data definitions provided in Appendix B includes the ability to indicate the IATA code for an aerodrome.
- The Preliminary and Filed Flight Plan messages as described in Appendix C include the ability to provide the IATA operator code and commercial flight identifier (described in B-2.6.2).

2.9.7 It is important to note that the ability to include the IATA representation of the data is optional and does not replace the standard ICAO representation of the data which remains mandatory, as do the procedures for providing alternative information when, for example, an aerodrome doesn’t have an ICAO identifier.

2.10 IMPACT OF THE FF-ICE IMPLEMENTATION

2.10.1 Regulatory Authority Perspective

2.10.1.1 A State regulatory authority will need to consider the impact that the introduction of FF-ICE may have under the three areas of interest mentioned below. In doing so it should also take into account the impact of a mixed mode transitional period.

a) Licensing — the introduction of FF-ICE and related procedures into ATM, particularly the use and exchange of trajectory information, may impact personnel training (see 2.9) and related licensing procedures;

b) Certification — ATM systems and related procedures will require modifications to address the introduction of FF-ICE. The certification process may need to be adapted to include the introduction of FF-ICE;

c) Publications — a State authority which is responsible for the production or oversight of state related publications such as the AIP will need to make the necessary changes.

2.10.2 State Publications impact

Publishing available FF-ICE Services

2.10.2.1 A State implementing FF-ICE will need to publish the necessary information an operator requires in order to determine the services, procedures and processes available/applicable within the State as a whole and/or the various airspace(s) and aerodromes for which the State is responsible.

2.10.2.2 To do so, a State will need to publish, within its AIP, the services and processes it provides and the necessary details to enable an operator to make use of the service. The following list illustrates the types of services and processes that may be provided:

a) the provision of FF-ICE mandatory services (Filing and Flight Data Request)

b) the provision of Planning Service

c) the provision of Trial Service

d) the provision of Publication Service

e) the provision of Notification Service

f) the provision of translation and delivery process

g) the provision of forwarding process

h) the provision of re-evaluation process

2.10.2.3 For each of the services referred to above the State responsible will need to provide the location of the corresponding Information Service Overviews (see 2.5.4.2). This location is expressed as a URL which will be either:

- The URL of the SWIM Service Registry (see 2.5.4.3) that would contain the Overviews of the information services used by the FF-ICE Services. When a region uses a common SWIM Service Registry, the URL of that common SWIM Service Registry shall be added to each State AIP participating in the concerned region; or
- The URL of the web site that would provide access to the Information Service Overviews.

Publishing supporting ATM information

2.10.2.4 The use of trajectory information by operators and ASPs introduces a higher level of fidelity in terms of the information that can be exchanged and the detail that can be represented. If operators and ASPs are to succeed in reaching a common view of the trajectory, it is essential that the basic data concerning the ATM configuration (routes, navigation aids, airport data, etc.) as well as flight planning restrictions related to ATFM or airspace management processes are published by the relevant authority.

2.10.2.5 A state should ensure that this information is made available and can be used appropriately to enable the FF-ICE operations and related information exchanges.

2.10.2.6 The State AIPs and/or regional supplementary procedures should be used to either provide the necessary information or to indicate how and where the information can be obtained, as appropriate. As the SWIM uptake expands, this information is expected to be consumed from information services.

2.10.3 Training impact

General

2.10.3.1 The introduction of FF-ICE Planning is not expected to change the roles and responsibilities of either the airspace user or the ASP. It is however expected to impact the tools and procedures to be used in performing their roles and responsibilities. An assessment should therefore be made of the changes to tools and procedures currently in use and relevant training introduced as required. This assessment and resulting training should include the actors' awareness of the context of information related to an individual flight.

2.10.3.2 Since most of the first phase of FF-ICE implementation concerns pre-departure, it is envisaged that training needs for staff will focus on flight preparation, flight dispatch and of course flight planning tasks.

2.10.3.3 Those staff that deal with flight plan information in the post departure phase will only require basic understanding of FF-ICE Planning. It is envisaged that automation will either translate advanced plan information back into the traditional flight plan format to support legacy users, or take care of flight plan processing once a flight plan has left the planning stage. Until FF-ICE implementation moves to the point where automation both on the ground and in the cockpit supports real-time modification of trajectories, it is important that flight plan information remains readable and understandable by human operators.

Aircraft Operator

2.10.3.4 Aircraft operators and personnel responsible for flight planning will require significant training to become familiar with the new procedures and services. While these new FF-ICE services and procedures are intended to be performed primarily by the automation, personnel will need to be familiar with the new operational environment, i.e. the services being used by the automation, and how it can be used to improve their operations and advance their decision making processes.

2.10.3.5 Where applicable, the use of trajectories negotiation and its relationship with the standard, Field 15 type, route description will be important for operators to understand.

2.10.3.6 In addition to the new procedures related to FF-ICE, operators and particularly flight planning personnel will need to understand the impact of operating within a mixed mode environment. As ASPs will make the transition to FF-ICE at varying points in time, dispatchers and other airline FOC staff will have to interact with both concepts.

2.10.3.7 Flight crew need to be aware of the environment in which they are operating and how the process of interacting with ATC may be affected by this. They also need to remain proficient and be provided recurrent training in dealing with legacy providers.

ATM Service Provider

2.10.3.8 AIS staff will require transition training once their ASP decides to introduce FF-ICE. Since eASP also support legacy flight plans, AIS staff of such eASPs need to remain proficient in the legacy system until that system is completely phased out.

2.10.3.9 Flight Data Specialists supporting Air Traffic Controllers in FF-ICE Planning enabled ATS facilities will require training to understand and process the advanced flight plan information available through FF-ICE Planning and how to interface with neighbouring ASPs that have not transitioned to FF-ICE.

2.10.3.10 Air Traffic Controllers in FF-ICE Planning enabled ATS facilities require training to make use of the additional information provided by enabled airspace users, and understand the limitations of dealing with non-enabled flights and neighbouring units that have not transitioned to FF-ICE.

2.10.3.11 Personnel engaged in ATM related resource management will need to understand the potential use/impact of the Planning Service, the Preliminary Flight Plan and trajectory information and how this enhanced and improved data can be used within their respective processes.

2.11 AIR TRAFFIC FLOW AND CAPACITY MANAGEMENT

2.11.1 Capacity management is based on the principle of adapting the ATM capacity to fit the traffic demand. Only when this procedure is still unable to satisfy the complete demand will flow or traffic management measures be required. Capacity management is achieved primarily through the dynamic modification of ATC sectorisation or the assignment of military airspace reservations in such a way that they facilitate the traffic demand, and therefore more efficient flight trajectories, i.e. the Flexible Use of Airspace (FUA) procedure. Most strategic ATM planning is performed using historical data and/or airline scheduled information with limited or no route/trajectory information. The Planning Service bridges the gap between medium/long-term ATM planning, based on flight schedules and/or historical traffic data, and short-term planning based on filed flight plans. Effective ATM capacity planning and management requires early knowledge of the “underlying” demand; that is, the demand that would exist without “interference” due to daily variations in airspace availability and ATFM measures. These interferences are tools used by ASM/ATFM to provide needed capacity or to keep demand to within the available capacity. It therefore makes no sense if the first indications of the demand, early flight plans, are already adapted to take account of daily ATM measures and thereby distort the underlying demand picture. To provide benefit, the first route/trajectory for a flight must therefore be provided early enough to enable the resource planning activities associated with ASM, ATFM and airport planning to be effective. In practise this means the first route/trajectory for a flight should be provided in advance of the publication of daily airspace availability and ATFM measures.

2.11.2 The process should become self-enhancing, meaning that as more operators engage in early Planning confidence in the accuracy of the anticipated traffic demand will improve. This improved predictability will reduce the need, and/or the impact, of an applied ATM restriction. The process, once established, will make planning less reactionary allowing a more stable situation to be developed earlier and earlier publication of any necessary restrictions and their impact. This is in contrast to the situation where late engagement by the operator is encouraged because only then are the restrictions and their constraints known – a self-deprecating process.

2.11.3 The manner in which ATFM procedures are executed today, in particular the interface with the operator, can differ significantly from one ASP to another. Work is on-going to develop a global approach to the exchange of ATFM related information through FF-ICE. Implementation of FF-ICE Planning and Filing Services does however include the ability to make reference to an applicable published restriction in the feedback provided by an eASP to the operator. In addition, the ability to represent the impact of an ATFM restriction in the form of a route/trajectory constraint such as a flight level constraint, time constraint, etc. is also included.

3 GENERAL PROCEDURES

3.1 MESSAGE SUBMISSION

3.1.1 “Submission” is understood for the purpose of this manual as the procedure to be followed by an operator when providing flight plan data and associated messages to ATM.

3.1.2 This manual provides guidance with respect to FF-ICE procedures. An operator that is unable to submit FF-ICE flight plan data shall continue to submit flight plans (FPL) and associated ATS messages (CHG, DLA, etc.) in accordance with the procedures described in PANS-ATM chapter 4.4 and Appendices 2 & 3. ASPs that have implemented FF-ICE (eASPs) are obliged to continue their support of FPL and associated messages as long as the mixed-mode environment exists.

3.1.3 An important feature of FF-ICE is its facilitation of CDM processes between the operator and ATM services. FF-ICE therefore supports and encourages the direct submission, see Figure 3, by the operator (or its designated representative) of flight plan data to the relevant ASPs.

3.1.4 The recipients of the Preliminary Flight Plan may be different to those of the Filed Flight Plan. As described in sections 4 and 6 respectively, the 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. The Filed Flight Plan however must also be provided to ATC functions, both FF-ICE capable (eASPs) as an eFPL, and non-FF-ICE capable (aASPs) as an FPL.

3.1.5 In a mixed mode environment it is necessary to ensure that aASPs are not unduly impacted by the introduction of FF-ICE. The procedure for the submission of an ICAO2012 flight plan (FPL) and the possibility for the operator or its representative to file direct, is determined by the ATS unit responsible for the departure aerodrome. This needs to be taken this into account, as described in 3.3, when an FF-ICE capable aircraft operator departs from an aerodrome where the ATS unit is not FF-ICE capable.

3.1.6 It should be noted that today there can be national or even regional arrangements that affect how messages should be either submitted and/or addressed; i.e. not every ATS unit within a FIR or even every FIR within a region may need to be individually addressed. These arrangements may also exist in an FF-ICE environment. In this case, guidance specific to FF-ICE flight plan data should be published in the relevant AIP(s) and/or regional supplementary procedures, as is done today for FPL.

3.1.7 In a mixed mode environment where one or more relevant ASPs are unable to process FF-ICE data (aASP), it is incumbent upon the operator to ensure they are provided with the appropriate ATS messages (FPL, CHG, etc.) as necessary and in accordance with the applicable procedure, as described in 3.3.

3.1.8 It is likely that many flight planning service providers, having implemented FF-ICE capabilities, will also retain the ability to generate the flight plan, and any subsequent update messages, as ATS messages (FPL, CHG, etc.), as required.

3.1.9 An eASP may also choose to provide a forwarding facility where, upon request of the flight plan originator, the received FF-ICE flight plan will be delivered in the appropriate format to all relevant ASPs as indicated by the originator, thereby enabling an operator to submit its eFPL to a single eASP. An eASP that chooses to provide such a service must also forward the resultant response messages received from the relevant eASPs to the flight plan originator that submitted the flight plan.

3.1.10 It is also possible that an eASP may, in addition to its own internal distribution of flight data, provide a translation and delivery process where, upon request of the flight plan originator, the received FF-ICE flight plan information will be translated by the eASP into the appropriate ATS message(s) and distributed to the aASP recipients indicated by the originator. The relevant eASPs will receive the FF-ICE flight plan directly from the flight plan originator.

3.1.11 When the facility identified in 3.1.9 and/or 3.1.10 is provided by an eASP, the enlisting of the service and necessary details should be published via the appropriate national or regional documentation, as appropriate.

3.1.12 It is of particular importance that the flight plan and any subsequent flight planning messages for the flight are submitted using the same procedure. If a translation and delivery process or a forwarding process is used for the submission of the flight plan to aASPs then subsequent flight planning messages should be submitted in the same way, using the same service. Failure to adhere to this guidance could result in the reception by an aASP of duplicate messages from different originator addresses.

3.1.13 The operator needs to ensure that the necessary information described in Appendix C is provided in each FF-ICE message. In particular, if the operator is using one of the services of an eASP identified in 3.1.9 or 3.1.10 the following information needs to be provided:

a) an indication of the eASP being requested to perform the required translation and delivery of the flight plan information to the relevant aASPs provided.

b) the list of aASP recipients to which the indicated eASP is requested to deliver the flight plan data. The identity and the address data of each recipient should be provided. Their identity is expected to be provided using the appropriate location indicator and aeronautical authority and service designator as per ICAO Docs. 7910 & 8585.

c) an indication of the eASP being requested to forward the flight plan data to all relevant ASPs.

3.1.14 The operators need to take necessary actions to ensure that they are in receipt of relevant Submission Response and Filing Status messages made available by all relevant eASPs.

3.2 PRELIMINARY FLIGHT PLAN SUBMISSION

3.2.1 The Planning Service (and Preliminary Flight Plan) only exist as a FF-ICE service. There is no equivalent ATS message and therefore no need for translation or submission/distribution to non-FF-ICE units (aASPs). Preliminary Flight Plans and any subsequent updates are therefore submitted directly by the operator to the relevant eASPs thus facilitating the collaborative planning process. A detailed description of the Planning Service is provided in chapter 4.

3.3 FILED FLIGHT PLAN SUBMISSION

3.3.1 An overview of the submission procedure applicable to the FF-ICE Filing Service within a mixed mode environment is provided in Figure 2. In such an environment it is necessary that the operator continues to take into consideration the procedure related to the submission of flight plans published by the ATS unit responsible for the aerodrome of departure.

(see APPENDIX A – Key to Swimlane Diagrams)

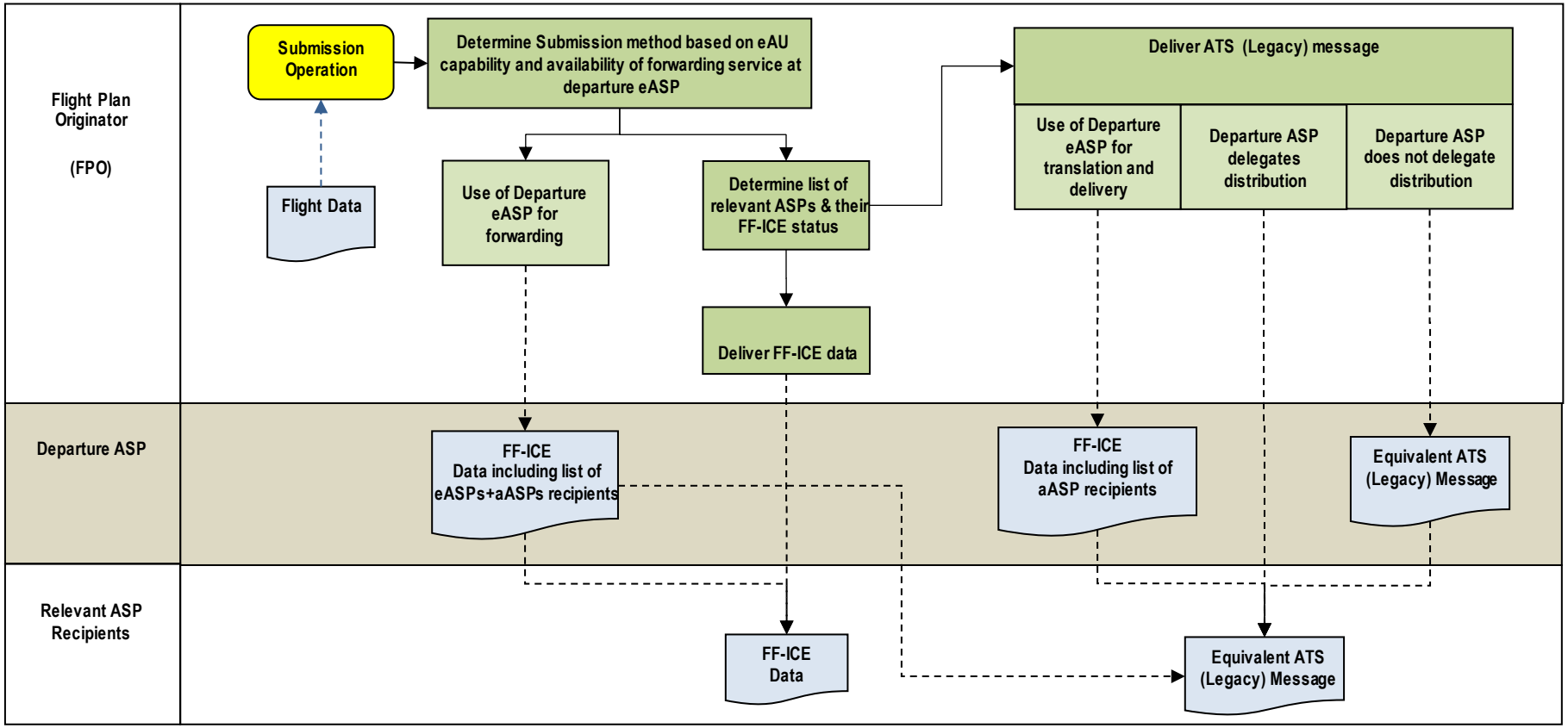


Figure 2: eFPL Submission Procedure

3.3.2 If the ATS unit responsible for the departure aerodrome is FF-ICE capable (an eASP) and/or delegates responsibility for flight plan distribution to the operator, then the flight plan should be provided by the operator, or its designated representative, to all relevant ASPs in the appropriate format (eFPL or FPL). This may be achieved in different ways depending upon circumstances, as illustrated in Scenarios 1, 2 & 3 below.

Scenario 1: the departure ASP is FF-ICE capable (eASP) and has delegated responsibility for the distribution of flight plans to the operator. The operator, or its representative, is willing and able to ensure all data are distributed in a consistent manner (see 3.4.3) and in the correct format for each ASP.

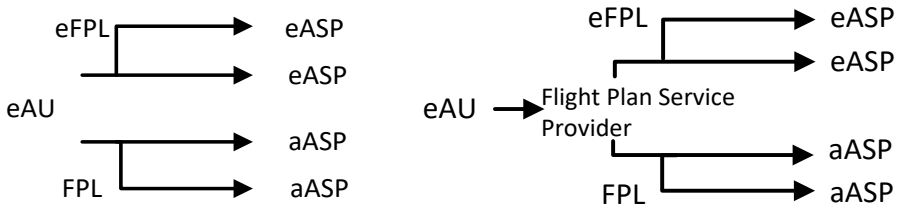


Figure 3: Direct Submission

Scenario 2: the departure ASP is FF-ICE capable (eASP) and has delegated responsibility for the distribution of flight plans to the operator. The departure eASP also provides a translation and delivery capability. The operator, or its representative, is unwilling or unable to ensure all data are distributed in a consistent manner (see 3.4.3) and in the correct format for each ASP and chooses instead to use the capability provided by the departure eASP.

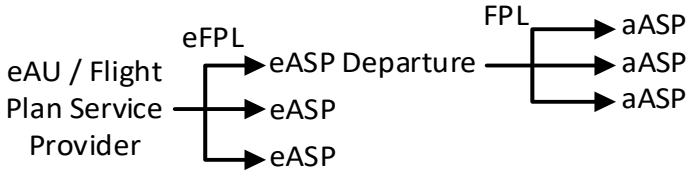


Figure 4: Translation & Delivery by eASP

Scenario 3: the departure ASP is FF-ICE capable (eASP) and has delegated responsibility for the distribution of flight plans to the operator. The departure eASP also provides a forwarding capability. The operator, or its representative, is unwilling or unable to ensure all data are distributed in a consistent manner (see 3.4.3) and in the correct format for each ASP and chooses instead to use the forwarding capability provided by the departure eASP.

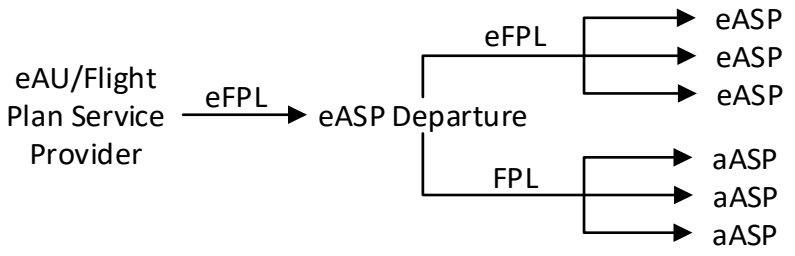


Figure 5: Forwarding by eASP

3.3.3 If the ATS unit responsible for the departure aerodrome is not FF-ICE capable then the operator, or its designated representative, shall:

a) Provide an eFPL to all relevant eASPs and;

b) Provide a FPL in accordance with published procedures for the departure aerodrome, by either:

i. Submitting the FPL to the ATS unit responsible for the departure aerodrome. This unit will then address and distribute the FPL to all ATS units concerned with the flight. See Scenario 4 below.

or,

ii. Addressing and distributing the FPL to each concerned ATS unit which is not FF-ICE capable i.e. which is not included under a) above. See Scenario 5 below.

Scenario 4: the departure ASP is not FF-ICE capable (aASP) and has not delegated responsibility for the distribution of flight plans to the operator. Note that eASPs in this scenario will receive the FPL in addition to the eFPL.

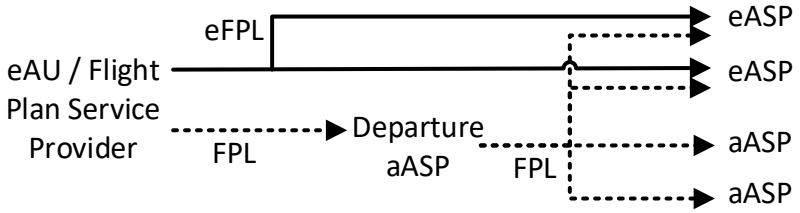


Figure 6: No Delegation of FPL Distribution

Scenario 5: the departure ASP is not FF-ICE capable (aASP) but has delegated responsibility for the distribution of flight plans to the operator. Flight Plan distribution will be the same as for Scenario 1.

Scenario 6: the operator, for whatever reason, is unable to ensure (with or without the services of a flight plan service provider or an eASP) that all data are distributed in a consistent manner (see 3.4.3) and in the correct format for each ASP. Note the FF-ICE status of the departure ASP is irrelevant in this case:

→ the operator is obliged to submit an FPL to all relevant ASPs (eASPs and aASPs) in accordance with local procedures and the provisions in PANS-ATM section 4.4.2.

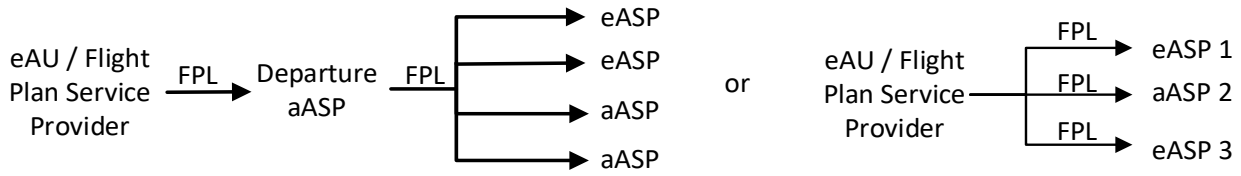


Figure 7: Non-FF-ICE Flight Plan Submission

3.4 SUBMISSION CONSIDERATIONS

3.4.1 Procedure

3.4.1.1 As the FF-ICE concept includes the provision of feedback by each eASP concerned with the flight, the need for the departure ASP to pre-validate as performed by the ARO today is less significant. Although the FF-ICE submission procedure (as illustrated in Scenario 1 above) could provide the same basic errors to all ASPs, with subsequent processing failures, possible manual intervention, and reception by the operator of multiple error indications for the same error. This would be an inefficient process, albeit primarily an automated one. However, the implementation of FF-ICE and the use of automated tools and a more advanced format and communications technology is expected to reduce, if not eliminate, the creation and exchange of basic format errors.

3.4.2 Format

3.4.2.1 In a mixed mode environment an eAU, its designated representative or an eASP performing a translation and delivery or a forwarding process will be responsible to provide current ATS message format to those ASPs unable to accept FF-ICE messages (aASPs). They will therefore be required to translate the FF-ICE message into the appropriate ATS message, see section 12.

3.4.3 Content

3.4.3.1 An eAU that engages in direct submission as per 3.1.3 or an eASP performing the forwarding or the translation and delivery process as per 3.1.9 or 3.1.10, will also be responsible to ensure that consistent and meaningful information is provided to aASPs. For example, a modification to the trajectory, and therefore an update for eASPs, may not be visible when expressed via the less detailed Field 15 format of a FPL, and therefore not a modification for aASPs (see also 6.4.2.7).

3.5 FLIGHT PLAN EVALUATION & RE-EVALUATION

3.5.1 An eASP, upon reception of a flight plan or Flight Plan Update, will evaluate the data provided with respect to its area of responsibility. However, nothing precludes eASPs from entering into bi-lateral or multi-lateral agreements as to the handling of flight plan data.

3.5.2 The extent of the checks performed and the resultant status may differ from one eASP to another usually depending upon the complexity of the ATM situation and/or the type of airspace concerned. For example, an eASP responsible for an oceanic airspace may pay more attention than an Approach ATS Unit would to the correct provision of a SELCAL code. Nevertheless, the use of a standard exchange format will provide a level of standardisation which, together with the guidance provided in Appendix E-1, will serve to provide consistent logic checks.
The following list provides a non-exhaustive set of checks, presented within different categories, that an eASP might choose to perform:

a) Data format and completeness — is the data correctly represented and all compulsory data items present for the message or service being processed or performed;

b) Flight Plan association — is the flight information received consistent with current information. Is there an error with regard to the assigned GUFI. For example, for a flight plan creation, does a duplicate flight plan(s) already exist, for an update is there only one associated flight plan;

c) Flight authorisation — does the flight comply with any required prior-approvals in the form of overflight permissions, etc. Does it comply with aerodrome curfew times. Does it comply with safety or security requirements, certification, licensing, etc;

d) Flight capabilities — does the flight possess the capabilities, typically CNS capabilities, for the airspace(s), routes or procedures it proposes to enter or perform;

e) Route/Trajectory — does the route/trajectory comply with the published ATM configuration, airspace and route descriptions, valid transitions between routes, etc. Does the route/trajectory comply with all published restrictions applicable to the flight;

f) Flight Constraints — does the route/trajectory comply with all constraint(s), such as a required take-off time, which have been allocated to the flight.

3.5.3 Typically, most ASPs would perform at least some of the checks described in a), b), d), e) & f) while probably very few would perform the sort of checks described in c), at least not during the process of flight plan acceptance.

3.5.4 An eASP, when performing the checks referred to above and deciding the appropriate action/response, should take into consideration any reason for special handling indicated within the flight plan. For example, a flight indicated as Search and Rescue (SAR) or a life critical medical emergency (MEDEVAC) should probably not be rejected.

3.5.5 The operator may indicate within the flight plan the applicable AIRAC cycle that was used in the computation of the flight plan. Over the period of an AIRAC cycle switch this information may be taken into consideration by an eASP in determining it's processing response. The information may also be made available to control staff if it is deemed by the eASP to be advantageous to do so. This may depend on, for example, whether or not the eASP's area of interest has been modified in a significant way, such as a change to the physical characteristics of published route(s), Navigation aid(s), waypoint(s), during the latest AIRAC cycle.

3.5.6 An eASP is encouraged to publish a description of the type of checks performed.

3.5.7 Re-evaluation is an optional process (see Figure 8) that an eASP may perform to determine whether or not a flight plan remains in compliance with published restrictions or ATM measures that may have been applied or modified since the flight plan was last evaluated. If provided, the process should be applied within both the Planning and Filing services. The re-evaluation process, if provided, is advisory and does not relieve the operator of its responsibility to ensure the proposed flight remains in compliance with published restrictions and procedures.

3.5.8 It is highly recommended that a re-evaluation process is provided by an eASP responsible for an airspace where frequent modifications to the ATM configuration occur. Typically, this would be in complex airspace where traffic demand is high and/or in airspace where other restrictions, such as military activity or severe weather conditions, frequently occur.

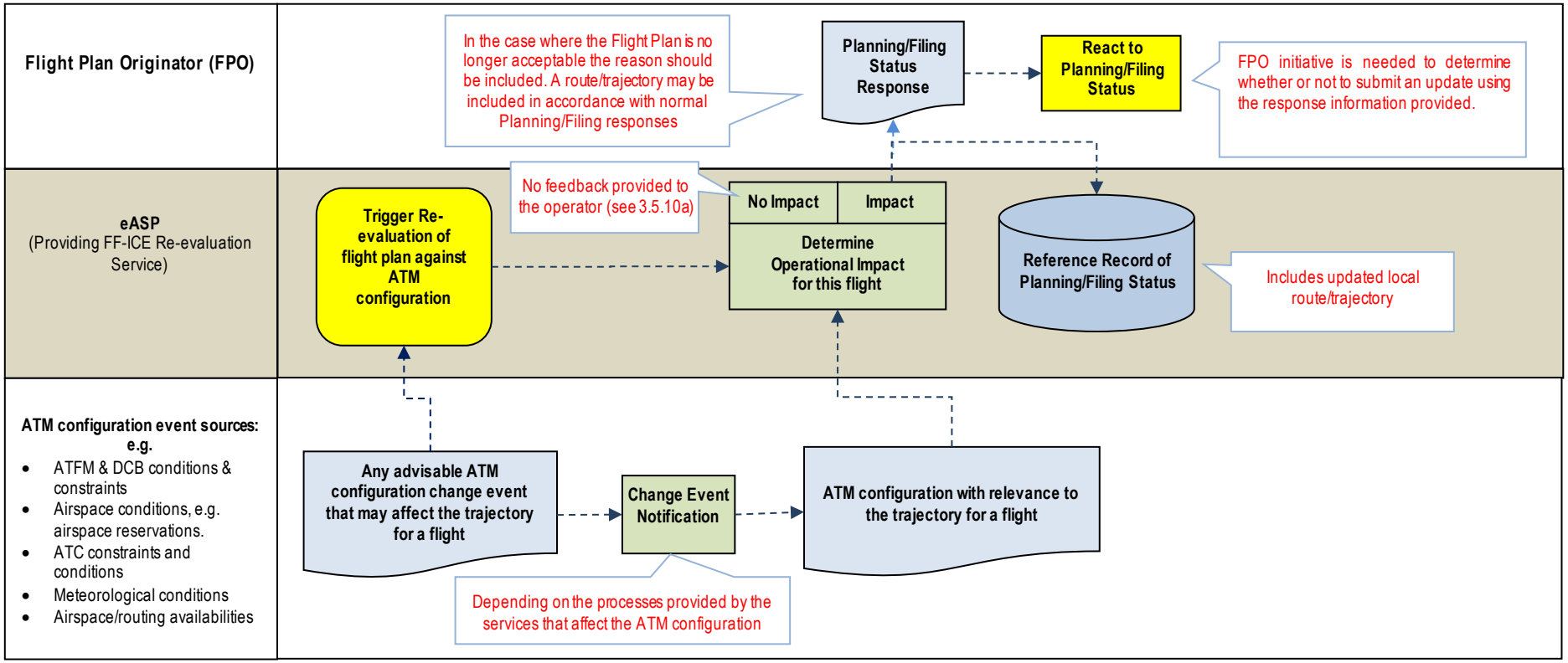


Figure 8: Re-evaluation Process

(see APPENDIX A – Key to Swimlane Diagrams)

3.5.9 The trigger that causes the eASP to re-evaluate a flight plan may be the modification of the ATM configuration, a restriction or constraint, or the trigger may be a periodic review of each flight plan, irrespective of other changes.

3.5.10 Basic re-evaluation can result in one of two primary outcomes:

a) the flight plan status remains unchanged — no feedback provided to the operator in this case;

b) the flight plan status changes — a Planning or Filing Status response is provided in this case, as appropriate.

3.5.11 There are additional possible outcomes of the re-evaluation process that an eASP may implement. APPENDIX D – Re-Evaluation Feedback provides an overview of a more comprehensive re-evaluation process and its possible responses.

3.5.12 The time period in advance of the flight during which re-evaluation is performed is at the discretion of the ASP concerned, as local conditions may dictate specific needs or constraints. During Planning the re-evaluation process should begin from the time the Preliminary Flight Plan (PFP) is received. If a Preliminary Flight Plan is not regularly re-evaluated by the eASP with feedback provided to the operator and duly taken into consideration, then one of the main purposes of Planning is not being achieved. Re-evaluation may continue right up to the Estimated Off-Block Time (EOBT) or even the allocated Off-Block time, if applicable. However, it is clear that an operator may not be in a position to respond to a late notification via the normal pre-departure flight planning procedures. Similarly, constraints will also apply to the late acceptance by ATM/ATC of flight plan modifications[5]. Local procedures, particularly at aerodromes where a fully integrated A-CDM process exists, may have procedures in place that enable relatively late modifications to be coordinated and implemented.

3.5.13 The operator is expected to react to the reception of a Planning or Filing Status taking into account any changes to the restrictions/constraints and/or the route/trajectory (Negotiating or Agreed, as applicable) calculated by the eASP, see sections 4.3 and 6.3. As described in 3.5.12, the ability of an operator to respond to a Filing Status received close to EOBT may be limited requiring either a post-departure procedure[5] to be invoked or a tactical intervention by controller and/or pilot. See also section 6.3.9.

3.6 eASP RESPONSE PROCESSES

[5] Required changes to the route/trajectory close to, and after, the EOBT will be part of post-departure FF-ICE procedures.

3.6.1 An eASP, upon reception of a FF-ICE message, is expected to perform an evaluation process, as described in 3.5. Having performed an evaluation, the eASP will decide whether or not the data received can be processed and the information provided can be accepted, retained and acted upon. The result of the evaluation process will be provided to the originator of the message.

3.6.2 While basic syntax and semantic rules or criteria (see Appendix E-1) are expected to be applied, each eASP has the discretion to determine the extent of the evaluation performed and the criteria against which it is decided to retain or reject a flight plan, or a flight plan modification. The evaluation of circumstances, such as airspace type, traffic density, etc., will differ from one eASP to another meaning a particular discrepancy that may be tolerable for one eASP may cause a rejection within the airspace of a different eASP.

3.6.3 Two types of response are foreseen; Submission Response and either the Filing or Planning Status, as applicable.

The Submission Response (see 3.6.8) is provided immediately to the originator indicating whether or not the received message is assessed as valid and will be retained and acted upon or whether it is assessed as invalid and is therefore rejected. A rejection response indicates that no data has been retained by the eASP. All messages provided to an eASP, other than response messages, should receive a Submission Response.

The Filing Status (6.3) or Planning Status (4.3) provides information concerning the status of the flight plan, and typically concerns route/trajectory acceptability.

3.6.4 A Filing or Planning Status message (as appropriate) may be triggered by the reception of the following message types or by a re-evaluation of the flight plan where, for example, a modification to the ATM configuration, such as a change of airspace availability, is detected:

- Preliminary Flight Plan
- Filed Flight Plan
- Flight Plan Update

3.6.5 An eASP that provides a re-evaluation process would normally be expected to provide a Status response at the same time as the Submission Response, knowing that any subsequent modifications to the status will also be provided. However, there are two circumstances when an operator may receive status messages sometime after the message was submitted and the submission response was received:

a) the Filed Flight Plan has been received well in advance of the flight by an eASP that doesn't provide a re-evaluation process. In this case the status response will be provided at a time when the eASP considers it is able to provide the most meaningful feedback in due time for the Operator to react, as may be required. In this case, although the real operational status will be provided later, the eASP should still provide an immediate Filing Status response with a status indication of PENDING;

b) the eASP provides a re-evaluation process (see 3.5.7) in which case a status message(s) will be provided to the operator when, as a minimum, a change of status has been detected by the eASP. This can happen if, for example, an ATFM measure has been implemented which impacts the previous status.

3.6.6 The availability of two types of response provides the eASP with greater flexibility, enabling acceptance of a submission and retention of the flight intent for planning purposes while at the same time being able to indicate that, for example, the route/trajectory does not comply with all restrictions. The flexibility to retain a flight plan submission containing a route/trajectory which does not conform with all restrictions is intended as a feature of the Planning Service as it facilitates the subsequent negotiation of the optimal route/trajectory.

3.6.7 It is not recommended that eASPs provide the same flexibility when the flight plan is filed, for two main reasons:

- earlier determination of flight intent during Planning facilitates greater efficiencies;
- modifications (potentially many systematic modifications) to the Filed Flight Plan may result in numerous modification (CHG) messages being received by aASPs, some of which may be reliant upon a manual procedure.

3.6.8 Submission Response

3.6.8.1 The Submission Response (see Figure 9) is always an immediate response provided by an eASP to the message originator indicating retention or rejection of the message received. A response may also be given indicating that the received message is being handled manually, in which case, once manual processing has been completed a second Submission Response will be sent indicating retention or rejection of the message.

(see APPENDIX A – Key to Swimlane Diagrams)

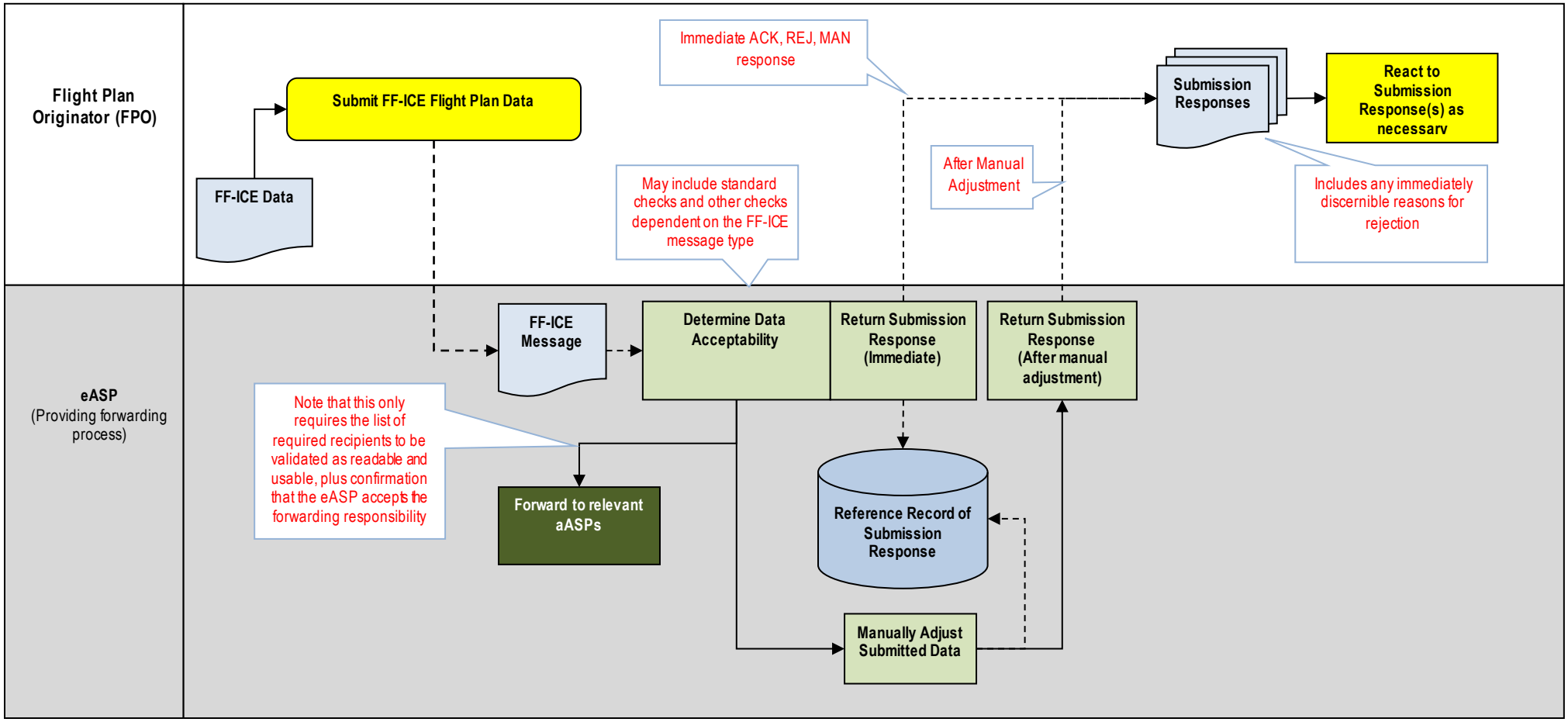


Figure 9: Submission Response Procedure

3.6.8.2 Each message received by an eASP should result in a Submission Response.

3.6.8.3 An “acknowledge” (ACK) response indicates that the message received can be processed by the eASP and will be acted upon.

Note: Reception of a Submission Response with an “ACK” indication does not necessarily mean that the flight plan data are operationally acceptable, without the need for change.
The acceptability of the flight plan, as perceived by each eASP, is subsequently provided within the Planning (4.3) or Filing (6.3) Status response, as applicable.

3.6.8.4 Reception of a Submission Response with a “rejected” (REJ) status indicates that the message received could not be processed. The message has therefore not been processed or acted upon by the eASP and none of the data has been retained.
If the message being responded to is related to the submission of a flight plan then, as a consequence, the flight plan will not exist as far as that eASP is concerned.
If the message concerned is an update to an existing flight plan then the update will not have been applied by that eASP.
An operator, having received a REJ response from an eASP, is required to make the necessary correction(s) and to re-submit the information. The re-submitted information should be provided to all relevant ASPs, not only the one having rejected the original submission.

3.6.8.5 Reception of a Submission Response with a “manual” (MAN) status indicates that the message has been queued for manual processing. It is an indication to the message originator that some time may be needed before a second Submission Response indicating an ACK or REJ can be expected.
As FF-ICE processes are expected to be highly automated manual interventions should be very limited. However, occasionally an error can occur within the ATS system, such as an error within the ATM configuration data or a system error, which therefore cannot be overcome by the message submitter. Only a manual intervention on behalf of the ATS system can resolve the problem.

3.6.8.6 As described in 3.5.2 an eASP has the discretion to determine if a message will be retained and acted upon (ACK) or if it will be rejected (REJ). The decision to reject a message is not always due to syntax errors. The examples listed as a), b) and c) in 3.5.2 are typical cases that may result in a rejection.

3.6.9 ‘Non-Compliance’ Feedback

3.6.9.1 An eASP, when providing feedback to the message originator via either a Submission Response or a Planning/Filing Status concerning a data error or non-compliance with a published restriction, is expected to provide an indication of the problem. This may include reference to the published restriction and, when applicable, an indication of its impact, the resultant constraint. For example, if the route of flight penetrates an airspace that is closed due to military activity the feedback will indicate the non-availability of the

route or airspace and may make reference to the publication where the airspace availability, or lack thereof, has been made available. If the flight is subject to an ATFM restriction resulting, for example, in the allocation of a target time, reference to the published ATFM restriction may be provided together with an indication of the allocated time; i.e. the constraint.

3.6.9.2 When a problem is caused by non-compliance with a published restriction reference should be provided to the publication of that restriction using the published identifier.

3.6.9.3 Efforts are underway to establish a basic set of validation checks that are globally applicable and can therefore give rise to a standard list of 'error' messages or message sets. The information provided in APPENDIX E – Logic Rules is intended as a first step in this process.

3.7 GUFI & FLIGHT PLAN ASSOCIATION

3.7.1 General

3.7.1.1 The Global Unique Flight Identifier (GUFI) is intended to provide a unique reference to a specific flight, civil or military. Its purpose is to assist in associating a message to the correct flight and to help in distinguishing between similar flights. There can be multiple flight plans with the same aircraft identification and departure point and it is not always readily apparent when two flight plans are different versions for the same flight, or different intended flights. The GUFI will resolve such situations.

3.7.1.2 Most ATM systems today rely upon a comparison of various "key fields", such as Aircraft Identification, Aerodrome of Departure, EOBT, etc., to identify a flight and to distinguish one flight from another. This method can however give an unreliable result particularly if, for example, a flight is delayed and/or the aircraft identification is the registration and therefore the same for each flight.

3.7.1.3 The introduction of FF-ICE together with SWIM-type functionality facilitates a working environment in which many transactions would be performed in an automated manner. Such an environment, with potentially many transactions per flight, requires a quick and reliable identification of the flight concerned and cannot depend on an unreliable mechanism with frequent manual interventions to assist in determining the correct target flight.

3.7.1.4 An important principle behind the introduction of a globally unique identifier (PANS-ATM 17.4.1) is that it should identify only one flight and each flight should be identified by a single identifier (see 3.7.2 for the determination of 'a flight') .
If a flight plan is cancelled and a new flight plan is submitted, the new flight plan shall contain a new GUFI even if the new flight plan relates to what the operator will consider to be the same flight. Alternatively, in place of the cancel and re-file option, or the flight plan is updated, the new flight plan can be provided with the same GUFI but with an incremented flight plan version and as a consequence it will be treated as a complete replacement of the existing data. See 3.7.4.3 and 6.4.3.7.

3.7.1.5 As the GUFI identifies an individual flight it is therefore understood that the operator will only assign a GUFI to a flight when it is prepared to engage in communications concerning a specific flight. A GUFI will therefore not be allocated to schedule information which is repetitive by nature and therefore relates to multiple flights.

3.7.1.6 In addition to identifying the correct flight to which a message or transaction should be associated, the GUFI together with the flight plan version number will also assist in distinguishing between different flight plans e.g., answering the question “do these two flight plans concern one flight or two different flights?”

3.7.1.7 Although the GUFI should help to provide a clear indication of the target flight and of the operator’s intent with regard to the operation of one or more flights, in the early days of implementation, before GUFI allocation and handling by all parties can be completely verified in operations, it would be more reliable for the systems to continue to use additional information to verify flight association. Furthermore, it needs to be considered that in a mixed mode environment, some flight plans will not include a GUFI.

3.7.1.8 An incorrect GUFI indication can result in data being applied to the wrong flight plan and must be avoided. While this is a significant error the introduction of the GUFI as an additional key field means the frequency with which it happens should be reduced in comparison to current practices. It is interesting to note that an update which contains a significant change (e.g., aircraft type changed to a C172, wrongly applied to a long haul commercial flight) will quickly fail further processing while a less significant change may go undetected.
It is therefore recommended that, at least during initial implementation of FF-ICE and/or initial implementation by a new eFPL provider, some data validation that includes the GUFI is performed, particularly upon reception of a flight plan.

3.7.2 Determination of “A Flight”

3.7.2.1 For the purpose of GUFI allocation “a flight” is considered to be the operation of an aircraft with a specified aircraft identification, at a specified departure aerodrome, at a specified date and time, from first submission of the flight plan (Preliminary or Filed) until in-blocks at an arrival aerodrome.

It is worth noting that each leg of a multi-leg operation is therefore defined as a different flight (it will depart from a different specified aerodrome), from an ATM perspective, and shall be allocated a different GUFI.

3.7.2.2 A flight is considered to have taken place once the aircraft has completed its planned operation at its destination aerodrome or, it has landed at a diversion aerodrome. Therefore, following a diversion a subsequent attempt to reach the destination aerodrome will require a new flight plan and a new GUFI. Likewise, a flight which needs to return and land (a diversion from its planned operation) at its departure aerodrome immediately after becoming airborne will require a new flight plan and a new GUFI, if it wishes to re-attempt the flight as originally planned.

3.7.2.3 An aircraft that is obliged to return to its parking stand prior to becoming airborne; i.e. a “ground return” or an aborted take-off, may retain the flight plan and its GUFI if it is

intended to continue the flight. This is based on the concept that ATC systems can perform a "roll-back" of the flight prior to it becoming airborne. If there is no intention to continue the flight, the flight plan should be cancelled.

3.7.3 Flight Plan Association

3.7.3.1 The process of determining whether or not two flight plans actually refer to just one flight, or the difficulties sometimes encountered in determining the correct flight to which an update should be applied, is not new. ATM systems have been dealing with these problems for many years, sometimes having to resort to manual intervention.

3.7.3.2 The introduction of FF-ICE, GUFI and more data sharing processes will provide an opportunity to perform better association of received information with a specific flight, and to detect inconsistencies (e.g., two flight plans for the same flight). To avoid differences in acceptance of a flight plan between different eASPs, it is strongly recommended that a flight plan that will be relevant to multiple ASPs be subject to the flight plan association checks in APPENDIX F – Association Checks. A flight plan for a flight that remains within the scope of a single ASP can be validated against local rules.

3.7.3.3 In determining whether or not two flight plans refer to the same flight, it is common practice to use the aircraft identification, the departure aerodrome and the off-block date and time. Use of the destination aerodrome is not recommended on the basis that two flights departing the same aerodrome at the same time using the same identification should probably not be accepted even if they have different destinations.

3.7.3.4 Most of the issues encountered today concern timing aspects; i.e. how far apart the EOBTs have to be before two flight plans with the same aircraft identification and aerodrome of departure can be accepted as two distinct flights. Different ASPs will have implemented different solutions with differing complexity based on factors such as the total estimated elapsed time of each flight, whether or not the two flights would exist in the same airspace at the same time, etc. The most significant ASP in making this determination is the ASP responsible for the departure aerodrome. It is therefore suggested that eASPs which are not responsible for the departure area i.e., downstream eASPs, could place greater reliance on the GUFIs.

3.7.3.5 Assessment of the timing aspects for flight plan association should not be rigidly applied in the processing of modifications to the EOBT. An operator who has planned to fly a series of flights should not be obliged to delay each flight in reverse chronological order to achieve a delay to the first flight.

3.7.4 GUFI Procedure

3.7.4.1 The operator, or its designated representative, is required to generate and allocate a GUFI to its FF-ICE flight plan. It is important that only one GUFI is allocated to a flight and this can only be assured by ensuring that the GUFI is allocated at source by the operator, or its representative, upon creation of the flight plan.

3.7.4.2 The operator should ensure that all flight data submitted for a flight is submitted using the same GUFI. This applies to both the Preliminary and Filed versions of the flight plan. It also applies to a Trial Request when a Preliminary or Filed Flight Plan already exists

for the flight. This will enable the ATM system to ensure that, in assessing the impact of a Trial Request, it doesn't include the same flight twice.

3.7.4.3 An eASP on reception of a Preliminary or Filed Flight Plan (a new flight plan creation) should use the logic in APPENDIX F – Association Checks to verify that:

- the same Preliminary Flight Plan or the same Filed Flight Plan does not already exist with a different GUFI. It is of course normal that, upon Filing, a Preliminary Flight Plan may already exist for the same flight with the same GUFI;
- the same GUFI does not already exist, at least within the operational database, for a different flight plan.

If the same Preliminary Flight Plan or the same Filed Flight Plan does exist with the same GUFI and the new submission has a later version number, it should be treated by the eASP as a complete replacement of the existing data. See also 6.4.3.7.

3.7.4.4 On reception of an update or cancellation message, an eASP will use the GUFI as an index to obtain the target flight plan. It is nevertheless recommended that, having obtained the flight data using the GUFI, the eASP performs a verification of the GUFI by ensuring that the other key fields used for message association are consistent. However, in circumstances in which the operator and service provider systems have successfully achieved some form of integrity testing the eASP might choose to rely purely upon the GUFI without further verification.

3.7.4.5 In the case of a missing flight plan an eASP would be expected to obtain the flight plan, and the GUFI, through the use of the Flight Data Request service as described in section 8.

3.7.4.6 In translating an eFPL into a FPL for transmission to non-enabled ASPs the GUFI will not be provided.

3.7.5 GUFI Composition

3.7.5.1 A GUFI shall include a version 4 "Universally Unique Identifier" (UUID), as standardised by IETF RFC 4122 of the Open Software Foundation (OSF) and documented by the International Standards Office (ISO/IEC 9834-8: 2014) and the International Telecommunications Union.

3.7.5.2 The GUFI's UUID shall be supplemented with the following additional information:

1. A namespace identifier to record the originator of the GUFI. Namespaces are used in a variety of settings to both organize content as well as help ensure that content is uniquely identifiable. In FF-ICE, the originator of each GUFI can construct their own namespace as described in Appendix G-1 to ensure that no GUFI generated with a given namespace can be a duplicate of a GUFI generated with any other namespace.
2. A GUFI creation timestamp to further decrease the chances of a GUFI collision. Timestamps will also ensure the GUFI is perpetually unique over any period of interest.

3.7.6 Validation of a GUFI Generator

3.7.6.1 Testing can validate the proper generation of the namespace portion of the GUFI. It should be static for a given originator, and can be readily examined for correctness.

3.7.6.2 Validation of the flight-specific UUID portion of the GUFI will depend somewhat on verifying the use of a suitable generation method per appropriate standards. Testing can be used to check for duplication with previously assigned UUIDs.

3.7.6.3 Validation of the timestamp portion of the GUFI will include checking that the timestamp is in an appropriate Coordinated Universal Time (UTC) format.

3.7.7 Validation of the assigned GUFI

3.7.7.1 In addition to mitigating any small residual risk of GUFI duplication at generation there is also a risk associated with mismanaging the assignment of a generated GUFI to a flight plan. It is absolutely critical that two flights in the operational ATM system not have the same GUFI. Therefore, operators are encouraged to consider additional safeguards that ensure an assigned GUFI has not already been assigned to another flight, including one that may have been subsequently cancelled.

3.8 VERSIONING & REFERENCE INFORMATION

3.8.1 Versioning

3.8.1.1 FF-ICE is intended to facilitate a systematic exchange of data between operators and eASPs. In the context of Planning and trajectory negotiation in particular, such a systematic negotiation process can give rise to a significant number of modifications to the flight plan, performed over a period of time. In order to assist in data synchronisation and in providing a reference for feedback, the operator is required to provide an indication of the flight plan revision, i.e. its flight plan version.
The FF-ICE concept also includes the notion of an eASP flight plan version indicator. Use of an eASP version indication has not yet been described and is expected to become more relevant during post-departure planning processes.

3.8.1.2 The complete set of data held by the ATM system for a particular flight may include data items for which the operator is not wholly responsible. Such data items are not part of a flight plan submission and typically will be associated with traffic management and/or A-CDM processes that take place close to departure. The operator flight plan version only relates to the provision and update of flight plan data provided by the operator. Flight plan data which has not been provided or updated by the operator is not expected to modify the operator flight plan version.

3.8.1.3 The flight plan version number is intended to provide both a reference to a particular version but also an indication of the sequence in which versions have been created. It shall therefore be an incremental number.

3.8.1.4 The threshold value for different flight data beyond which a change to the flight plan should be triggered, together with a new version number, may be specified by the local eASP. In this initial FF-ICE implementation, threshold values to be applied globally are not specified however, as a minimum, changes requiring a modification to the flight plan today (FPL) shall also be applied to an FF-ICE flight plan and result in a new version number.

3.8.1.5 As an FF-ICE flight plan can contain more detailed information, such as trajectory and performance data, it is recommended that all modifications provided by the operator should be accompanied by an increment to the version number.

3.8.1.6 In nominal circumstances an FF-ICE flight plan would be expected to begin as a Preliminary Flight Plan, as used during Planning, and then to be replaced or superseded by the creation of a Filed Flight Plan (eFPL), containing of course the same GUFI. The version numbering should be continued across this transition with the eFPL containing a version which is one increment higher than the last version used during Planning.

3.8.1.7 The combination of version number and GUFI should provide a unique reference, i.e. for a given flight (GUFI) a version number should not be repeated.

3.8.2 Referencing

3.8.2.1 The feedback, in the form of a Submission Response or a Planning or Filing Status, provided by the eASP to the operator should reference the version used for determining the feedback.

3.8.2.2 An operator that elects to perform Planning on an ad hoc basis, choosing to negotiate with different eASPs at different times and therefore probably using different versions, must keep in mind that the version contained in the response from each eASP, which may be a delayed or non-immediate response, will reflect the same ad hoc pattern. A compromise needs to be determined by the operator between:

- a parallel approach, providing at the same time all eASPs, with which Planning is required, with the Preliminary Flight Plan and every version update thus ensuring that a response provided by an eASP would normally refer to the latest version;

and

- an ad hoc individual approach in which the operator negotiates with eASPs independently. This approach may suit the business planning of the operator, to determine the constraints of the most complex eASP first.

3.8.2.1 In order to ensure that all relevant eASPs offering a Planning Service are provided with up-to-date and consistent information concerning the flight it is recommended that the operator employs the parallel approach.
It should be noted that in using the ad hoc approach, any assumption that a particular update will not impact eASPs downstream is far from obvious.

3.8.2.2 Regardless of the approach being employed, once an eASP has been included in the planning process through the provision of a Preliminary Flight Plan it must then be provided with all subsequent versions. This will ensure that all eASPs aware of the flight have consistent information. It will also ensure that all Planning Status messages received by the eAU will refer to the latest version of the PFP.

3.8.2.3 If the eAU has not provided an eASP with all subsequent versions, in order to bring that eASP up to date the eAU is required to submit a complete flight plan (PFP) containing the latest information and the latest version number.

3.8.2.4 Once an eFPL has been filed, the eFPL and all subsequent updates are required to be provided to all ASPs. All eASPs should therefore be in receipt of the same version number as that maintained by the operator. This version number, if provided to the pilot, would allow ATC and the pilot to verify they are using the same version of the flight plan. If included in on-board systems it would enable a synchronisation check to be performed between ground and airborne systems, as may be required.

3.8.3 Sequencing

3.8.3.1 As described above, the Planning procedure, and in particular the ad hoc approach, does not allow a strict sequencing to be imposed or expected on first reception of the flight plan. An individual eASP cannot assume that the first reception of a Preliminary Flight Plan will begin with version “1”. When using the ad hoc approach, it is the Operator’s responsibility to send a complete Preliminary Flight Plan at the correct version when adding an eASP to the negotiation.

The same applies to the filed eFPL. As the version numbering is required to continue from Planning through to Filing, the filed eFPL may contain a version number higher than “1”.

3.8.3.2 As a consequence, the following guidance applies:

a) A recipient shall discard (and not process) a PFP, eFPL, or Flight Plan Update whose version number is lower than the version of flight plan information currently held. The submission response for such a message should be a REJ unless circumstances (e.g. recovery from a network failure) indicate the message can be accepted and discarded.

b) A recipient shall reject a Flight Plan Update whose version number is more than one higher than the version of flight plan information currently held. This jump in version number indicates that the recipient has missed updates and therefore has inaccurate flight plan data.

c) When a rejection of a Flight Plan Update message due to a version mismatch is received, the operator or designated representative shall submit the latest version of the complete flight plan (PFP or eFPL as appropriate).

Note: An update to flight data received from other sources, such as A-CDM, is not expected to update the operator’s flight plan version.

4 PLANNING SERVICE

4.1 GENERAL

4.1.1 The Planning Service is an optional service expected or recommended to be provided by an eASP whose airspace is complex and/or regularly constrained. Typically this would be the result of high traffic demand where an ATFM service is already provided. However, an airspace where other restrictions, such as military activity or severe weather conditions, frequently occur may also benefit from the provision of a Planning Service.

4.1.2 In circumstances where restrictions frequently occur over an area that may encompass more than one ASP some form of collaboration between ASPs is recommended to ensure, as far as possible, an efficient and consistent feedback to the operator that addresses the restrictions within the complete area.

4.1.3 The Planning Service provides a CDM process between the operator and the eASP(s) concerning the intended operation of a flight.

4.1.4 The Planning procedure is therefore intended to serve two main purposes:

a) assist the operator in determining the optimal route/trajectory for a flight by identifying the ATM configuration and restrictions applicable to the flight as proposed; and

b) enable eASPs to obtain an earlier, more detailed and more accurate assessment of the anticipated traffic demand. Such an improvement in predictability will enable the ATM services to provide greater flexibility and the ability to facilitate the operator in overcoming short-term difficulties. Figure 10 illustrates this improvement cycle.

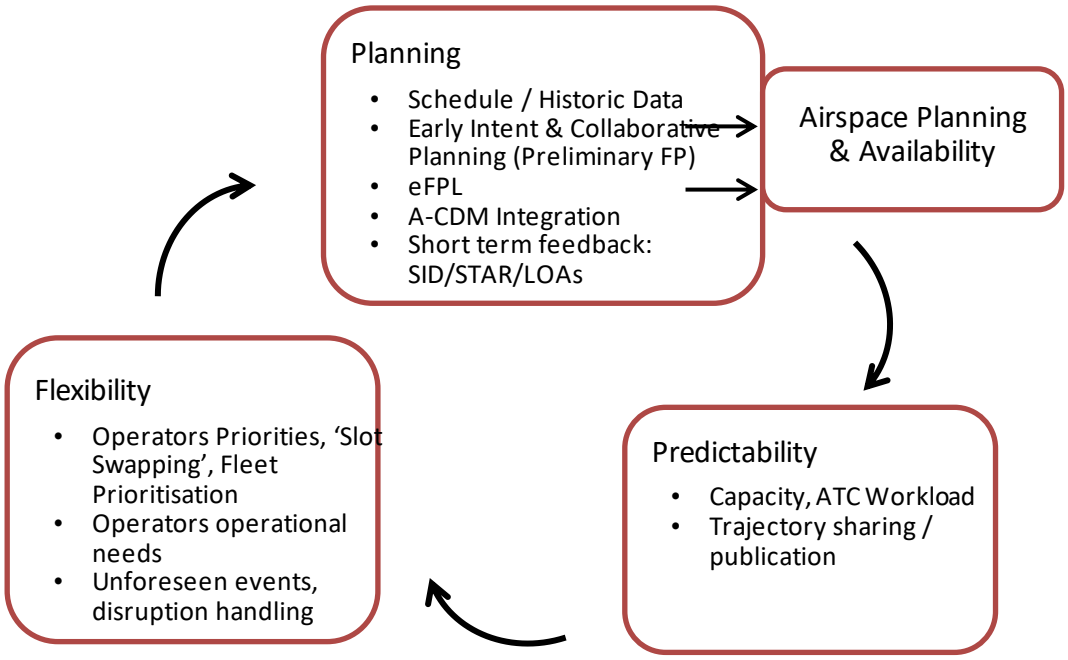


Figure 10: Planning Improvement Process

4.1.5 The greater detail provided via the exchange of trajectory information allows the operator and the eASP to share their expectations in an unambiguous manner.

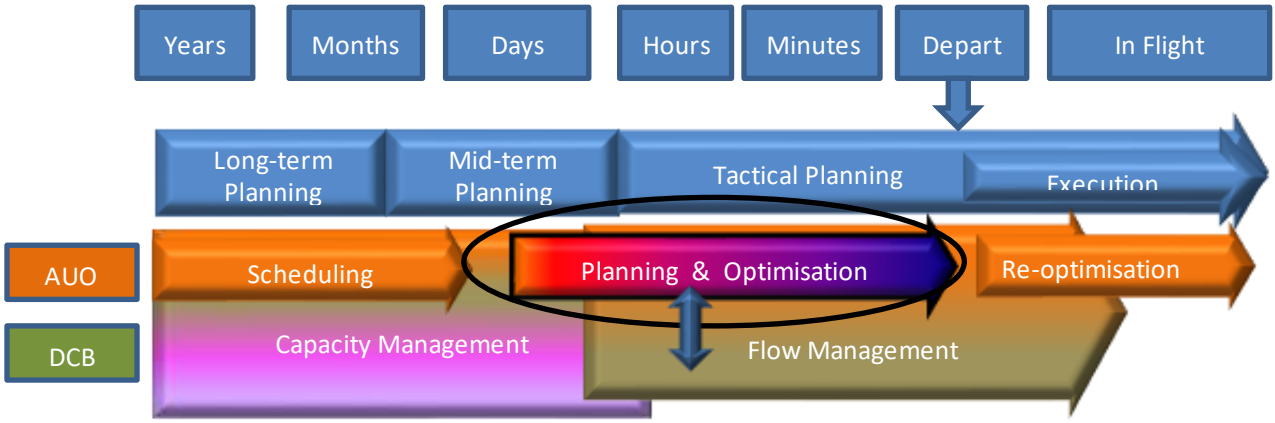


Figure 11: Planning Service

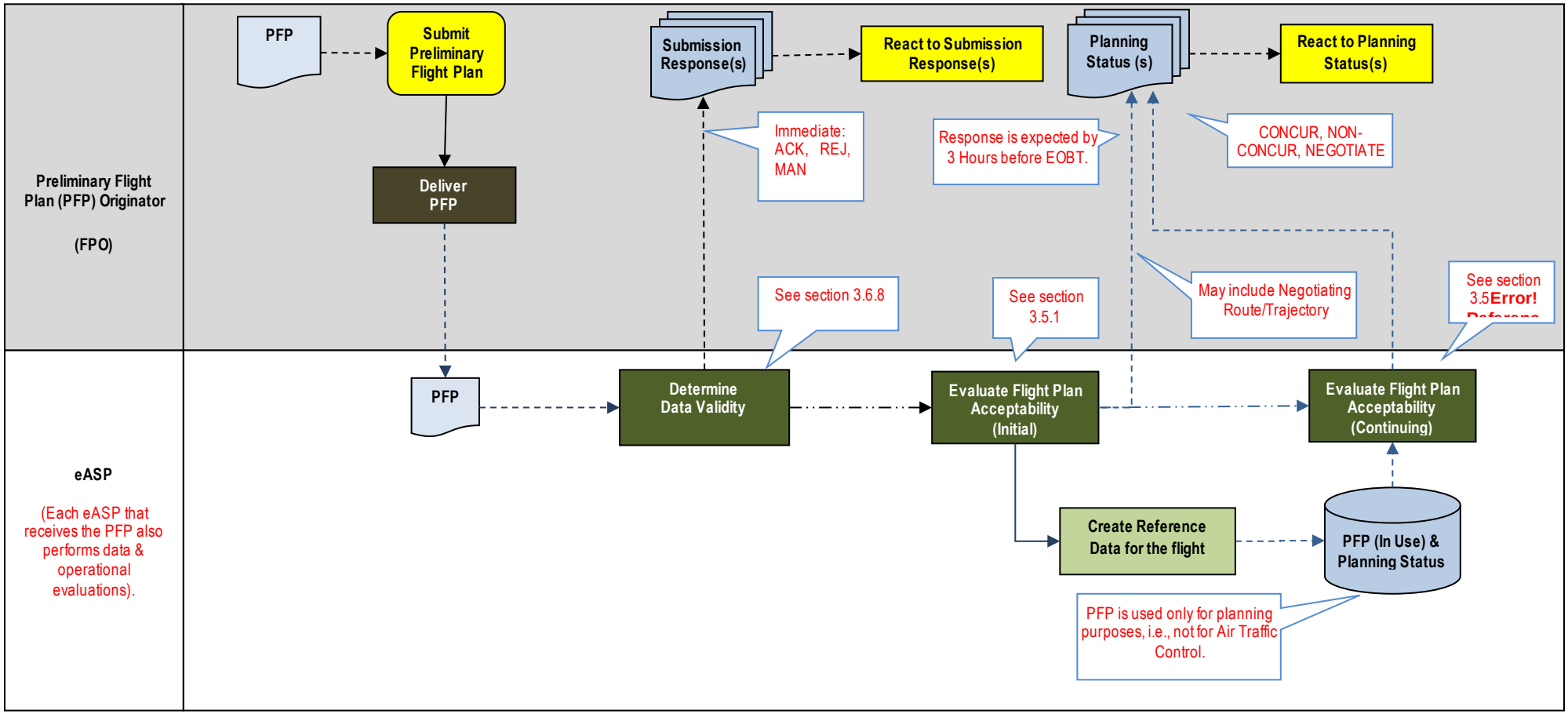
4.1.6 The Preliminary Flight Plan information provided by the operator to obtain the Planning Service will be retained and used by the eASP for traffic and resource planning processes. The Preliminary Flight Plan information is therefore used operationally and should be either maintained by the operator as a true indication of the flight's intent until the flight plan is filed, or else cancelled, as appropriate.

4.1.7 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. Cancellation of the Filed Flight Plan (eFPL) will result in the removal of all related flight plan data from further flight plan processing.

4.1.8 An eASP that provides a Planning Service is expected to publish the fact, together with appropriate submission and addressing information, via its AIP.

4.2 PLANNING PROCEDURE

4.2.1 An operator wishing to obtain a Planning Service (see Figure 12) should submit, in accordance with the procedures described in 3.1, a Preliminary Flight Plan (PFP) to the eASP(s) that provide a Planning Service and from which it wishes to receive the service. It is therefore at the discretion of the operator to determine with which eASPs it considers it necessary to perform the negotiation or planning exchanges prior to filing the flight plan. For example, an operator may choose to perform the planning procedure with the most constrained eASP first. As an operator may perform planning with individual eASPs, and at different times, the operator should ensure that all updates to the Preliminary Flight Plan are provided to all eASPs either currently or previously engaged in the planning process for the concerned flight.



(see APPENDIX A – Key to Swimlane Diagrams)

Figure 12: Planning Procedure

4.2.2 In choosing the eASPs with which it wishes to perform the Planning Service, priority is expected to be given to the departure eASP (as it is the one that may or may not issue a departure clearance!), and any eASP along the route of flight where restrictions can be expected. An eASP which is many hours flying time away may not be able to offer much detailed feedback. Nevertheless any feedback can be useful to the operator. In addition, reception of the Preliminary Flight Plan by an eASP will allow it to assess, as early as possible, the expected traffic demand to serve Capacity Management processes. It is therefore recommended that the operator include all relevant eASPs that provide a Planning Service in a Planning Service request.

4.2.3 In principle there are no limitations placed upon the earliest time when a Preliminary Flight Plan may be provided. In practice however it is expected that individual eASPs may publish a limit in accordance with local conditions and ATM system capabilities.
The latest time that a Preliminary Flight Plan may be filed is only limited by the need to submit a Filed Flight Plan. Although a PFP may be accepted by the departure eASP shortly before the EOBT, the resulting Planning Status may provide a NON-CONCUR status with an indication that a Filed Flight Plan is overdue. The same response, when provided as a result of the re-evaluation process, will serve as a reminder to the operator that the eFPL has not yet been filed. The time in advance of the EOBT when such feedback may be provided will likely differ from one eASP to another depending upon local requirements for filed flight plan submission, as published via AIP. If the operator does not provide a Filed Flight Plan in due time the Preliminary Flight Plan will eventually contain an EOBT in the past. A PFP with an EOBT in the past, having already been declared a NON-CONCUR status, should be discarded.
PANS-ATM para 11.3.2 provides a minimum requirement for the provision of basic flight plan data for flow management procedures. This requirement can be achieved through the submission of either a Preliminary or Filed Flight Plan. However, the Planning Service, and Preliminary Flight Plan, are specifically intended for this purpose.

4.2.4 Having provided a Preliminary Flight Plan to the chosen eASPs the operator is expected to take into account the feedback provided such as, restrictions applicable to the route or airspaces concerned which have not been taken into consideration by the operator, any applicable ATFM measures and their impact (if known at the time) and the operational environment anticipated by the eASP such as runway-in-use and choice of SID/STARs. Having re-assessed its options the operator is then expected to modify the Preliminary Flight Plan, as may be required, in an attempt to reconcile the restrictions with its business needs to obtain an optimal flight plan. This process may necessitate several iterations to achieve a satisfactory result and to adapt as circumstances change.

4.2.5 An eASP should continue the evaluation process after having provided a first Planning Status feedback (see 3.5.7). The Preliminary Flight Plan is re-evaluated as necessary to determine whether or not its status may have changed due to changes in the operational environment; i.e. the ATM configuration. A change of status will be notified to the operator via the Planning Status response. It should however be noted that it is the responsibility of the operator to ensure that its flight plan remains consistent with the ATM configuration, restrictions and constraints. The re-evaluation process, where provided, simply assists in ensuring that consistency is maintained.

4.2.6 A Planning request, provided through the submission of a Preliminary Flight Plan, may contain the minimal content as described in Appendix C-2. Clearly the more information that can be provided the more meaningful will be the response. However, even minimal content; i.e. the intention to operate a flight from 'A' to 'B' at a particular date and time, is useful information for the eASPs and can provide feedback useful for the operator.

4.2.7 For example, an eASP serving a highly constrained airspace may respond even to minimal Preliminary Flight Plan information with an indication of restrictions and/or constraints that may apply to the flight based upon the departure or destination airports such as an arrival management process. For non-scheduled air transport operations or General Aviation, the response may contain an indication of airport slot compliance. Given minimal information; i.e. without route/trajectory data, some eASPs may have the capability to propose, within the Planning Status response, the optimal route (from the eASP perspective) within the airspace for which the eASP is responsible.

4.2.8 An eASP with the ability to propose an alternative route/trajectory, which may also include an alternative set of restrictions and constraints including traffic management constraints, may require the operator to respond to the proposal within a prescribed time, after which the proposal may no longer be available.

4.2.9 A GUFI shall be allocated by the operator to the first submission of an FF-ICE flight plan, normally the Preliminary Flight Plan, in accordance with the guidance provided in 3.7. The same GUFI should then be used for all communications concerning the same flight.

4.2.10 In order to facilitate consistency requirements, allowing an eASP and/or operator to ensure they are referring to the same information, the use of versioning and reference information as described in 3.8 is required.

4.2.11 The operator should ensure that a Preliminary Flight Plan is provided only to eASPs having published their provision of a Planning Service.

4.2.12 The Planning procedure, by definition, is intended to facilitate an exchange of information between the operator and the eASP concerning the intended operation of a flight. Rejection by an eASP of a Preliminary Flight Plan would not serve this purpose as it effectively refuses the dialogue before it has begun and removes the intent to operate the flight from the eASPs database. Rejection of a Preliminary Flight Plan is counter-productive. It is therefore recommended that the rejection of a Preliminary Flight Plan should be limited to cases where the data cannot be processed due to basic data errors or violation of database rules such as GUFI related errors.

4.2.13 The operator is encouraged to provide a "Desired" route/trajectory as described in B-3.1. This will receive a response from the relevant eASPs, perhaps including a Negotiating route/trajectory, to which the operator is then expected to respond, as required, by the submission of an update to the Desired route/trajectory.

The Planning Service supports the following message exchanges:

From Operator:	From eASP:
Preliminary Flight Plan Flight Plan Update Flight Cancellation	Submission Response Planning Status

4.3 PLANNING STATUS

4.3.1 A Planning Status response is provided by the eASP to the message originator (in addition to the Submission Response) to indicate the status of a Preliminary Flight Plan and, if applicable, any effective constraints with which the flight plan is non-compliant (see Figure 13). The Planning Status response is triggered under the following circumstances:

a) Following the acceptance by the eASP of a message (ACK Submission Response), to indicate the resultant status of the flight plan;

b) Following the Re-Evaluation (see 3.5.7) of the flight plan during which a change to the flight plan status has been detected;

c) The allocation of a constraint to the flight by the eASP.

4.3.2 If a received message is not accepted by the eASP, for whatever reason (REJ or MAN Submission Response), no Planning Status will be provided.

4.3.3 A successful manual intervention will result in a subsequent ACK Submission Response and a Planning Status. An unsuccessful manual intervention will result in a subsequent REJ Submission Response and no Planning Status.

(see APPENDIX A – Key to Swimlane Diagrams)

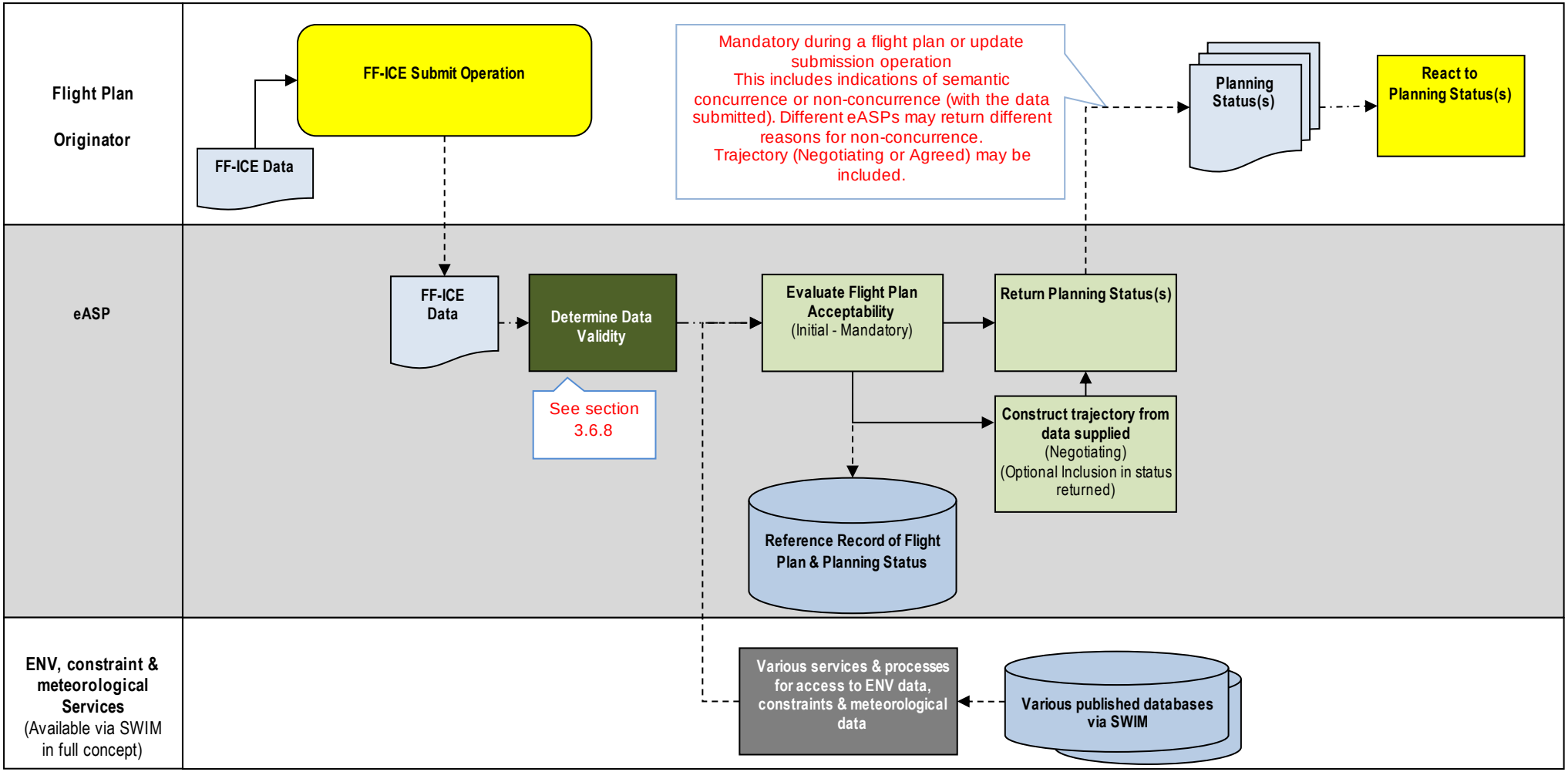


Figure 13: Planning Status Process

4.3.4 A Planning Status response should ideally be provided by an eASP as soon as possible and updated, as may become necessary, via the re-evaluation process. Under these circumstances a Planning Status may be provided by an eASP with or shortly after the Submission Response.

4.3.5 The first provision by an eASP of the Planning Status may be deferred if:

- the flight's planned time of entry into the eASP's area of responsibility is beyond the planning horizon of the eASP concerned;
- the eASP doesn't provide a re-evaluation process and therefore will wait until an optimum time when most restrictions likely to affect the flight are known.

4.3.6 The first Planning Status response (response to the submission of the Preliminary Flight Plan) should not be returned:

a) later than 3 hours before EOBT, provided the submission was delivered in due time. In providing a timely feedback, allowances should be made for the characteristics of the flight e.g., long haul versus short haul;

b) following reception of a Filed Flight Plan for the flight.

4.3.7 The Planning Status may provide feedback concerning any aspect of flight plan acceptability as described in 3.5.1. The detail will vary from one eASP to another as requirements and their relative importance will differ from one type of airspace to another. Normally the Planning Status will provide feedback concerning the route/trajectory. A Preliminary Flight Plan and Planning Update messages, which received a Submission Response of ACK, shall receive a Planning Status response. A Flight Cancellation will not receive a Planning Status (nor a Filing Status in the case where a Filed Flight Plan exists).

4.3.8 An illustration of the Planning response process is provided in Figure 14. There are three possible status indications that can be provided:

i. CONCUR — the flight plan and in particular the route and trajectory is acceptable without the need for modification. This should mean that if the flight plan were to be filed, it would be accepted.

It is worth noting however that although the route/trajectory complies with applicable restrictions it doesn't necessarily mean that all restrictions known by the eASP are also known and taken into consideration by the operator. There are two scenarios:

a) An applicable restriction is unknown to the operator but by chance the route/trajectory is compliant;

b) A restriction in the form of an ATFM measure or an arrival management process is applicable to the flight but due to the time at which the processing occurs the impact (constraint) is not yet known and therefore cannot be applied to the route/trajectory.

In case a) the restriction/constraint is not expected to be provided in the feedback by the eASP. The feedback provided by the eASP is typically not expected to include restrictions/constraints with which the route/trajectory is compliant. However,

judgement should be applied in cases where a restriction, while currently met, would not permit any significant changes. For example, if a flight plan is projected to clear a military airspace moments before it becomes active, then a delay of even a few minutes would cause it to have to deviate. It would be useful for the operator to know about that constraint, even though the current submitted route/trajectory based on the EOBT appears compliant.

In case b) reference to the applicable restriction is expected to be provided by the eASP, even if the impact is not yet known. Once the impact is known and applied to the route/trajectory it should be provided to the Operator in the form of a new Planning Status indicating the constraint, the appropriate route/trajectory (Negotiating or Agreed) and providing the resulting status in accordance with i, ii or iii. (Note that the allocation of a constraint does not necessarily modify either the route/trajectory or the status, for example, an "on-time" slot).

ii. NEGOTIATE — the flight plan, and in particular the route and trajectory, is acceptable and would be accepted if filed. However the route/trajectory determined by the eASP has included additional constraints and/or has applied ATM configuration factors such as runway-in-use or Met data which may have resulted in a route/trajectory that is different to the Desired route/trajectory. The operator is expected to assess the feedback and determine whether or not it wishes to amend its Desired route/trajectory. If filed without change, it may lead, in some cases, to a clearance being received by the pilot that was not expected.

iii. NON-CONCUR — the flight plan does not comply with published airspace/route availability or published restrictions and would result in a rejection or an unacceptable status if the flight plan were to be filed.

4.3.9 A Planning Status response may include a Negotiating route/trajectory provided by the eASP as an indication of the route/trajectory the flight is proposed to fly within the airspace of the eASP. It may therefore cover only a part of the complete route/trajectory of the flight. Where applicable, the Negotiating route/trajectory will provide a detailed indication of the effective flight constraints that apply to the flight. The Negotiating route/trajectory is provided as a proposal to the operator, and may include a Respond-By time if a resource is being reserved pending a response. If the appropriate response has not been received within the Respond-By time limit provided, the conditions under which the Negotiating route/trajectory is proposed may no longer be available or valid. On reception of a Negotiating route/trajectory the operator is at liberty to either use or ignore the proposal in favour of its own procedures for route/trajectory determination. The provision of a Negotiating route/trajectory by the eASP is appropriate for a status response of NEGOTIATE or NON-CONCUR.

4.3.10 A Planning Status response may include an Agreed route/trajectory provided by the eASP as an indication of the route/trajectory on record with the eASP. In nominal circumstances it is provided with a status response of CONCUR, indicating the trajectory the flight would be expected to fly as determined by the eASP. It may however be provided with a status response of NON-CONCUR thereby facilitating the operator in determining why the eASP has assessed the route/trajectory as non-compliant.

4.3.11 An eASP may provide a NON-CONCUR response if the proximity of the EOBT is such that a Filed Flight Plan should already have been submitted for the flight.

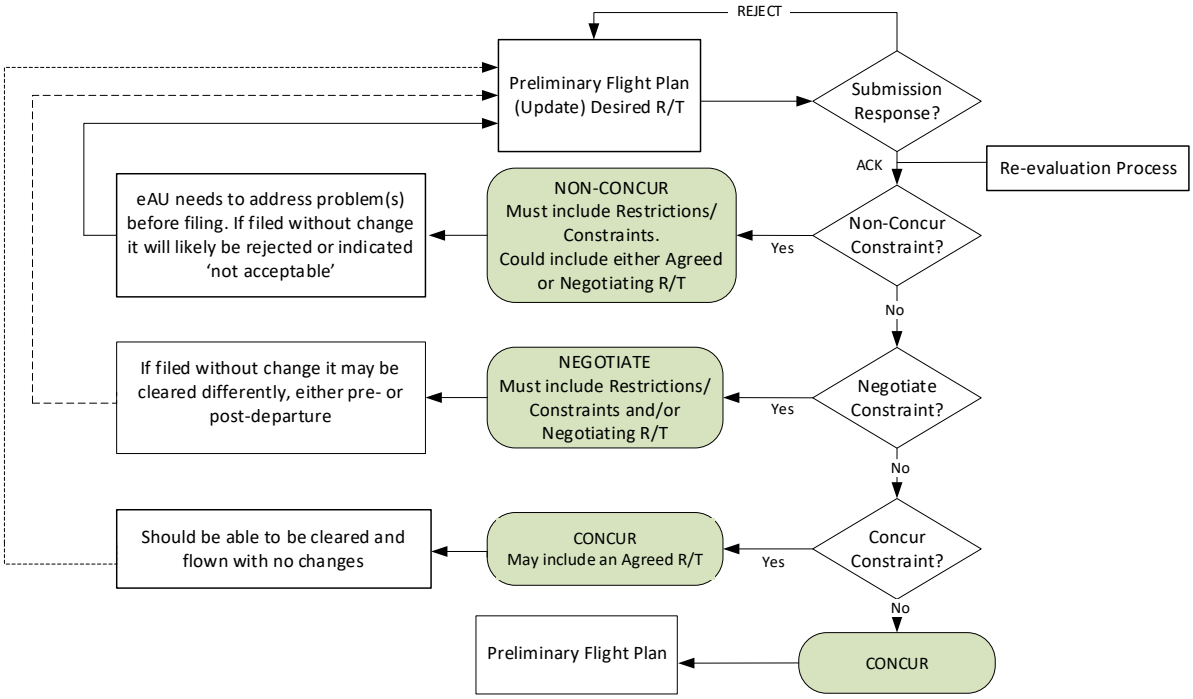


Figure 14: Planning Status & Response Procedure

4.4 FLIGHT PLAN UPDATE

4.4.1 The procedures related to the modification of a Preliminary Flight Plan are practically the same as those related to the modification of a Filed Flight Plan, only the list of concerned eASPs may differ, and of course a Preliminary Flight Plan is never provided to non-FF-ICE enabled ASPs.

4.4.2 See section 6.4 for a detailed description of the procedures related to flight plan updates.

4.5 FLIGHT CANCELLATION

4.5.1 The procedures related to the cancellation of a Preliminary Flight Plan are practically the same as those related to the modification of a Filed Flight Plan, only the list of concerned eASPs may differ, and of course a Preliminary Flight Plan is never provided to non-enabled ASPs.

4.5.2 See section 6.5 for a detailed description of the procedures related to flight cancellation.

5 TRIAL SERVICE

5.1 GENERAL

5.1.1 The Trial service is an optional service provided by an eASP. It offers a very similar service to the Planning Service but with the important exception that the request is treated by the eASP as a separate, standalone transaction which has no impact on existing data.

5.1.2 A Trial request may be submitted to evaluate an alternative to an existing flight plan, either Preliminary or Filed. Existing flight plan data will not be modified as a result of a Trial Request. The eASP receiving a Trial request is not expected to retain information related to the request and therefore will not be in a position to offer further information or consultation concerning a Trial Request. Note that an eASP receiving a Trial request may or may not be aware of the previously submitted flight plan, since the Trial Request could involve a proposed routing into airspace not along the original route of flight.

5.1.3 An operator can use the Trial procedure to perform one or many “what-if” type of investigations for an existing flight. It is possible that local implementations may limit, via an automated system response, the number or frequency with which Trial Requests will be accepted either for a single flight or generally (see 2.5.2.4).

5.1.4 The Trial service should not be used for long term planning such as a tool to maintain a route catalogue; it is a service intended to evaluate alternatives for a flight, either Preliminary or Filed, intended within the time limits established by PANS-ATM 17.4.2.3.

5.2 TRIAL PROCEDURE

5.2.1 The Trial service supports the following message exchanges:

From Operator:	From eASP:
Trial Request	Submission Response Trial Response

An illustration of the Trial procedure is provided in Figure 15.

5.2.2 The Trial service is initiated through the submission of a Trial Request, normally by the operator, to the relevant eASP(s) in accordance with the procedure published by the eASP(s) concerned.

5.2.3 A Trial Request may contain the minimal content as described in AppendixC-6.

5.2.4 A Trial Request that relates to an existing Preliminary or Filed Flight Plan should contain the GUFI. This will assist the eASP that already received the existing Preliminary of Filed Flight Plan, to ensure that the same flight is not considered twice when assessing the impact of the request. A Trial Request that does not relate to an existing Preliminary or Filed Flight Plan is not required to contain a GUFI.

5.2.5 As a Trial Request is a standalone operation with no impact upon the existing flight data there is no consistency requirement and therefore no need to provide or maintain an operator flight plan version indication.

5.2.6 The originator of the Trial Request should ensure that it is provided only to eASPs and only to those that are relevant to the flight, as proposed in the request, and that have published their provision of a Trial service. In order to evaluate a change of route, a Trial request may be provided to an eASP that did not receive the Preliminary or Filed Flight Plan.

5.2.7 The route/trajectory provided in a Trial Request shall be a Negotiating route/trajectory as described in B-3.1.

5.2.8 An eASP, having received a Trial Request, will perform the same evaluations as those performed for a Preliminary or Filed Flight Plan and will respond by providing the Submission Response and Trial Response. The Trial Response process is identical to that of the Planning Status response (see 4.3) with the exception that a Trial Response will never contain an Agreed Route/Trajectory, only a Negotiating Route/Trajectory.

5.2.9 The originator of the Trial Request, on reception of a Trial Response, is expected to associate the response to its originating request using the Message Identifier data item. As a GUFI is not mandatory in a Trial Request (see 5.2.4) it cannot always be used as a sole means of association. In addition, where multiple requests may have been provided for the same flight, use of the GUFI alone will not resolve the association of a response to its request.

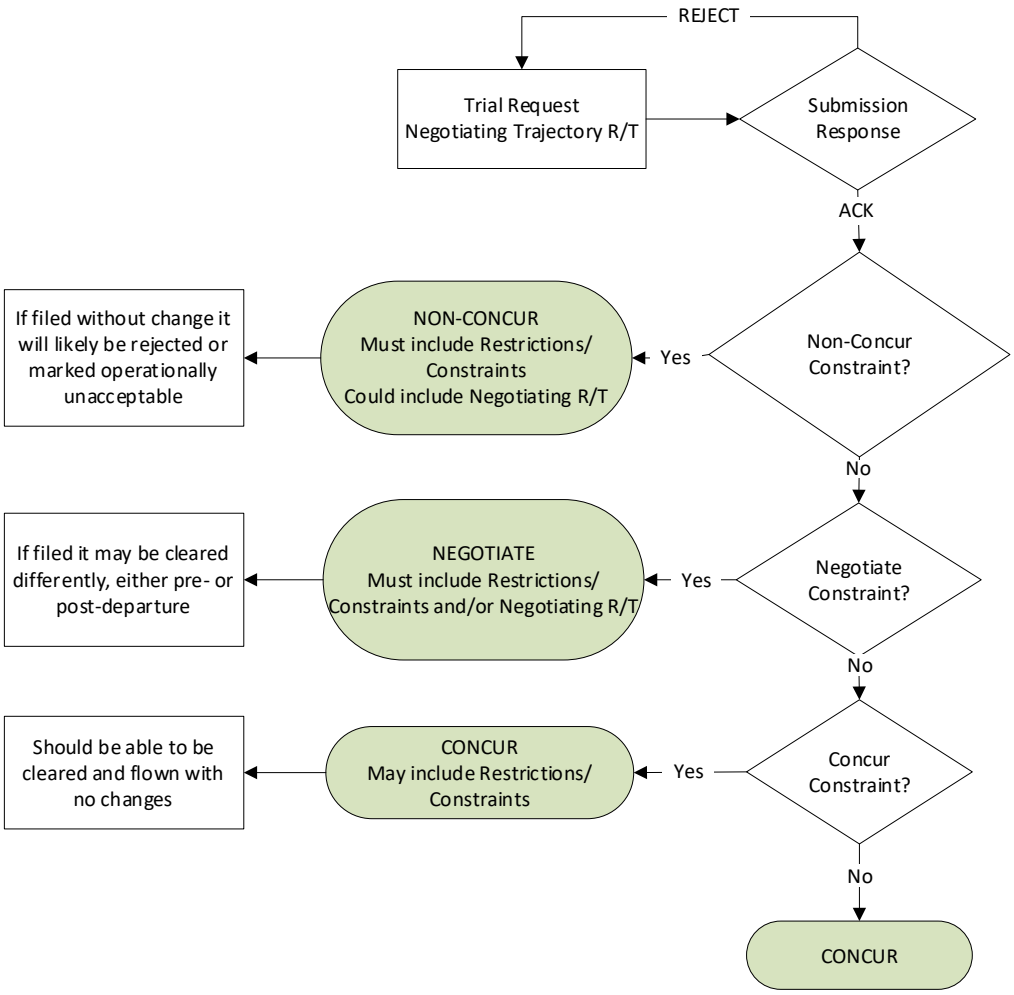


Figure 15: Trial Request & Response Procedure

6 FILING SERVICE

6.1 GENERAL

6.1.1 The flight plan filing service is a mandatory service provided by an eASP which enables an operator to submit the necessary information, and any subsequent updates, in order to obtain air traffic services.

6.1.2 The existence, or not, of a Preliminary Flight Plan and the status of such a Preliminary Flight Plan does not restrain the eAU in proceeding to the filing procedure. The operator is at liberty to submit a Filed Flight Plan that could differ from the last version (see 3.8) of the Preliminary Flight Plan. However, when supported by the Planning Service, the Filed Flight Plan is more likely to be feasible and acceptable, both to the ATM services and to the operator.

6.1.3 An operator should take care to ensure a flight plan is filed in due time, in accordance with the published minimum and maximum time criteria. Engagement in Planning does not fulfil the need to file a flight plan, nor does it fulfil the applicable timing requirements for the provision of a Filed Flight Plan.

6.1.4 Once a flight plan has been filed it will become the reference for all ATM processes concerning that flight. If a Preliminary Flight Plan existed prior to filing it will become irrelevant once filing has been successfully achieved. Attempts by the operator to engage further in planning activities concerning a Preliminary Flight Plan once filing has occurred will be rejected by the eASP. If an operator wishes to determine the impact of potential changes to a Filed Flight Plan it should, if the service is available, submit a Trial Request.

6.2 FILING PROCEDURE

6.2.1 An eFPL should be filed (see Figure 16) in accordance with the appropriate submission method as described in 3.1.1 and should contain the necessary data items as described in AppendixC-4.

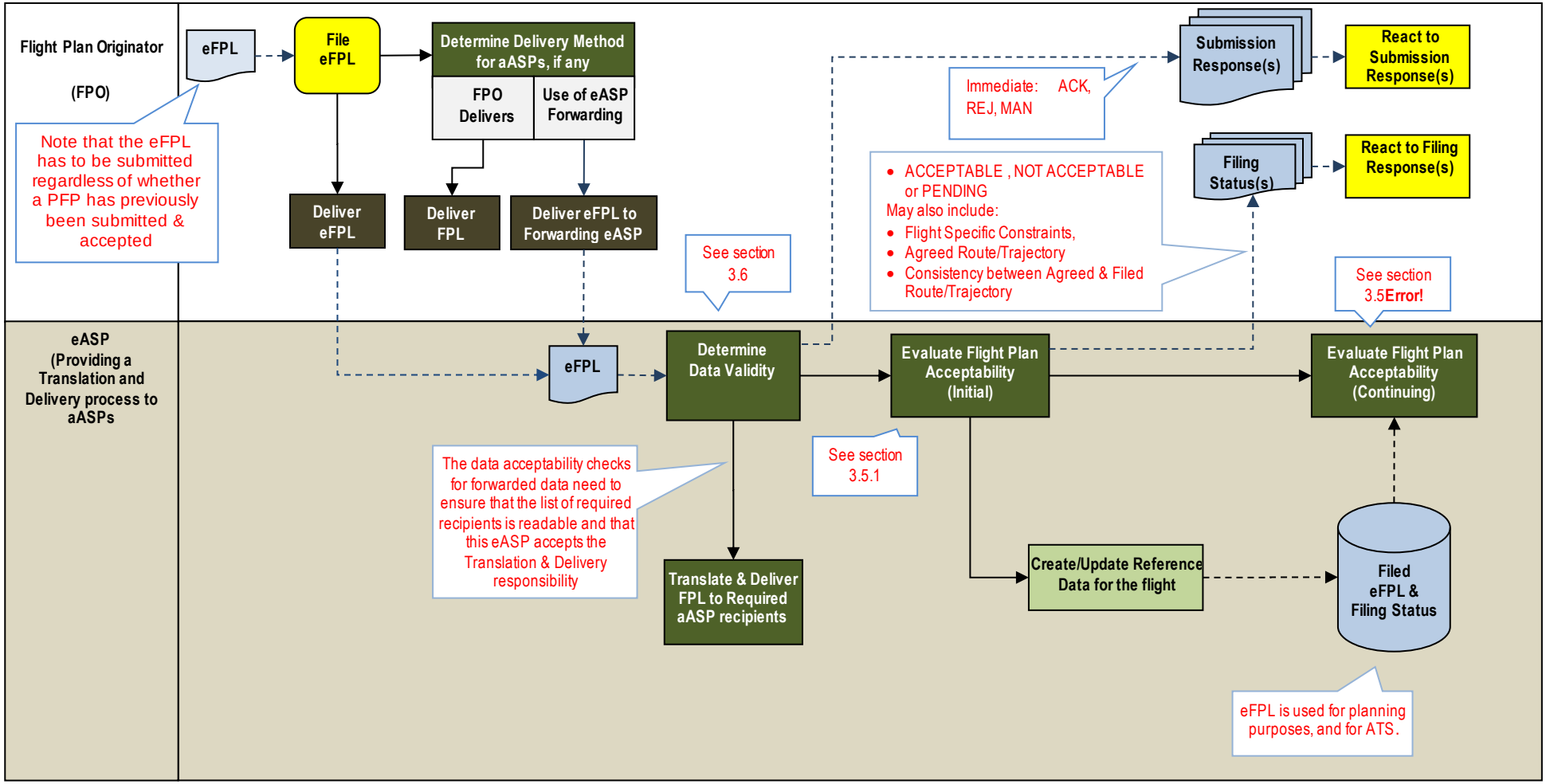
6.2.2 In submitting the Filed Flight Plan in accordance with 3.1.1 the operator should ensure that the list of addressees includes all relevant addressees; i.e. in addition to the relevant eASPs (who may or may not have been provided with a Preliminary Flight Plan) it should also include any ASPs that need to receive the FPL format.

6.2.3 An eASP, having received a Filed Flight Plan (eFPL), is expected to evaluate it in accordance with the guidance provided in 3.5. and to provide the appropriate feedback as described in 3.6.8. (Submission Response) and 6.3 (Filing Status). An eASP that provides a re-evaluation process (3.5.7) should continue the provision of Filing Status feedback, as appropriate.

6.2.4 An operator, having received the feedback in the form of the Submission Response or Filing Status is expected to react to the information provided as necessary by updating the Filed Flight Plan to address identified restrictions/constraints.

6.2.5 The Filing procedure supports the following message exchanges:

From Operator:	From eASP:
Filed Flight Plan (eFPL) Flight Plan Update Flight Cancellation	Submission Response Filing Status



(see APPENDIX A – Key to Swimlane Diagrams)

Figure 16: Filing Procedure

6.3 FILING STATUS

6.3.1 A Filing Status response is provided by the eASP to the message originator under the following circumstances:

a) Following the reception and acceptance by the eASP of a message (ACK Submission Response), to indicate the resultant operational status of the flight plan;

b) Following the Re-Evaluation (see 3.5.7) of the flight plan during which a change to the flight plan status has been detected;

c) The allocation of a constraint to the flight by the eASP.

Note: In case a) if a received message is not accepted by the eASP, for whatever reason (REJ Submission Response), no Filing Status will be transmitted.

6.3.2 A Filing Status response provides the result of an evaluation (see 3.5) performed by the eASP. If the flight plan has been received by the eASP at a time which is in advance of its processing horizon[6] for the flight, the eASP may defer its evaluation and notify the operator accordingly (see 6.3.11). The first evaluation (and the first non-Pending Filing Status response) should be performed no later than 3 hours before EOBT, provided the submission was made in due time.
An eASP that provides a Re-evaluation process would normally provide an immediate Filing Status response knowing that any subsequent changes will also be notified.

6.3.3 The Filed Flight Plan and Flight Plan Update messages which received a Submission Response of ACK, shall receive a Filing Status response. A Flight Cancellation will not receive a Filing Status response.

6.3.4 An illustration of the Filing Status response is provided in Figure 17. There are three possible status indications that can be provided within a Filing Status response:

i. ACCEPTABLE — the flight plan, and in particular the Desired route/trajectory, is acceptable.

It is worth noting however that although the route/trajectory complies with applicable restrictions it does not necessarily mean that all restrictions known by the eASP are also known and taken into consideration by the operator. There are two possibilities:

a) a restriction exists which is applicable, is unknown to the operator, but by chance the route/trajectory is compliant; and

b) a restriction in the form of an ATFM measure or an arrival management process is applicable to the flight but due to the time at which the processing occurs the impact is not yet known and therefore cannot be applied to the route/trajectory.

[6] The amount of time in advance of a flights expected entry into an eASPs area of interest, when the eASP is able to process and evaluate the flight data against the ATM configuration

In case a) the restriction is not expected to be provided in the feedback by the eASP. The feedback provided by the eASP is not expected to typically include restrictions with which the route/trajectory is compliant. However judgement should be applied in cases where a restriction, while currently met, would not permit any significant changes. For example, if a flight plan is projected to clear a military airspace moments before it becomes active, then a delay of even a few minutes would cause it to have to deviate. It would be useful for the operator to know about that constraint, even though the current submitted route/trajectory based on the EOBT appears compliant.

In case b) reference to the applicable restriction is expected to be provided by the eASP, even if the impact is not yet known. Once the impact is known and applied to the route/trajectory it should be provided to the Operator in the form of a new Filing Status indicating the constraint and providing the resulting status in accordance with i or ii. Note that the allocation of a constraint does not necessary modify either the route/trajectory or the status, for example, an "on-time" slot.

ii. NOT ACCEPTABLE — the flight plan, typically the route/trajectory, does not comply with operational requirements.

iii. PENDING — the flight plan has not yet been evaluated by the eASP.

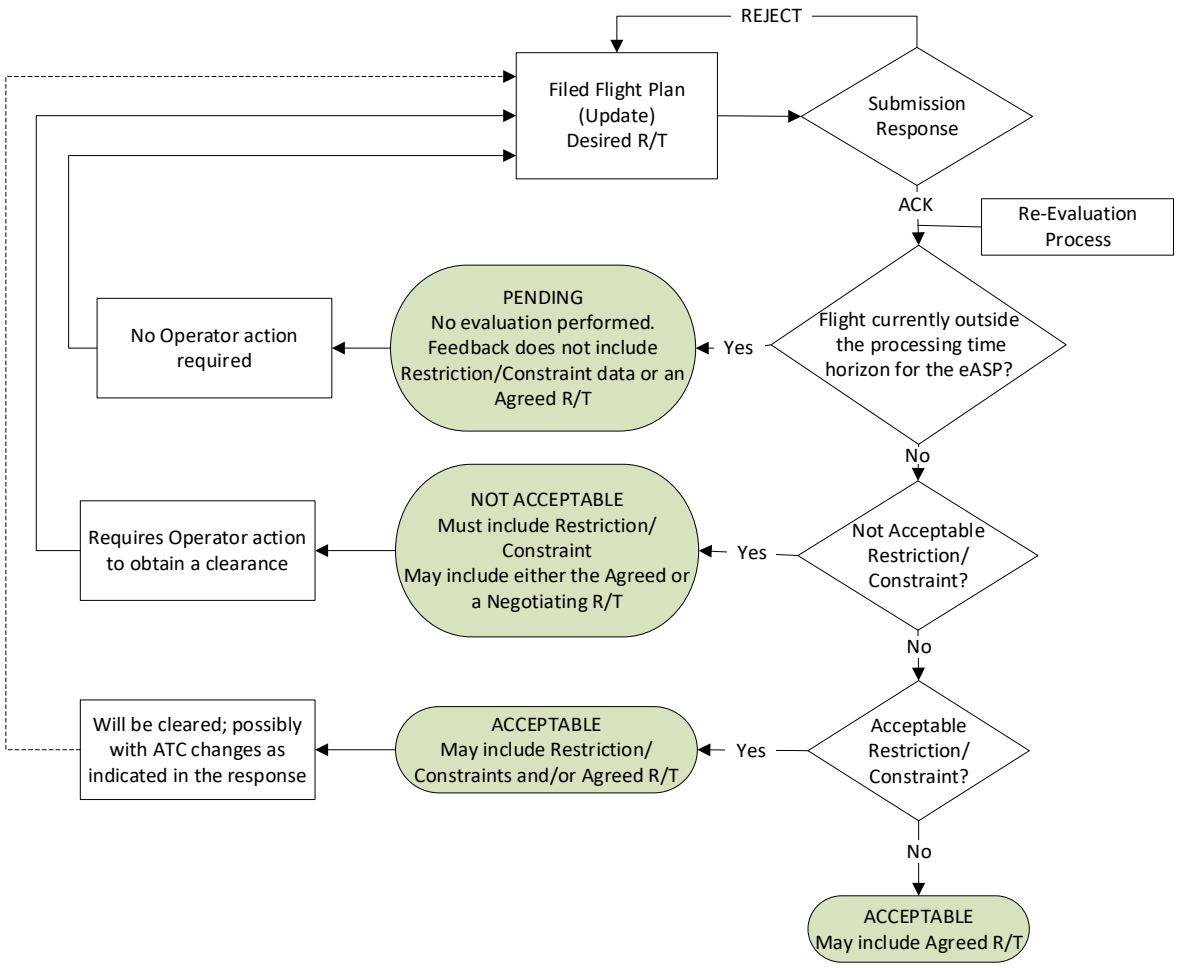


Figure 17: Filing Status & Response Procedure

6.3.5 A Filing Status response with a status of ACCEPTABLE will mean that the two trajectories, the Agreed Route/Trajectory determined by the eASP and the Desired Route/Trajectory provided by the operator in the Filed Flight Plan, are within acceptable limits for the eASP concerned (see 6.3.6 for an exception condition). An overview of the Filing Status feedback is provided in Table 1.

The meaning of "acceptable limits" may differ from one eASP to another depending on local factors, such as the type of airspace concerned. Ideally any differences between the two trajectories should be sufficiently small so as not to be visible within the Field 15 format route description; i.e. the trajectories may be slightly different but the Field 15 format route description should be unaffected by the difference. The acceptable limits should be objectively definable and consistently applied within an eASP.

The Filing Status response may include the Agreed Route/Trajectory, which provides the operator with an indication of the trajectory the eASP anticipates the aircraft will fly within its area of responsibility. While the operator is not obliged to react to the Agreed route/trajectory, if provided, it is recommended that the operator assesses any differences with a view to improving flight efficiency. To assist in this process, and to help distinguish this case from the case described in 6.3.6, the Trajectory Purpose data item may be provided by the eASP in the Filing Status response with the indication "SYNC". This informs the operator that the Agreed R/T is being provided as a means of enabling the operator to synchronise its trajectory with that of the eASP eliminating, as far as possible/practicable, any 'within-acceptable-limits' differences regarding applicable constraints and details of eASP predictions. Synchronising trajectories is one of the main objectives of trajectory based operations allowing both the operator and the ATM functions to obtain the benefits that improved predictability can provide in terms of flight efficiency and ATM resource management.

6.3.6 An eASP may have local agreements or procedures in place which allow it to unilaterally assign a route to a flight. The Agreed route/trajectory returned by the eASP will provide the route/trajectory the operator is expected to fly within the airspace of the eASP which, in this case, may be significantly different to the submitted Desired route/trajectory. The operator will therefore be required, in accordance with the local procedures, to take the Agreed route/trajectory information into consideration making sure it is provided to the pilot. In order to assist the operator in identifying when such a procedure has been applied by the eASP, and to distinguish this case from the one described in 6.3.5, the Trajectory Purpose data item may be provided, in accordance with the local agreement, with the indication "ATC CHANGE". The 'ATC CHANGE' flag indicates that a significant modification has been applied by the eASP to the route, that is, a modification that would affect the ATC clearance, such as a change to the lateral route description. It should be noted that the Agreed route/trajectory provided by an eASP may cover only a part of the complete route/trajectory of the flight.

6.3.7 Use of the Trajectory Purpose indication by an eASP is primarily intended to assist an operator to readily identify the scenario described in 6.3.6. Although an analysis of the Agreed route/trajectory will also reveal any differences between the Agreed trajectory and the Desired or previously Agreed route/trajectory, initial implementors may not have the ability to make such an analysis of complete trajectory information. In addition, the ability to distinguish between the two types of change, as described in 6.3.5 and 6.3.6, is more easily achieved by the originator of the change. Nevertheless, it should also be noted that use of the Trajectory Purpose indicator by an eASP is advisory and the operator remains responsible to ensure that feedback provided by the eASP is taken into consideration and acted upon, as necessary.

6.3.8 A Filing Status response with a status of NOT ACCEPTABLE indicates that the flight plan is operationally inconsistent with the ATM configuration and/or with restrictions applicable to the flight. The response will indicate the inconsistency and the applicable restriction.

6.3.9 An operator is expected to react to a NOT ACCEPTABLE status by making the necessary changes and submitting a Flight Plan Update, as required. In determining the best solution the operator may, if available, make use of a Trial Request(s). In certain circumstances, such as close proximity to the EOBT, the operator may be unable to respond to a NOT ACCEPTABLE status indication provided by the departure eASP. In such circumstances the problem will be resolved by FF-ICE post-departure procedures if available, or tactically by ATC. However, it needs to be understood that such a scenario will represent an additional workload for both the controller(s) concerned and pilot, a less efficient flight operation and, depending upon circumstances, may adversely affect downstream units and the arrival planning at the destination aerodrome. While making allowance for a short notice change of status, as described above, an ASP may take measures to refuse start-up clearance to a flight that has been informed of a change of status in sufficient time but has failed to act on the information. The meaning of “sufficient time” may differ from one ASP and airport to another depending on local factors. A fully coordinated airport with a complete A-CDM process in place may be able to accommodate late changes to the flight plan better than a non-coordinated airport. Typically “sufficient time” would be understood to mean more than one hour in advance.

6.3.10 Local procedures may also include the ability for an eASP to provide, as the outcome of a re-evaluation process, an alternative, proposed, route/trajectory in the form of a Negotiating R/T potentially including constraints and possibly a Respond-By time, indicating the time limit after which the proposal may no longer be available. Typically such a proposal would have been triggered by a re-evaluation result of NOT ACCEPTABLE, and therefore provides a possible solution. It is at the operator’s discretion to either make use of the proposal made by the eASP or to determine an alternative preferable solution.

6.3.11 A Filing Status response with a status of PENDING indicates that the eASP is unable to perform an evaluation of the flight plan at the current time. Normally this may occur if the flight plan has been received by the eASP at a time which is in advance of its processing time horizon for the flight. Once the flight is within the processing horizon of the eASP, evaluation will be performed and the Filing Status updated accordingly. A Filing Status response with a PENDING status may indicate the time at which the flight plan is expected to be evaluated (Expected Evaluation Time), and the Filing Status updated.

Table 1 Filing Status Response to eFPL Filing or Update

Processing Result	Filing Status	eASP Feedback	Trajectory Purpose	eAU Response
Compliant - may or may not have included changes to the ATM configuration inc. applicable restrictions/constraints	***Acceptable***	None	Not provided- not imperative to return a R/T.	No action required.
		Agreed R/T	***Synch***- The R/T on record showing applicable constraints and details of eASP predictions. Route is consistent with eAU submitted route but R/T details may differ.	No action is required from the operator. However, it is always recommended that the eAU takes note of the R/T on record with the eASP together with its restrictions & constraints, re-computes and updates its Desired R/T accordingly.
		Agreed R/T	***ATC Change-*** The R/T on record that is modified from eAU submitted R/T to comply with all restrictions/constraints. It contains required elements (e.g. required reroute; controlled departure time; required altitude).	Action required. The operator needs to be aware of the changes and make the necessary adjustments to the operational flight plan. In addition, the eFPL should also be updated to ensure that all relevant eASPs are aware of the R/T and to ensure that the latest operator version number reflects the correct information, consistent with the operational flight plan.
Not Compliant- a restriction/constraint is not complied with or other flight plan data is inconsistent with the submitted R/T: violated business rules e.g. CNS incompatibility	***Not Acceptable***	None	Not provided- not imperative to return a R/T. The violated restriction/constraint will be indicated in the error message.	Action required. The operator is required to take note of the indicated errors, re-compute its Desired R/T as required and update its flight plan accordingly.
		Agreed R/T	**Synch-** The R/T on record showing applicable restrictions/constraints, some of which are not met. Route is consistent with eAU submitted route but R/T details may differ.	Action required. The operator is required to take note of the indicated errors, re-compute its Desired R/T and update its flight plan accordingly. In doing so it may consult the R/T on record with the eASP.
None - Processing not yet performed	***Pending***	None	Not provided	No action required. The message may provide an indication of the time at which the flight plan is expected to be processed by including the Expected Evaluation Time.

6.4 FLIGHT PLAN UPDATE

6.4.1 Submission

6.4.1.1 In order to modify flight plan information, an operator should submit a Flight Plan Update.

6.4.1.2 A Flight Plan Update should be submitted using the same procedure as that used to submit the corresponding flight plan (Preliminary or Filed), as described in 3.1.

6.4.1.3 A Flight Plan Update should be provided to all eASPs having received the Preliminary Flight Plan or, if a Filed Flight Plan has been submitted, to all eASPs having received the Filed Flight Plan, as appropriate.

6.4.2 Procedure

6.4.2.1 A Flight Plan Update may be used to update either a Preliminary Flight Plan or a Filed Flight Plan. As a Preliminary Flight Plan is effectively replaced by a Filed Flight Plan, an eASP will apply an update to the appropriate data as required. It should be noted that the transition from Planned to Filed cannot be achieved via an update. The filing procedure requires submission of complete flight plan information in the form of an eFPL, regardless of the existence of a Preliminary Flight Plan.

6.4.2.2 A Flight Plan Update may be used to update all items that may be included in a Filed or Preliminary Flight Plan except:

a) The GUFI assigned to the flight; and

b) The aircraft identification.

Many ATS systems globally are unable to support a modification to the aircraft identification as it is used as a unique key in accessing the flight data. Use of FF-ICE will not automatically overcome these processing limitations. While Preliminary Flight Plans will not be translated into FPL 2012 (only eASPs will receive Preliminary Flight Plans), initially the same system limitations regarding modification of the aircraft identification may exist. Therefore, global acceptability of aircraft identification modification for a Preliminary Flight Plan cannot be guaranteed. However, nothing precludes a local system(s), capable of accepting aircraft identification modifications, to continue to do so using FF-ICE services for flights that are conducted entirely within their area(s) of responsibility.

6.4.2.3 A Flight Plan Update may be used for the removal of a previously provided flight data item(s), provided the item is not mandatory.

6.4.2.4 Flight plan data items, other than those listed under 6.4.2.2, that are mandatory in a Flight Plan Update (such as the Destination aerodrome) may be modified but not removed.

6.4.2.5 When updating or removing data from a flight plan, care should be taken to ensure that the resultant flight plan remains consistent; i.e. that individual data items are consistent

with each other. Failure to do so may lead to a lengthy cyclic process as some errors or inconsistencies may only become visible once others have been resolved.

Examples:

- When updating the route/trajectory of a flight, the estimated elapsed time information should be updated to correspond to the new route;
- Updating the aircraft type should normally be accompanied by an update of aircraft registration, possibly equipment and/or capabilities and other aircraft-related data items;
- Updating the aircraft type should normally be accompanied by an update of the performance and trajectory data.

6.4.2.6 All updates to data items in a Filed Flight Plan that have an equivalent data item in the FPL format (see chapter 12) should also be transmitted to relevant aASPs in the form of a Modification Message (CHG), as defined in Appendix 3 of the ICAO Doc 4444.

6.4.2.7 There may be modifications to data items that are specific to the eFPL, such as Dangerous Goods or Airport Slot information, or trajectory modifications that have no impact on the Item 15 route description. Such changes should only be transmitted to eASPs. If a CHG message were to be created in such circumstances the aASP would receive a modification message that changes nothing!

For example, Figure 18 illustrates a modification to the anticipated departure procedure within the route/trajectory. If the SID/STAR information is not included in the Field 15 route description such a change will not be visible in a Modification Message (CHG).

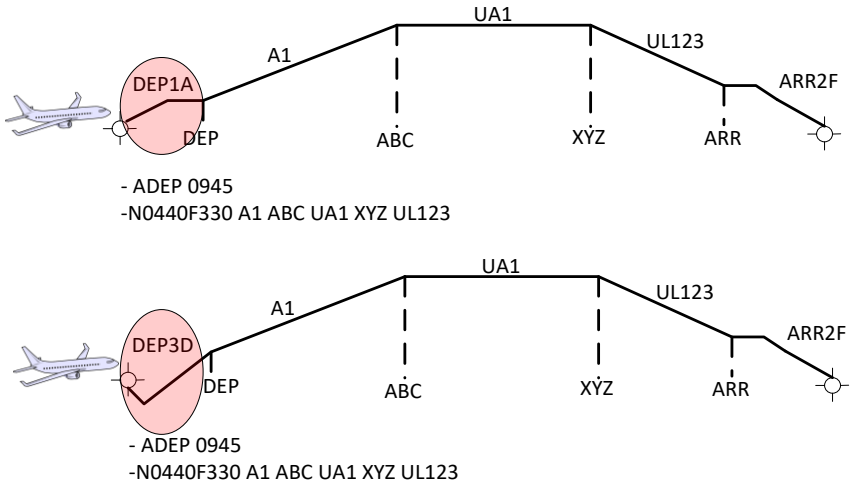


Figure 18: Field 15 Vs Trajectory

6.4.2.8 When a route update leads to new eASPs becoming concerned with the flight, then:

- The modified data should be provided within a Flight Plan Update/CHG to eASPs/aASPs that have already received the Flight Plan, as appropriate;

- The complete set of flight plan data should be provided as an eFPL/FPL, as appropriate, to the new ASPs that have become concerned with the flight;
- The List of Recipients for each type of message should be updated/built correspondingly.

6.4.3 Content

6.4.3.1 A Flight Plan Update shall include the data items as described in Appendix C-9.

6.4.3.2 A Flight Plan Update should contain the same GUFI as the Preliminary/Filed Flight Plan to which it refers.

6.4.3.3 In order to assist in message association processes an update to any of the departure, destination or EOBT information is achieved by indicating the new values that need to be applied in addition to providing the existing values (prior to the update), which are mandatory.

6.4.3.4 The Flight Plan Version (see 3.8) in a Flight Plan Update shall be a unique value for the subject GUFI; i.e. no previous Preliminary or Filed Flight Plan submission for the GUFI should have had the same version.

6.4.3.5 The flight plan version should be incremented by the operator each time a Flight Plan Update is submitted.

6.4.3.6 A Flight Plan Update is only required to contain those items that have changed (in addition to the mandatory items specified for an Update message); i.e. it is not necessary to resend complete flight data. Data items that were included in the previous version of the flight plan and have not been included in the Flight Plan Update will remain unchanged. This means that a mechanism is required to identify when a flight plan data item is to be deleted.

6.4.3.7 Systematic repetition of complete flight plan data, either in the form of a second flight plan submission or within an Update message, is not a recommended practice. It can place an unknown burden upon networks and creates undue complexity for both software and operational personnel if there is a need to translate into CHG messages for non-enabled ASPs. Re-submission by the operator of the flight plan as a complete replacement of existing data should be used only when the recipient is more than one version behind, has the flight in an unknown state after a system or communications failure, has never received the flight plan because it was previously not relevant, or route update leads to new ASPs becoming concerned with the flight and the message submission is performed according to Scenario 2 or Scenario 3.

6.4.3.8 An eASP may publish threshold modification values that should trigger the transmission of an update. For example, to what extent should a route/trajectory change, before an updated trajectory should be sent. As a minimum, the criteria used in determining the need to update a FPL should also be applied to the eFPL.

6.4.3.9 Individual elements within a repeating sequence of elements such as those found within a route/trajectory group or a climb/descent performance profile cannot be modified or deleted. The entire group must be updated as required.

6.4.4 Evaluation by eASP

6.4.4.1 Taking into consideration the requirements specific to the Update message as described in 6.4.2, an eASP should evaluate a Flight Plan Update against the same set of criteria (see 3.5) as a Preliminary or Filed Flight Plan, as appropriate. The correct application of flight plan versioning and sequencing as described in section 3.8 should also be assessed.

6.4.4.2 The evaluation process should include the complete flight plan data set including both, items that have been updated and items that have remained unchanged. Items that remained unchanged will be copied from the previous flight plan data received for the flight.

6.4.4.3 An eASP should respond to a Flight Plan Update by providing a Submission Response (see 3.6.8) and either Planning (see 4.3) or Filing Status (see 6.3), as applicable.

6.4.4.4 Flight Plan Updates that attempt to remove mandatory data items should be rejected.

6.4.4.5 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. It should not be sent a Flight Cancellation, as the flight has not been cancelled. The flight will still take place so a cancellation message is wrong and misleading. It is incumbent upon the eASP to determine that the flight is no longer relevant.

6.5 FLIGHT CANCELLATION

6.5.1 Submission

6.5.1.1 In order to cancel a flight plan (Preliminary or Filed as appropriate), an operator should submit a Flight Cancellation message.

6.5.1.2 A Flight Cancellation should be submitted using the same procedure as that used to submit the corresponding flight plan (Preliminary or Filed), as described in 3.1.

6.5.1.3 A Flight Cancellation should be provided to all eASPs having received either the Preliminary or Filed flight plan, as appropriate.

6.5.2 Procedure

6.5.2.1 A flight cancellation message should contain the data items as described in Appendix C-8.

6.5.2.2 A flight cancellation will terminate operational use of the GUFI and further processing of any instances of the flight plan (Preliminary and Filed). Any further correspondence (other than for historical archive purposes) with respect to the flight and/or the GUFI will fail.

6.5.2.3 A cancelled flight cannot be re-instated and the GUFI from a cancelled flight cannot be either re-instated or re-used.

6.5.2.4 Once a flight has been cancelled, if the operator subsequently decides to operate the flight, a new flight plan with a new GUFI will need to be submitted.

6.5.2.5 An operator, having submitted a cancellation message, should receive only a Submission Response. Planning or Filing Status messages are not returned for a cancellation message.

7 NOTIFICATION SERVICE

7.1 GENERAL

7.1.1 The Notification service is intended to notify relevant eASPs or eAUs of significant events in the life cycle of the flight. 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 provided by the notification service is significant in the further processing of the flight within the ATM system and therefore the provider of the information needs confirmation that the information has been received, just as the filing of a flight plan receives a confirmation response.

7.1.2 There are two events currently defined to be notified via the Notification service: the departure and arrival notifications, which equate to the ATS messages DEP and ARR. Although these two events are, by definition, post-departure their inclusion is considered to be advantageous to early FF-ICE implementers giving them the ability to exchange departure and arrival information within the FF-ICE environment rather than reverting to the Aeronautical Fixed Service (AFS).

7.1.3 The provision of departure and arrival information is often subject to local and/or regional agreements between ASPs and operators. These agreements may, depending upon local circumstances and FF-ICE deployment planning amongst concerned actors, dictate that sole use of the Notification service for departure and arrival notification cannot be achieved at the same time and that use of the DEP and ARR messages via the AFS may need to continue for a specified period. Therefore, while the ICAO provisions related to the dissemination of departure and arrival information remain applicable, the use of the Notification service to meet those requirements is currently defined as optional.

7.2 FLIGHT DEPARTURE

7.2.1 A Flight Departure Message (see Appendix C-12) can be used in any situation where a DEP message would have been used per PANS-ATM 11.4.2.2.6, if the relevant parties have agreed. Otherwise, the DEP message described in PANS-ATM Appendix 3 should be used.

7.2.2 The content of the FF-ICE Flight Departure message is equivalent to the DEP message, with the addition of the GUFI. The GUFI and other key fields (Aircraft Identification, Departure, Destination, and EOBT) are used to associate the departure message to a specific flight plan, see section 3.7.

7.2.3 The actual departure time should, for consistency, reflect the Wheels-Off time of the flight. However, in practice it is recognized that departure times are recorded by a number of different automated and manual means which do not always refer to the same event or location and often are only available to the nearest minute.

7.2.4 The Flight Departure Message can resolve any ambiguity by indicating the specific event and location on an aerodrome to which the reported departure time refers, such as Off-Block or Wheels-Off.

7.2.5 An eASP having received a departure notification will respond with only a Submission Response.

7.2.6 It is possible that a departure notification can raise an issue(s) with the operational acceptability of the resultant route/trajectory, in case of a delayed departure for example. Any such issue(s) will be notified and resolved via procedures that are applicable in the post-departure phase of flight.

7.3 FLIGHT ARRIVAL

7.3.1 A Flight Arrival message (see Appendix C-13) should, when possible, reflect the Wheels-On time at the arrival aerodrome and can be used in any situation where an ARR message would have been used per PANS-ATM 11.4.2.2.7, if the relevant parties have agreed. Otherwise, the ARR message described in PANS-ATM Appendix 3 should be used.

7.3.2 The content of the FF-ICE Flight Arrival message is equivalent to the ARR message, with the addition of the GUFI. The GUFI and other key fields (Aircraft Identification, Departure, Destination, and EOBT) are used to associate the Arrival message to a specific flight plan, see section 3.7. As with departure messages, in practice it is recognized that arrival times are recorded by a number of different automated and manual means which do not always refer to the same event or location and often are only available to the nearest minute.

7.3.3 The Flight Arrival Message can resolve any ambiguity by indicating the specific event and location on an aerodrome to which the reported arrival time refers, such as Wheels-on or In-block at the parking position.

7.3.4 Note that both the destination aerodrome and the arrival aerodrome are included. Inclusion of the destination aerodrome allows a recipient to match with a flight in their database, while the arrival aerodrome indicates where the flight actually landed, typically the same as the destination but would be different in the case of a diversion.

7.3.5 An eASP, having received an arrival notification, will respond with only a Submission Response.

8 FLIGHT DATA REQUEST SERVICE

The flight data request service in a mandatory service for an eASP to provide. As a minimum the service should provide the information outlined in 8.1.1.

An operator may optionally provide a flight data request service allowing, as a minimum, an eASP to obtain the latest version flight plan for a flight.

8.1 TYPES OF INFORMATION REQUESTS

8.1.1 In the FF-ICE environment, a Flight Data Request message can be used to obtain information about a flight. The message is designed to allow customized flight data queries (see Appendix C-10), but the following should be a minimum set for implementation:

a) Flight Plan — request a copy of the flight plan, analogous to the use of the RQP ATS message.

b) Supplementary Plan — request a copy of the supplementary data filed for the flight, equivalent to use of the RQS ATS message.

c) Flight Status — request a copy of the latest Planning or Filing status for the flight.

8.1.2 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.

8.1.3 An eASP that provides a Planning Service may facilitate a request for Preliminary Flight Plan data as a discrete request. The eASP would respond in accordance with the guidance provided in 8.7. However, if a Filed Flight Plan already exists for the flight the eASP may respond by providing the Filed Flight Plan.

8.1.4 An operator may also provide a query and reply service enabling an eASP to query the flight data. This may be useful in any situation in which the information currently held by the eASP is limited or of uncertain quality, but particularly useful in obtaining information which is only required on an ad hoc basis and/or is typically only available shortly before departure.

8.2 USES OF FLIGHT DATA REQUESTS

8.2.1 The Flight Data Request service is intended to be used by ASPs to obtain required information about a flight or by operators primarily to obtain the status of their own flight(s), with respect to the eASP being queried. See also 8.5.

8.2.2 When an eASP is contacted about or receives an update for a flight for which they do not have a flight plan, they can use a Flight Data Request to request the flight plan from another eASP or from the operator, if the operator has implemented this service.

8.2.3 When an Operator is uncertain regarding the status of a flight plan, they can query a Relevant eASP to obtain the flight plan status. An operator shall only request information about their own flights.

8.3 EXTENSIONS OF FLIGHT DATA REQUEST

8.3.1 If there is additional information about the flight that the eASP wishes to make available, it can publish the indicator to be used in the Requested Flight Data item.

8.4 USE OF FLIGHT DATA REQUEST– FORMATTING, SENDING

8.4.1 A request for flight information requires the data elements described in Appendix C-10.

8.4.2 Besides the normal addressing and contact information (to/from), there are just two things required:

a) What flight is being referenced? At a minimum, the Aircraft Identification should be supplied. Optionally, departure/destination data may be included to facilitate the creation of an RQP or RQS to send to non-FF-ICE ASPs should the addressed provider not have the plan. When an operator requests status information about a flight, it must include the GUFI.

b) What type of information is desired? The type of information request should be identified, as per 8.1.1.

8.4.3 The Flight Data Request should be used judiciously so as not to impose undue loads on computer and network resources. For example, it should not be used in a polling manner to query flight status at a higher frequency than the status is normally provided. eASPs should consider publishing specific rules on acceptable use.

8.4.4 It is intended that this capability be used as a query regarding information about a single flight. It is not intended as a capability for obtaining information on a set of flights, e.g., all flights for a carrier. It is expected that Publication Services would serve that need and provide the required bandwidth.

8.5 AUTHENTICATION AND CONFIDENTIALITY

8.5.1 Requests for flight plan information shall be authenticated to ensure that they are from an appropriate party such as relevant ASPs, the flight operator or a designated representative. Requests that cannot be authenticated shall be rejected.

8.5.2 Sensitive flights (e.g., military or law enforcement) should receive special consideration; eASPs should consider restricting access to sensitive flight plan data unless it can be adequately assured that such sensitive data will not be disclosed to unauthorized parties.

8.5.3 Information security policies may require measures to ensure the confidentiality of flight plan information; appropriate safeguards may be required to ensure that operators only request information regarding their own flights.

8.6 VALIDATION

8.6.1 A Flight Data Request should be checked to ensure that all required fields (per Appendix C-10) are present and formatted correctly.

8.6.2 When provided, the GUFI should be checked to ensure that a flight plan with that GUFI exists.

8.6.3 Other identifying information (aircraft identification and departure/destination/EOBT, if provided) should be checked for consistency with the GUFI.

8.6.4 Depending on implementation, the source of the request should be checked to ensure that it is allowed to query the identified flight.

8.7 FLIGHT DATA RESPONSE PROCEDURE

8.7.1 The recipient of a Flight Data Request should return a Submission Response to the sender as described in the following paragraphs.

8.7.2 If the request is incorrectly formatted, a submission response of REJ should be returned with an explanation that the request was incorrectly formatted.

8.7.3 If the requested information is not found, a Submission Response of REJ should be returned with an explanation that the recipient does not have the requested information.

8.7.4 If a flight plan is found for the provided GUFI but the other identifying information provided does not match, a Submission Response of REJ should be returned with an explanation that the provided information does not identify a single flight.

8.7.5 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. Note that a response indicating non-authorization verifies for the sender that the flight exists, which is information in itself. So a generic message indicating that there is no information for the flight is preferable.

8.7.6 If the requested flight data are for items not supported by the eASP, a Submission Response of REJ should be returned with an explanation that the request is not supported.

8.7.7 If multiple flights, which the source is authorised to access, match the submitted flight information, then a Submission Response of REJ should be returned, with an explanation that includes the aircraft ID, departure, destination, EOBT, and GUFI of each matching flight.

8.7.8 If the message passes all validation checks, a Submission Response of ACK should be returned, together with a Flight Data Response containing the requested information per Appendix C-11.
Note: No response is expected from the recipient of the Flight Data Response.

9 PUBLICATION SERVICE

The Publication Service is an optional service that an eASP may provide to disseminate flight information to multiple stakeholders in an efficient manner. As a minimum, the Data Publication Service shall use the data conventions defined in Appendix B.

9.1 GENERAL

9.1.1 An eASP may provide a Publication Service that enables authorised subscribers to obtain information about flights that are relevant to their operations. Subscribers may include airspace users, including 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 that may require the data.

9.1.2 Receiving changes on flight information through a Publication Service allows subscribers to maintain an awareness of changes to flight plan and trajectory information that will affect flights relevant to them. Such advance information will be valuable to subscribers for making adjustments to better manage their operations.

9.1.3 An eASP that provides a Publication Service should publish the availability of the service in its AIP or other appropriate documentation, together with details of the service provided and conditions concerning access to the service.

9.2 SUBSCRIPTIONS

9.2.1 A Publication Service 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.

9.2.2 An eASP should indicate the events and/or criteria to which a subscriber can subscribe.

9.2.3 The range and sophistication of subscriptions offered by an eASP will be determined by the requirements of its potential users. For example, an eASP may need to subscribe to the flight plans of all flights planned to penetrate an airspace, while an aerodrome control tower may wish to subscribe to all flights planned to operate to/from an aerodrome, and an aircraft operator may wish to subscribe to modifications concerning its flights.

9.2.4 At the simplest, an eASP might offer a choice of subscriptions with fixed filter and data transmission event criteria. More sophisticated services may allow subscribers to refine filters (e.g., to select a particular aerodrome or airspace, or to add time periods of interest) or even to combine filters. For example, an eASP may wish to subscribe to all flights planned to penetrate an airspace above a certain flight level or which also departed a specified aerodrome, or both. Increasing flexibility increases the complexity of the eASP's systems. However, an eASP may choose to offer tailored subscriptions to meet specific requirements.

9.3 AUTHENTICATION AND CONFIDENTIALITY

9.3.1 An eASP should take measures to ensure that subscribers are granted access only to subscriptions that provide flight data relevant or necessary for their operations.

9.4 IMPLEMENTATION

9.4.1 The Publication Service shall be implemented as a SWIM Information Service.

9.4.2 To allow sharing of flight data efficiently, it is recommended that the Publication Service use the Publish/Subscribe message exchange pattern with a push mechanism (see ICAO Doc 10039 section 5.3.2.5.4.1). This reduces the communication overheads of point-to-point message exchanges and polling.

10 ROUTE AND TRAJECTORY INFORMATION

The following sections describe the different types of trajectories that exist in FF-ICE and explain their construct. Further guidance, logic rules and examples are provided in Appendix E-3.

10.1 ROUTE/TRAJECTORY RELATIONSHIP

10.1.1 Types of Route/Trajectory Group

There are three types of Route/Trajectory Groups supporting FF-ICE, these may be provided by an eAU to request a service, or be provided by an eASP in response to a service request:

a) Desired – This is provided by an operator when submitting or updating either a Preliminary or Filed Flight Plan.

b) Negotiating – This is provided by an eASP in response to a Preliminary Flight Plan or Trial request. It may also be provided by an eASP as a proposed solution when a re-evaluation of a Preliminary or Filed Flight Plan results in a Non-Concur or Not Acceptable status. Constraints and known changes to the route/trajectory group are included. The negotiating route/trajectory group may also be provided by the eAU with a Trial request.

c) Agreed – This is provided by an eASP as an indication of the route/trajectory on record with the eASP. In nominal circumstances it is provided together with a planning status of Concur, or a filing status of Acceptable. It may however be provided by the eASP with a planning or filing status of Non-Concur or Not Acceptable thereby facilitating the operator in determining why the eASP has assessed the route/trajectory as non-compliant.

An eASP may provide the Desired or Agreed route/trajectory group in a Flight Data Response to a legitimate Flight Data Request message.

10.1.2 Combination of route and trajectory information in FF-ICE

Item 15 of the FPL as described in Appendix 2 of the PANS-ATM (ICAO Doc. 4444) contains the following data items:

a) Cruising Speed identifying the true air speed for the first or the whole cruising portion of the flight.

b) Cruising Level identifying the planned cruising level for the first or the whole portion of the flight.

c) Route as described through a series of sub-items:

1. ATS Route or an indication that the flight to the next point will be outside a designated route and direct
2. Significant Point
3. Change of speed or level
4. Change of flight rules
5. Cruise Climb

Under FF-ICE the route required for filing a flight plan contains the same mandatory information

as an FPL, but is modified in format and structure as described in Appendix B. This change to the format and structure of the data does not alter the phraseology used for the delivery of ATC clearances, which will still refer to the Item 15 information, so that clearances are provided in the same manner regardless of whether the flight plan was filed as an eFPL or an FPL.

Optional information items supplement the above data items allowing a trajectory to be described and/or created to a higher level of fidelity than is possible with the above route items alone. By providing this higher level of fidelity, the exchange of this additional data allows a Planning Service to both identify and provide a more accurate assessment of a Preliminary Flight Plan. The exchange of this additional data during filing allows improved performance of ATFM and ATC systems.

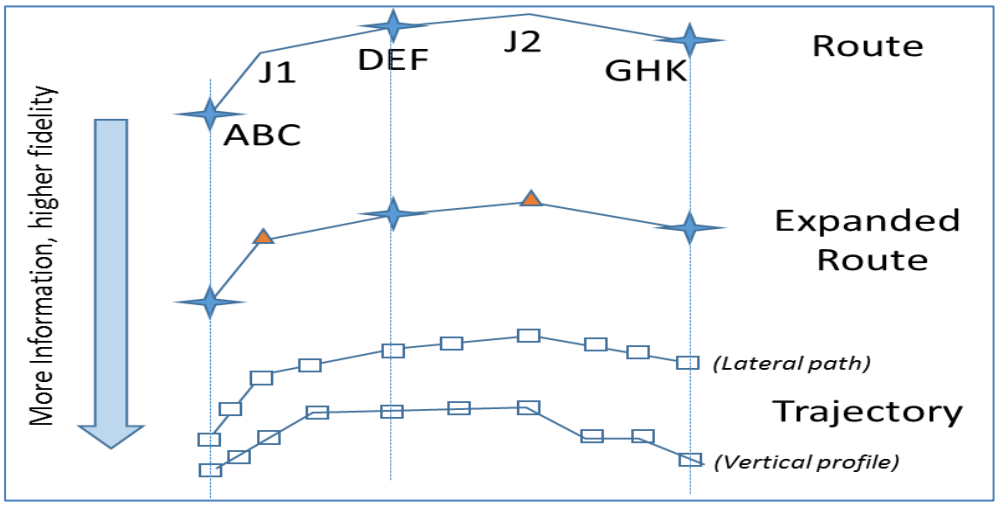


Figure 19: Relationship of Route to Trajectory

Figure 19 shows how the route can be supplemented with additional data to first expand the route to include all the significant points defining each ATS Route. This expansion is the "Expanded Route." Points may then be added to specify the level and time (not shown) in a trajectory. At each of these trajectory points, additional data can be provided to describe local information such as: constraints, winds, or properties of the flight at the point.

The data contained in the route/trajectory group is structured to contain all information above, as described in Appendix B. The route/trajectory group includes the following classes of data:

- Route/Trajectory Initial Cruising data and Estimated Elapsed Time
- Route/Trajectory Specific Aircraft Performance (provided by eAU only)
- A sequence of Route/Trajectory Elements

These data classes, together with the operational use for new data items are further detailed below.

10.2 ROUTE/TRAJECTORY INITIAL CRUISING DATA AND ESTIMATED ELAPSED TIME

The route/trajectory group contains the following items:

- The cruising speed or Mach number applicable to the first or the whole cruising portion of the flight. This is equivalent to Field 15a in Appendix 3 of the PANS-ATM.
- The requested cruising level applicable to the first or the whole cruising portion of the flight. This is equivalent to Field 15b in Appendix 3 of the PANS-ATM.

- The total estimated elapsed time of the route/trajectory group. This is equivalent to Field 16b in Appendix 3 of the PANS-ATM.

10.3 AIRCRAFT PERFORMANCE DATA

Table 2 describes optional items that may be provided by an operator for the purposes of providing the eASP with improved trajectory prediction for a variety of ATM functions including the accurate generation of feedback. The provision of performance data enables an eASP to calculate a more accurate trajectory when the route/trajectory submitted by the operator is unacceptable, for whatever reason, or to accurately simulate the impact of potential changes to the ATM configuration. Not all ASPs will be capable of making operational use of these optional aircraft performance data items.

It is recognized that an operator would also only provide certain logical combinations of the data items. These include the following combinations:

1. The operator provides climb and descent speed schedules with an estimated take-off mass. The eASP may use this information together with the route, speed and level information to construct a trajectory with climb and descent profiles better reflecting the individual flight.
2. The operator provides performance climb and descent profiles. The eASP uses this information, in concert with the route and atmospheric data, to construct a trajectory with climb and descent profiles representing the individual flight performance.

The information provided may also be used by an operator to construct a more accurate trajectory for evaluation of modifications to be proposed.

These items can be provided with any of the route/trajectory groups created by the operator.

Table 2 Route/Trajectory Specific Performance Data

Name	Description	Uses
Climb and descent speed schedule	Anticipated target IAS and Mach Number schedule in climb and descent	Used by the eASP to improve trajectory prediction in climb and descent
Performance climb and descent profile	A zero-wind, International Standard Atmosphere (ISA), unconstrained climb and descent profile reflective of the flight capabilities and desired parameters	Used by the eASP to improve trajectory prediction in climb and descent

10.4 ROUTE/TRAJECTORY ELEMENTS

As previously described in Figure 19, route/trajectory data are conveyed through different levels of information:

- Route items
- Expanded Route

- Trajectory

How each of the above are expressed is described further below.

10.4.1 Route Items

The route items include all the items described in Field 15c of the PANS-ATM Appendix 3 together with additional optional data items. These route items are represented as an ordered sequence of Route Elements (see Figure 20). The Route Elements are sequenced in the order in which they will be flown from departure to destination. These Route Elements can also be enriched with additional data such as the trajectory information to form Trajectory Elements. As a result, the more general term “Route/Trajectory Element” is used to refer to either.

As a trajectory begins at the departure aerodrome and ends at the destination, it follows that the aerodrome is included within the trajectory data as the first/last route element. As a result, data concerning the departure/destination appears twice in an eFPL, once within the specific departure and destination data items and again within the route/trajectory data.

When describing a route, each Route Element contains the items as described in Table 3. Not all items are required for all Route Elements in the table. Route Elements are associated with a starting point (Route Element Start Point) and a path (Route to Next Element). The end point of one Route Element is the starting point of the next Route Element in the ordered sequence.

Additional data provided on a Route Element may apply to either the associated start point or the path as describe in Table 3. For example, a delay may be taken either at the start point or along the path. However, a specified change of flight rules occurs at the associated Route Element Start Point.

A Route Element may include both speed and level changes in addition to constraints on speed and level. These are equivalent to Field 15c4 in Appendix 3 of the PANS-ATM. The changes may further indicate whether they are planned to commence or planned to be attained at the associated starting point. This provides greater flexibility than the FPL message which only allows a speed or level change that is planned to commence at a point. Guidance on translation is provided in section 12.

In contrast, constraints are used to indicate that a speed, level or time range or value must be met at the associated starting point. Constraints are provided as feedback by an eASP allowing the eAU to better understand the expected flight profile and make an assessment of flight time and fuel usage.

As illustrated in Figure 21, a constraint may be met through a planned change at any point prior to the constraint. The constraints are provided by the eASP while planned changes express how the eAU wishes to operate the flight while meeting any known constraints.

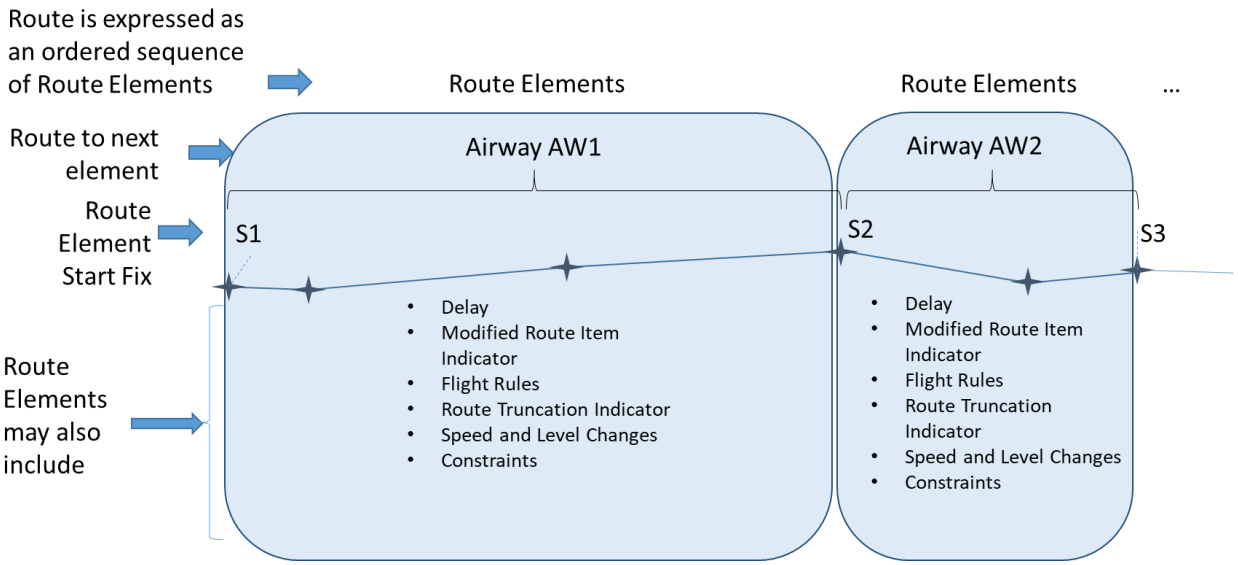


Figure 20: Description of a Route

Table 3 Route Element Items

Name	Description	Uses
Route to Next Element	The route to next element describes an ATS route (Field 15c2), a Standard Departure Route (Field 15c1), or a Standard Arrival Route (Field 15c3), or an indication that the flight to the next point will be outside a designated route and direct. These fields may be used consistent with the definition in ICAO Doc 4444. Each Route Element must contain the designated route to next element. The only exceptions are when the element is the last point of the flight; i.e. the destination, or when the route has been truncated. In these cases the item Route To Next Element is omitted. When the element is direct, "Direct" must be specified. When the two points concerned are both Lat/Long points the route to next element shall be indicated as 'Direct'. If the element is a delay segment, the route to next element should be	Used to describe the lateral path and procedures. Used for trajectory modelling and eligibility checking. Used to convert to the FPL.

Name	Description	Uses
	labelled as “Unspecified” even if both of the points are Lat/Long points.	
Route Element Start Point	Describes the point at the start of the Route Element. The point must be on any specified designated route of the Route Element and the preceding Route Element. The point may be a significant point or a point at which a change is specified (e.g., speed, level, flight rules, or cruise climb).	Used to describe the lateral path and procedures. Used for trajectory modelling and eligibility checking. Used to convert to the FPL.
Change of Flight Rules	Identifies a planned change of flight rules to IFR or VFR at the associated Route Element Start Point.	Used for eligibility checking and to identify ATS Services provided. Used to convert to the FPL.
Planned Delay	Identifies a planned delay at the associated point, along the Route to next Element, within a specified airspace, a specified holding pattern or at an aerodrome. Describes the planned duration of the delay.	Used for indicating planned airborne holding, or for operator-specified operations at a defined location. Also may describe a reference to a named hold pattern, airspace or aerodrome at which the delay is expected. Used to convert to the FPL.
Route Truncation Indicator	Indicates that the route has been truncated or terminated at the Route Point.	Provides an item, for compatibility with the FPL, to indicate that a route is incomplete. Used to convert to the FPL.
Cruising Speed Change	Describes a new planned cruising speed at the associated point. The speed change may indicate whether the change to the new speed is planned to commence or planned to be attained at the associated point.	Used to convert to the FPL. Used for computing or expressing a trajectory and obtaining time along path for evaluating constraints.
Cruising Level Change	Describes a new planned cruising level at the associated point. The item may indicate whether the change to the new level is planned to commence or planned to be attained at the associated point.	Used to convert to the FPL. Used for computing or expressing a trajectory and obtaining the vertical profile for evaluating constraints.
Cruise Climb	Describes the cruise climb parameters at the point at which a cruise climb is planned to commence. Includes the speed, the	Used to convert to the FPL. Used for computing or expressing a trajectory and obtaining the vertical

Name	Description	Uses
	lower level and the upper level of the cruise climb.	profile for evaluating constraints.
Speed Constraint	Describes a speed constraint applicable at the associated point. The item indicates: the type of constraint (AT, AT_OR_LESS, AT_OR_GREATER or BETWEEN), the constrained speed value(s), an indicator to specify whether the constraint applies to the departure or arrival, an indication if the constraint is to commence at or be attained by the associated point, and a reference to a published constraint (if applicable). Speed constraints are expressed as Indicated Airspeed or Mach Number.	Used in feedback by an eASP to indicate that a speed constraint is expected to be met by the flight profile at the associated point.
Level Constraint	Describes a level constraint applicable at the associated point. The item indicates: the type of constraint (AT, AT_OR_BELOW, AT_OR_ABOVE or BETWEEN), the constrained level value(s), an indicator to specify whether the constraint applies to the departure or arrival, an indication if the constraint is to commence at or be attained by the associated point, and a reference to a published constraint (if applicable).	Used in feedback by an eASP to indicate that a level constraint is expected to be met by the flight profile at the associated point.
Time Constraint	Describes a time constraint applicable at the associated point. The item indicates: the type of constraint (AT, AT_OR_BEFORE, AT_OR_AFTER or BETWEEN), the constrained time value(s), an indicator to specify whether the constraint applies to the departure or arrival, and a reference to a published constraint (if applicable).	Used in feedback by an eASP to indicate that a time constraint is expected to be met by the flight at the associated point.
Modified Route Indicator	Identifies if the Route Element Start Point or Route to next Element was modified by the eASP from a reference version. Includes a reference to an ATFM program name (if applicable).	May be used to indicate a change by the eASP in the lateral path when feedback is provided. See section on eASP feedback.

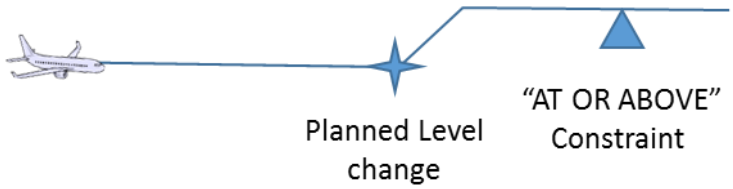


Figure 21: Constraint versus a planned change

10.4.2 Expanded Route

The expanded route takes the route described in 10.4.1 and expands each Route to next Element into its constituent significant points, explicitly indicating each published point along that portion of route. The expanded route is also expressed as an ordered sequence of Route Elements which may contain all of the data elements identified in Table 3. The expanded route may further include the along route distance as described in Table 4. The along route distance (ARD) measures the distance along the lateral path prescribed by the expanded route, not the trajectory. Differences between the distance along the trajectory and the ARD can occur due to turns (e.g., fly-by and fly-over turns versus instantaneous turns). As described in Table 4, differences can occur in the starting point for measuring the ARD depending on whether the Operator or the eASP computed the distance. The starting point is identified as the point at which the ARD is zero. When a route element is identified as "unspecified", including for handling "expect vectors", the along route distance should express the distance of a direct segment.

Figure 22 explains how an expanded route is expressed using the sequence of Route Elements. The airways are expanded to not only include the starting significant points; i.e. S1, S2, S3, but all the points describing the airway. These additional points; i.e., X1, X2, X3, are expressed through the route element start point within inserted route elements. The Route to next Element, in this example the airways, is identified for each Route Element in the expanded route. Any additional data, such as level changes or constraints, should be expressed in the Route Element with a Route Element Start Point at which the additional data (e.g., level change or constraint) applies. For example, if a level change occurs at X2 the level change should be expressed as part of the Route Element beginning at X2.

Table 4 Additional items contained in each Route Element of the expanded route

Name	Description	Uses
Along Route Distance	The distance along the route. For an eASP-provided expanded route, it is computed from the first converted point in the eASP's airspace for each route point in the expanded route. For an operator-provided expanded route, it is computed from the beginning of the route.	Used in the identification of constraints, and provides a unique reference to significant points that may be crossed more than once.

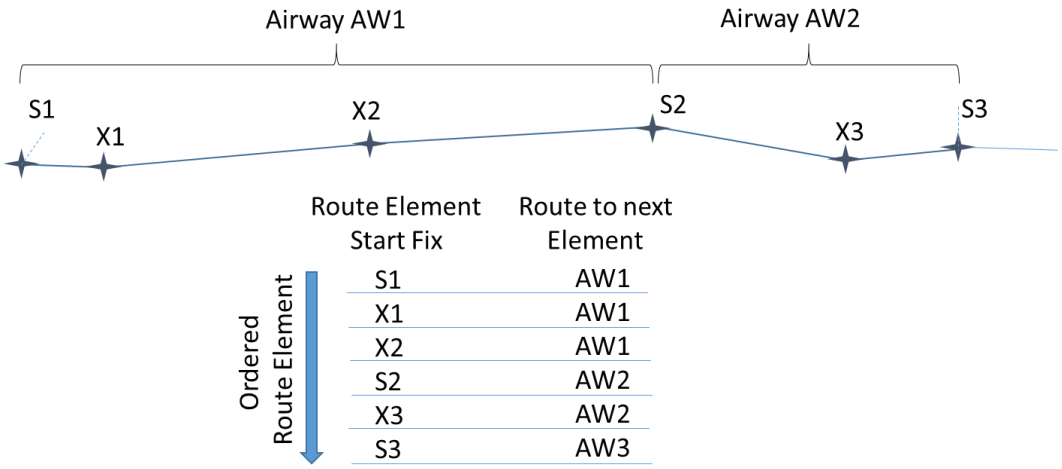


Figure 22: Expanded route example

10.4.3 Trajectory

An operator may also provide four-dimensional trajectory information in a flight plan to allow an eASP to evaluate and provide more precise constraint information. The four-dimensional trajectory is sent by the eASP to provide detailed constraint information pertinent to a Preliminary Flight Plan or a Trial request.

Just as the expanded route added more information to the route, the four-dimensional trajectory further enriches the flight data provided. The Route/Trajectory Element is supplemented with a four-dimensional point including the optional items described in Table 5. Trajectory information is expressed as illustrated in Figure 24. Trajectory points; i.e. T1, T2, etc. are added in addition to points on the route; i.e. S1, X1, etc. This is further described below and is necessary because the flight does not necessarily operate over the points (e.g., a fly-by waypoint). The trajectory point allows the information to more precisely reflect the expected location of the flight. Additional trajectory points may also be added in between points in the expanded route; in this case, the additional trajectory points may be the starting point of a new Trajectory Element. All of the information contained in Table 3 and Table 4 may also be included as part of the new Trajectory Element (see Appendix E-5 reference speed/level changes).

Figure 23 illustrates the case of a fly-by waypoint in which the trajectory is projected to not precisely overlay the route. The route of flight consists of track-to-point legs between waypoints S1, S2 and S3. Sampling a predicted trajectory conducting a fly-by of waypoint S2 results in the trajectory points T1, T2, T3, T4 and T5. When such a trajectory is provided, the fly-by waypoint is associated with the closest point on the trajectory. In this case, waypoint S2 is associated with trajectory point T3 during the turn, corresponding to the closest waypoint on the trajectory intersecting the turn angle bisector. In this case, the along route distance, being associated with the route in lieu of the trajectory does not represent the distance along the trajectory.

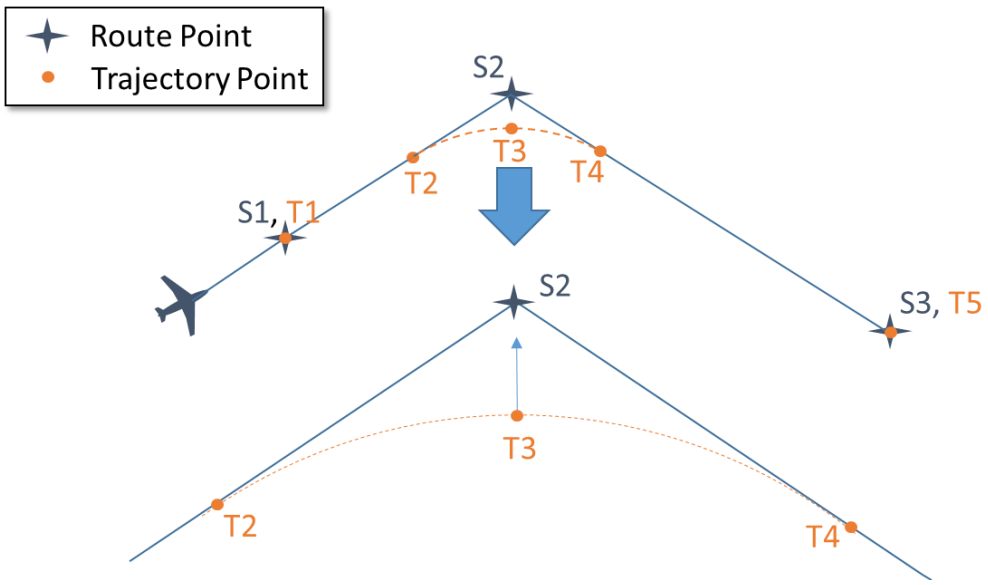


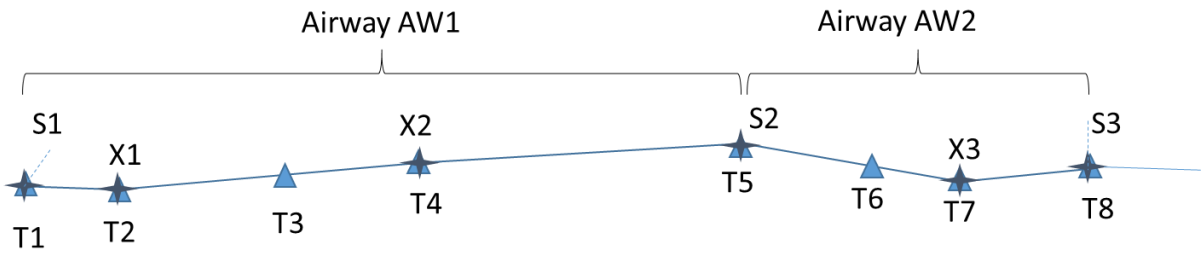
Figure 23: Trajectory points not on the route

The trajectory point includes an indication of time which may be expressed as a relative time or an absolute time. When expressed as a relative time, the time is the elapsed time from an initial prediction point which is identified using a trajectory point property (see Table 6). In such a case, the time at the initial prediction point must be expressed using an absolute time.

Table 5 Additional Items contained in each trajectory point

Name	Description	Uses
Trajectory Point	The location (expressed as a latitude/longitude), the time and the barometric altitude of a point on a computed flight path. When a trajectory can operate within an altitude range, vertical range may be provided. Prior to departure, the time at the point may be expressed as a choice between an absolute time or a relative time. In addition, the relative time may be used to express an EET by an operator when associated with an appropriate significant point.	Provides the predicted flight path used for ATFM demand predictions. Used to verify the meeting of constraints. Used to express how constraints are expected to be met. Used to provide the EET along the flight path.
Met Data	Indicates the wind direction and speed, together with temperature at the trajectory point which were used for the trajectory prediction.	Used to normalize for differences when sharing trajectories.
Assumed Altimeter Setting	Indicates the altimeter setting that was used during prediction at this trajectory point when the computation of barometric altitude is	Used to normalize for differences when sharing trajectories.

Name	Description	Uses
	provided. When an altimeter setting is not provided, a standard setting is assumed. (It is expected that, for planning purposes, most predictions will be based on a standard altimeter setting of 1013.2 hPa or 29.92 in Hg)	
Predicted Airspeed	The predicted indicated airspeed or Mach number at the trajectory point.	Used to verify the meeting of constraints and to normalize for differences when sharing trajectories.
Predicted Ground speed	The computed ground speed at the trajectory point.	
Trajectory Point Property	Describes any applicable properties of the trajectory point. May include multiple properties per point. Properties are described in Table 6.	Uses are specific to the point property.



Ordered Route/ Trajectory Elements	Route Element Start Fix (+)	Route to next Element	Trajectory Point (▲)
	S1	AW1	T1
	X1	AW1	T2
		AW1	T3
	X2	AW1	T4
	S2	AW2	T5
		AW2	T6
	X3	AW2	T7
	S3	AW3	T8

Figure 24: Expressing trajectory points in ordered route/trajectory elements

Table 6 Trajectory Point Properties

Enumerated Value	Description	Uses	Number of instances allowed (M=multiple)
Top of Climb	(From ARINC 702A) The point where the trajectory arrives at the cruise flight level after a climb. There will be one top-of-climb for each cruise flight level (step climbs).	Describes the vertical profile.	M
Top of Descent	The point where the trajectory begins a descent from the final cruise flight level.	Describes the vertical profile.	1
TCP – Vertical	Indicates that the associated trajectory change point (TCP) is one at which a level segment (intermediate or cruise) will be initiated or terminated.	Describes the vertical profile.	M
TCP – Speed	The point where the airplane will begin accelerating or decelerating as a result of a speed constraint or limit, or reaches the target speed. (ARINC 702A)	Describes the flight's speed profile to obtain accurate assessment of time at points.	M
TCP – Lateral	Indicates that the associated trajectory change point (TCP) is one at which a course, track or heading change will be initiated or terminated. It is not required to be provided for a planned transition between published ATS routes.	Describes the lateral profile.	M
Crossover Altitude	The point in climb or descent where the airplane will transition between Mach Number and IAS control. (ARINC 702A)	Enhances the vertical profile.	M
Transition Altitude or Level	Indicates that the associated trajectory point is the point at which the trajectory reaches the transition altitude (in climb) or level (in descent).	Provides clarity on assumptions for altitude reference.	M
Departure Runway end	Indicates that the associated trajectory point corresponds to the point at the end of the runway on departure. This point is at the center of the runway at the departure end when departing.	Provides clarity regarding the point at which a computed trajectory is being initiated on the runway.	1
Runway Threshold	This point is the threshold (which may be displaced) at the centerline of the runway at the approach end	Provides clarity regarding the point at which a computed trajectory is being	1

Enumerated Value	Description	Uses	Number of instances allowed (M=multiple)
	when arriving. See ICAO Annex 14.	terminated on the runway.	
Off blocks	This is the point at which the aircraft pushes back and begins to taxi for departure.	Provides clarity as to where the taxi will begin. May be the time provided in a departure message.	1
Start of take-off roll	Indicates that the associated trajectory point corresponds to the point at the start of take-off roll (used for departures only)	Provides clarity regarding the point at which a computed trajectory is being initiated on the runway. May be the time provided in a departure message	1
Wheels off	Indicates that the associated trajectory point corresponds to the point at which the aircraft is predicted to be wheels off the runway on departure.	Provides clarity regarding the point at which a computed trajectory is being initiated on the runway. May be the time provided in a departure message	1
Wheels on	Indicates that the associated trajectory point corresponds to the point at which the aircraft is predicted to be wheels on the runway for arrival.	Provides clarity regarding the point at which a computed trajectory is being terminated on the runway. May be the time provided in an arrival message	1
End of landing roll	Indicates that the associated trajectory point corresponds to the point at which the aircraft is predicted to come to a full stop on the arrival runway. (A prediction only, the flight will likely exit the runway without coming to a full stop).	Provides clarity regarding the point at which a computed trajectory is being terminated on the runway. May be the time provided in an arrival message	1
In blocks	Indicates the point and time at which an arriving aircraft is/was in blocks.	Provides clarity regarding when a flight has completed.	1

Enumerated Value	Description	Uses	Number of instances allowed (M=multiple)
		May be the time provided in an arrival message.	
Entry into Restricted/Reserved Airspace	Indicates that the associated trajectory point is the point at which the flight is predicted to enter an airspace restriction/reservation, including any additional safety buffer. An identifier to the airspace is provided in the trajectory point reference.	Used to indicate the point at which a flight's trajectory is predicted to enter an airspace restriction/reservation.	M
Exit from Restricted/Reserved Airspace	Indicates that the associated trajectory point is the point at which the flight is predicted to exit an airspace restriction/reservation, including any additional separation requirements. An identifier to the airspace is provided in the trajectory point reference.	Used to indicate the point at which a flight's trajectory is predicted to exit an airspace restriction/reservation.	M, each must pair to an Entry
Entry into Constrained Airspace	Indicates that the associated trajectory point is the point at which the trajectory is predicted to cross into designated constrained airspace.	Used during feedback to indicate the point at which a flight's trajectory is predicted to enter constrained airspace.	M
Crossing Constrained Airspace	Indicates that the associated trajectory point is the point at which the trajectory is predicted to cross constrained airspace designated as a line.	Used during feedback to indicate the point at which a flight's trajectory is predicted to cross a line constraint.	M
Exit from Constrained Airspace	Indicates that the associated trajectory point is the point at which the trajectory is predicted to exit from designated constrained airspace.	Used during feedback to indicate the point at which a flight's trajectory is predicted to exit constrained airspace.	M, each must pair to an Entry
Hold Entry	Indicates that the associated trajectory point is a point at which the flight is expected to enter into planned holding.	Used to indicate a point at which a flight is expected to enter planned holding.	M
Hold Exit	Indicates that the associated trajectory point is a point at which the flight is expected to exit from planned holding.	Used to indicate a point at which a flight is expected to exit planned holding.	M, each must pair to an Entry
Begin Stay	Indicates that the associated trajectory point is a point at which the flight is expected to begin an	Used in conjunction with a Delay	M

Enumerated Value	Description	Uses	Number of instances allowed (M=multiple)
	operation at which the flight will remain for some time.	indication to specify the starting point.	
End Stay	Indicates that the associated trajectory point is a point at which the flight is expected to terminate an operation at which it remained for some time.	Used in conjunction with a Delay indication to specify the ending point.	M, each must pair to a Begin
Initial Prediction Point	Indicates that the associated trajectory point is the initial point at which a prediction was made. For FF-ICE Planning, an eASP may provide a trajectory which is predicted to begin at an entry point into the eASP airspace. This includes a point near entry into the Area of Responsibility.	Provides the point at which a prediction was initiated. This point indicates an absolute time when others indicate time relative to this absolute time.	1
End Prediction Point	Indicates that the associated trajectory point is the final point at which a prediction was made. For FF-ICE Planning, an eASP may provide a trajectory which is predicted to end at an exit point from the eASP airspace.	Provides an indication of the last point at which a trajectory prediction was made. This point need not be the end of the flight.	1
Constraint Point	Indicates that the associated trajectory point is the point of application of a constraint. These can include explicit altitude, speed or time constraints or implicit MIT/MINIT, or sequencing constraints. For named constraints, a reference to the name of the constraint should be provided under trajectory point reference.	Used to provide feedback on constraints applicable to a trajectory.	M
FIR Boundary Crossing Point	Indicates the point at which the trajectory crosses from one FIR into another. A named reference to the FIR being entered may also be provided.	Used in conjunction with the time at a Trajectory Point to indicate the estimated elapsed time to a FIR boundary	M
Start of Expect Vectors	When procedures specify “Expect Vectors”, the associated point identifies the starting point of the vectoring.	Used to indicate a portion of the trajectory with uncertainty in lateral path choice and times.	M
End of Expect Vectors	When procedures specify “Expect Vectors”, the associated point identifies the ending point of the vectoring. The Trajectory Point	Used to indicate the end of vectoring and associated	M, each must pair to a Start

Enumerated Value	Description	Uses	Number of instances allowed (M=multiple)
	data at this point includes an estimate of the impact of vectoring.	uncertainty in lateral path and times.	
Prescribed EET Point	Indicates that the associated trajectory point represents a point that has been prescribed for required Estimated Elapsed Time reporting. This can include a FIR boundary crossing point or a significant point as prescribed on the basis of regional air navigation agreements, or by the appropriate ATS authority.	Prescribed EET Point	M
Airport Reference Location	Indicates that the associated trajectory point is the airport reference location.	Used for expressing the departure or arrival point when specific runway locations on the flight has not been used in the prediction.	2

10.4.3.1 Expressing Points versus a Trajectory

A trajectory point may be used to provide additional data items not found in a route point without providing a full trajectory. Some examples are described below:

- A trajectory point may be used by an eASP to identify altitude, speed or time constraints that are not associated with a point on the route or expanded route. In this case, the point is identified with a "Constraint Point" trajectory point property together with the relevant constraint as described in Table 3.
- A trajectory point may be used by an operator to identify the location and time at which a flight is predicted to cross into an FIR. This may be used to express the estimated elapsed time. The point is identified using a trajectory point property of "FIR Boundary Crossing Point" together with a time at the point.
- A trajectory point may be used to indicate the location and time at which a flight is expected to begin an operation at which the flight will remain for some time (e.g., "Begin Stay" trajectory point property).

In the cases expressed above, the trajectory points may provide insufficient data to infer the vertical and temporal profile of the flight by interpolating between trajectory points. The lateral path is also not described by simply joining the trajectory points. This is illustrated in Figure 25.

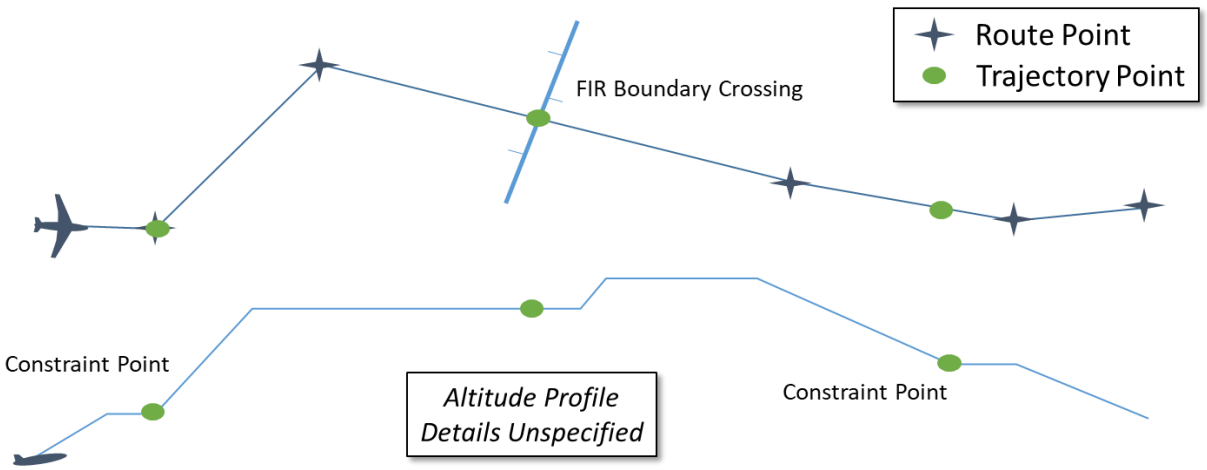


Figure 25: Expressing select trajectory points in lieu of a Trajectory

When these points are provided without providing a more complete Trajectory, the route trajectory group may not include points with trajectory point properties: "Initial Prediction Point" and "End Prediction Point." In such a case, any times at points expressed as relative times when there is no Initial Prediction Point, must be expressed relative to the take-off time. In such a manner, the time at the FIR boundary crossing point would be the estimated elapsed time.

10.4.3.2 Expressing the Vertical and Time Profile

An operator providing a Preliminary Flight Plan may provide:

- No trajectory information beyond the information required for a Filed Flight Plan (See Appendix C-4).
- Aircraft performance data as described in 10.3.
- An estimate of the flight's trajectory using the data described in 10.4.3

The eASP providing a response to a Preliminary Flight Plan makes an assessment of constraints that are applicable to the Preliminary Flight Plan. To do so, the eASP needs to determine the airspace that a flight is expected to traverse and when by using a predicted trajectory. In the three cases above, the eASP calculates a trajectory using the best available information. As more trajectory information is provided by the operator, the prediction is improved and consistent between operator and eASP.

When a trajectory is exchanged, there is a start and end point to the trajectory prediction. These points are identified using the Initial Prediction Point and End Prediction Point trajectory point properties. If a trajectory is provided by the operator, the trajectory should be end-to-end, starting at the first point and ending at the destination. Trajectories computed and provided by an eASP may only be described within the eASP's airspace. In such a case, an initial prediction point may occur subsequent to departure and an end prediction point prior to a planned arrival.

When a trajectory is provided by the operator, it includes some additional data items in order to allow an eASP to normalize the assumptions used in building the trajectory. These include the provision of the following data items with trajectory points:

- Meteorological Data – This data provides the meteorological (e.g., wind and temperature) assumptions used when building the trajectory. If the use of the trajectory requires the application of different assumptions, the information may be used to approximately

normalize the trajectory. For example, the eASP may have a different forecast of the winds being used.

- Assumed Altimeter Setting – It is expected that, for planning purposes, most predictions will be based on a standard altimeter setting of 1013.2 mbar or 29.92 in. Hg. For cases outside of this, the assumed setting is provided to allow an altitude correction. Points with property Transition altitude or Transition Level present allow the determination of the type of altimeter setting that is relevant to the route portions. Transition altitudes/levels are not uniform across ANSPs.

A prediction of the Top of Climb and Top of Descent is expressed as a Trajectory Point Property as well, allowing these points to be identified as such. Providing these points in the trajectory allows the vertical profile to be described as illustrated in Figure 26.

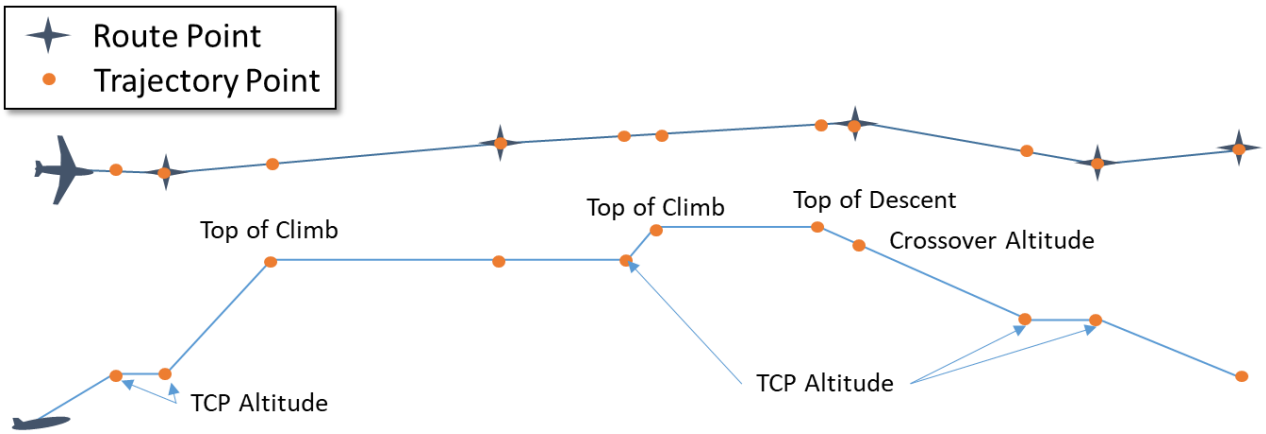


Figure 26: Expressing trajectory properties for vertical profiles

When a route/trajectory is predicted by an eAU, the starting point or end point of an end-to-end trajectory may be specified in terms of a Trajectory Point Property including: Start of Take-off Roll, Wheels off, Departure Runway End, Runway Threshold, Wheels on, End of landing roll (see Figure 27). These types of departure and arrival points provide clarity on the assumption used to determine the departure and arrival time of the trajectory. Only one of these types of points would be expected to be included in the trajectory on departure and one on arrival. This is useful for the eASP to normalize times when determining constraints that involve flight interactions. When the specific departure or arrival runway location is not known, a coarse trajectory may be provided by assuming the departure or arrival point in the trajectory is the airport reference location. The times associated with such points should be the take-off and touchdown times. The provision of different options to indicate the departure/arrival time of the trajectory is intended to facilitate system providers and operators enabling them to select the one most applicable to their operation.

Note: It is recognized that departure and arrival runways in conjunction with associated SIDs and STARs may not be known with certainty prior to the flight's departure. The trajectory point properties are provided to express the assumptions that are used when constructing the trajectory. The sharing of forecast airport and airspace configurations by an eASP allows an operator to make more informed assumptions.

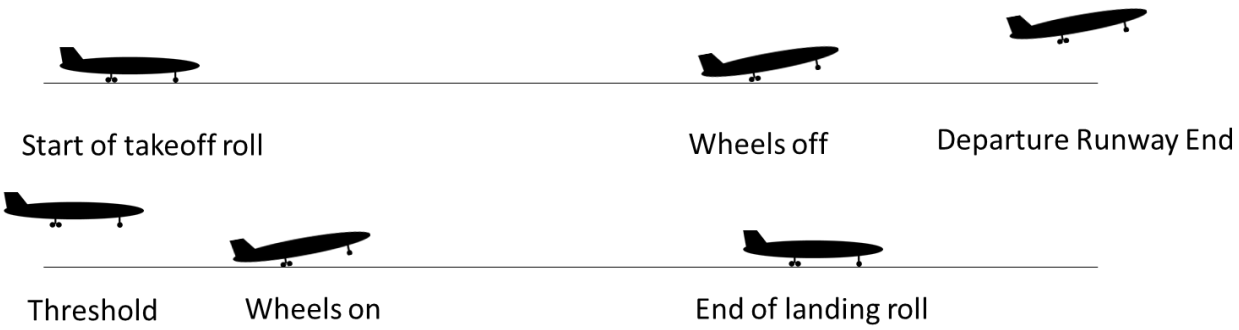


Figure 27: Expressing trajectory point property for departure and arrival

Time can be expressed as absolute time or relative time. Relative times are linked and can be used thanks to the initial prediction point associated to an absolute time.

All times should be precise to the second. Note that consecutive points in the trajectory may have the same time.

10.4.3.3 Expressing Planned Delay

When an operator expresses a planned delay through the delay route element item as described in Table 3, the corresponding trajectory may also include additional information regarding the delay.

There are several types of planned delay that can be expressed by a flight:

- Planned airborne holding
- Engaging in operations at a point
- Engaging in operations along a segment
- Engaging in operations at an aerodrome
- Engaging in operations within an airspace

Planned airborne holding allows airborne delay to be planned at a specified holding point in the trajectory. The duration of the hold is expressed through the delay in the route element (see Table 3). The trajectory point property of “hold entry” and “hold exit” (see Table 6) are used to identify the points where the trajectory is expected to enter and exit the hold. While planned airborne holding is a rare occurrence, there may be circumstances in which an operator may prefer to plan for airborne delay versus taking a pre-departure delay. This data element allows the Operator, where procedures are in place, to express such a plan as an alternative to taking an assigned ground delay for flow management purposes.

An operator may wish to operate a flight to a point, engage in operations at that point then resume IFR operations from that same point; i.e. operations at a point, or from a different point; i.e. operations along a segment. In this case, the duration of the operation would be expressed as a delay at the starting point (see Table 3), together with a trajectory point property (see Table 6) indicating the point(s) at which the flight will “Begin Stay” and “End Stay”. These points, together with the delay times allow the trajectory times to be fully specified through the delay.

A flight wishing to engage in operations at an aerodrome (e.g., touch-and-go practice) may do so by expressing a delay at a route element start point, where the point represents an

aerodrome.

When providing a delay together with an associated trajectory point, the time expressed in the Trajectory Point expresses the time, relative or absolute, at which the flight is expected to first arrive at the point.

10.4.3.4 Expressing Estimated Elapsed Time

Boundary crossings between FIRs are identified in the trajectory as a Trajectory Point together with the trajectory point property "FIR Boundary Crossing Point". The crossing time is provided in the Trajectory Point using a relative time from the start of the trajectory, the initial prediction point. When provided by an operator, the start of the trajectory corresponds to the departure point. A trajectory point reference can be provided to identify the FIR being crossed into.

10.4.3.5 Expect Vectors

Flights may depart or arrive using a procedure indicating that a flight should "expect vectors" at some point on the flight path. These are not amenable to providing a trajectory as the path is unknown. If such a segment is to be expressed in a trajectory, a direct segment should be inserted between the start and end of the "expect vector" portion of the flight, with times corresponding to the expected flight time between the points including any vectoring delays (see Figure 28). The expect vector should be labelled with an additional trajectory point property as follows:

- Start of Expect Vectors – Identifies the point in the trajectory at which the flight is expecting to begin to be vectored as part of a defined procedure.
- End of Expect Vectors – Identifies the point in the trajectory at which the flight is expecting to end being vectored as part of a defined procedure.

It is recognized that the above procedures add a higher level of uncertainty.

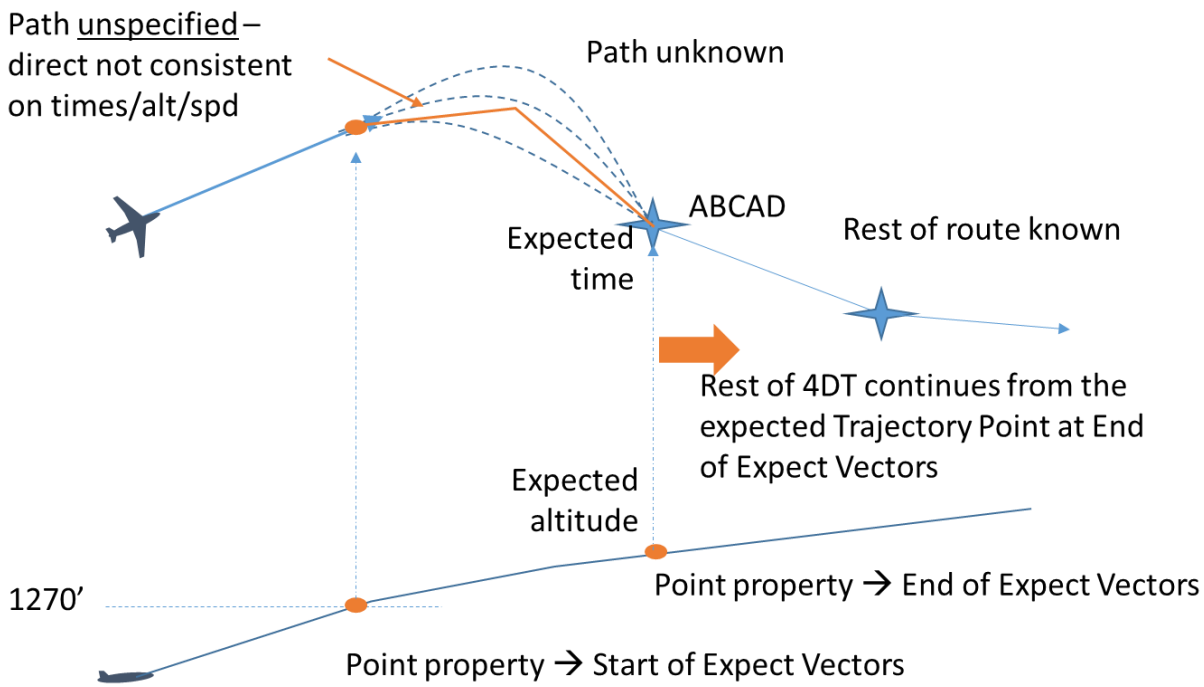


Figure 28: Treatment of Expect Vectors Case

10.4.3.6 Expressing Composite Flight Plans

When a flight plan includes a planned change of flight rules between IFR and VFR or VFR to IFR at an associated route element, that change must be identified through the flight rules for the associated route element (see Figure 20). A flight beginning as VFR followed by an IFR segment may begin the computation of the Along Route Distance at either the beginning of the flight or the start of IFR operations. This point is identified through an ARD = 0. Flights changing rules from IFR to VFR may compute the along-route distance through VFR route elements.

10.4.3.7 Providing Feedback using the Trajectory

When an eASP constructs an Agreed or Negotiating trajectory and provides it within a response, the start and end points of the trajectory prediction must be established. This is accomplished by indicating the initial prediction point and the end prediction point using the so-named trajectory point properties. Different ASPs may establish the initial prediction point in different manners. This is necessary as some ASPs may not have sufficient information to compute the time relative within another ASPs airspace; however, the point must be identified. The initial prediction point may correspond to a departure time, or to the entry into the FIR under authority of the eASP. The end prediction point can correspond to either the exit from the FIR or arrival time. When providing feedback on a trajectory, the eASP modifies the absolute time at the initial prediction point to ensure time constraints are met.

When an eASP provides feedback incorporating a required re-route on the flight, the portion of the route that has been modified is expressed using the "Modified Route Indicator" data item (see Table 3). When points are deleted, the modified route item will indicate both the starting point at which a route modification begins and the end point at which it terminates as illustrated in Figure 29.

Feedback may also be provided regarding restricted/reserved or otherwise constrained

airspace. This occurs by indicating the point on the trajectory corresponding to the entry and exit from the airspace. The points are labelled with a trajectory point property indicating that the point is: entry into restricted/reserved airspace, exit from restricted/reserved airspace, crossing constrained airspace or exit from constrained airspace. Associated with the point, a trajectory point reference allows the type and name of the constraint to be described. This reference allows the eASP to provide information on the type (e.g., restricted/reserved airspace, ATFM program), and identifier of the airspace constraint (e.g., identifier of the airspace restriction/reservation).

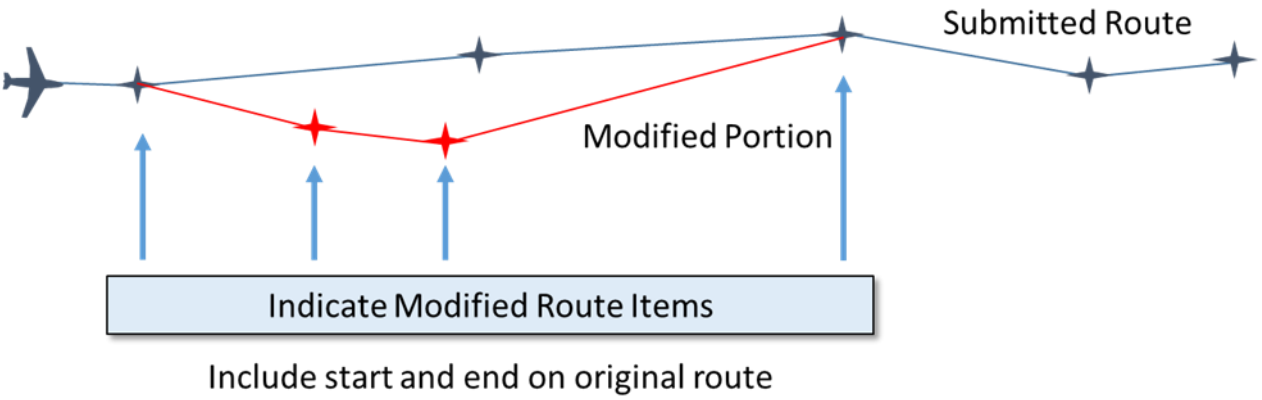


Figure 29: Feedback on a modified route

The eASP can express required altitude, speed or time constraints on the trajectory. These are expressed using the constraints as described in Table 3. These may be described at either a route point or trajectory point. This provides a greater level of precision regarding where the point of application of a constraint may be, compared to indicating the constraint only at a significant point contained in the route.

Additional constraints applicable at a point along the trajectory may be expressed through the use of the trajectory point property identifying a constraint point together with a trajectory point reference. These may indicate trajectory points at which constraints are expected (e.g., metering) but for which precise constraints are not yet known when a response to a Preliminary Flight Plan is provided.

10.5 UPDATING A ROUTE/TRAJECTORY GROUP

When a Flight Plan Update is provided, data within the route/trajectory group may be modified only at certain levels of the route/trajectory group. For example, specifying a change to one waypoint in the route necessitates updating the full route. Within the route/trajectory group, updates may be provided of the following data items in their entirety:

- Aircraft take-off mass
- Requested cruising speed
- Requested cruising level
- Total estimated elapsed time
- The entire sequence of route/trajectory elements
- Climb performance profile
- Descent performance profile

- Climb speed schedule
- Descent speed schedule

When changes to one item impact the value of another, previously provided item, the update must be provided in such a manner as to result in a consistent route/trajectory group. For example, if a trajectory has previously been provided, a change to the requested cruising speed should result in either: an updated sequence of route/trajectory elements with new times, or a removal of the previously provided route/trajectory elements.

10.6 RESTRICTION DATA

In order to enable the operator to compute a trajectory that will satisfy the operational needs of an ASP to manage its airspace and traffic flows, as well as reflect as closely as possible the business purpose of the operator, it is important that ASPs publish appropriate restrictions. These should include:

- Route restrictions: The closing of ATS routes or parts thereof (either laterally or at specific levels) for certain city pairs or specific departure and/or destination aerodromes.
- Level restrictions: Requirements to cross a point in space at/at or above/at or below a specific level. These requirements should indicate whether they are based on topographical criteria, due to airspace requirements, or based on inter-facility agreements and/or traffic flow criteria. Note: These Point restrictions are for planning purposes only. ATC will be required to issue clearances that allow the operator to meet these Point Restrictions or waive them. Operators are neither required nor permitted to manoeuvre without clearance in order to meet planning constraints.
- Time restrictions: Requirements to cross a point in space at/at or before/at or after a specific time. These requirements should indicate whether they are in place for ASP purposes or because of unavailability of facilities outside the control of an ASP (e.g., aerodrome operating hours).

11 OTHER NEW DATA ITEMS

11.1 GENERAL

11.1.1 FF-ICE facilitates the introduction of additional data items that are not present in the FPL format as defined in PANS-ATM Appendix 2.

11.1.2 eASPs should publish the types of additional information they use to better assess the flight plan when it is submitted and/or on an ongoing basis.

11.2 DANGEROUS GOODS

11.2.1 The FF-ICE flight plan includes the possibility for the operator to provide additional detail concerning the carriage of dangerous goods. The information that can be provided is the same information that is required to be provided to the pilot-in-command via the NOTOC form, as described in B-2.8.

11.2.2 The information is intended to be used by the appropriate services in case of need, providing quick reference to the relevant information.

11.2.3 It is anticipated that the dangerous goods information will sometimes be provided as a late update to the Filed Flight Plan given that the final manifest is often known at short notice.

11.3 AIRPORT SLOT

11.3.1 Airport Slots are used to balance demand against available airport capacity at airports where the demand exceeds this capacity. The process of allocating airport slots at coordinated airports is based on the IATA Worldwide Slot Guidelines as a globally accepted standard.

11.3.2 In some countries it is mandatory for non-scheduled air transport operations or General Aviation to obtain an airport slot reference and reflect it in the flight plan.

11.3.3 There is therefore a requirement to enable the inclusion of airport slot information, both departure and arrival slot information, in FF-ICE flight plans as optional data items.

11.3.4 The precise manner in which the data will be used is a decision that will be described in local rules or regulations.

11.4 AIRAC DATA

11.4.1 A flight plan for a flight that operates close to or over the AIRAC switch period may, depending upon circumstances, use either set of AIRAC data in computing the flight plan. The most commonly used reference for determining the AIRAC to be used is the EOBT. If the EOBT is before 00:00 UTC on the AIRAC date then the 'old' data are used and if after midnight then 'new' AIRAC data are used. However, such a fixed reference will never provide an optimal solution under all circumstances if, for example, the flight departs shortly before midnight but flies for many hours after midnight using what has then become 'old' data. The reality is that most systems are unable to handle a change to the reference data mid-trajectory whether during the calculation for planning purposes, during execution of the flight from an FMS perspective, or while the flight is active in the ATS systems from an ATM perspective.

11.4.2 The introduction of RNAV terminal procedures has heightened the need for consistent data to be used. For flights over midnight where a choice of dataset is required this often places greater emphasis on the need to achieve data consistency for the arrival phase of flight.

11.4.3 The FF-ICE flight plan allows the operator to indicate, by reference to the AIRAC Effective Date or cycle, the dataset used in the creation of the flight plan and calculation of the route/trajectory.

12 TRANSLATION

12.1 GENERAL PRINCIPLES

12.1.1 As long as there is a mixed mode in which both ATS messages (as defined in PANS-ATM Appendices 2 & 3) and FF-ICE messages (as defined in PANS-ATM chapter 17 and within this document) can be used operationally, the need to be able to map or translate from one format to the other will exist.

12.1.2 The guidance concerning mixed mode operations, and in particular the expected responsibilities with respect to supporting a translation capability, are provided in 2.7.

12.1.3 It is a fundamental operational requirement that in such a mixed mode environment the ability to translate from FF-ICE to ATS message format must be possible, enabling the necessary flight plan information to be provided to ASPs which have not yet implemented the ability to use FF-ICE data.

12.1.4 Table 7 provides an indication of the correspondence between FF-ICE messages and their ATS message equivalents.

Table 7 FF-ICE to ATS Message Mapping

Action	**FF-ICE**		**ATS Messages**	
	Message(s)	**PANS-ATM Section**	Message(s)	PANS-ATM Section
Submit a Preliminary Flight Plan	Preliminary Flight Plan	17.3.2	n/a	n/a
	Planning Status		n/a	n/a
	Flight Plan Update		n/a	n/a
Submit a Filed Flight Plan	Filed Flight Plan	17.3.3	FPL	11.4.2.2.2
	Filing Status		n/a	n/a
Submit a Trial Request	Trial Request	17.3.4	n/a	n/a
	Trial Response		n/a	n/a

Action	FF-ICE		ATS Messages	
	Message(s)	**PANS-ATM Section**	Message(s)	PANS-ATM Section
Delay a Flight	Flight Plan Update (only if the flight plan update specifies a change to the off-block time and no other data element) Filing Status	17.3.3	DLA n/a	11.4.2.2.3
Change a Flight Plan	Flight Plan Update Filing Status	17.3.3	CHG n/a	11.4.2.2.4
Cancel a Flight	Flight Cancellation	17.3.5	CNL	11.4.2.2.5
Indicate Departure of a Flight	Flight Departure	17.3.7	DEP	11.4.2.2.6
Indicate Arrival of a Flight	Flight Arrival	17.3.8	ARR	11.4.2.2.7
Request Flight Plan Information	Flight Data Request Flight Data Response	17.3.6	RQP FPL	11.4.2.4.2
Provide Supplementary Information	Filed Flight Plan	17.3.3	n/a	n/a
Request Supplementary Information	Flight Data Request Flight Data Response	17.3.6	RQS SPL	11.4.2.4.3 11.4.2.4.4

12.1.5 The guidelines for translation of FF-ICE flight data to ATS message fields are provided in Table 8 and section 12.2 below. A detailed description of how mapping to the FIXM format can be performed is provided within the “FIXM User Manual” document.

12.1.6 New flight information defined for use in FF-ICE that does not correspond to an existing ATS message field, such as the GUFI or Dangerous Goods information, will not be translated.

12.1.7 Existing flight information containing new data items defined for use in FF-ICE shall be translated into appropriate Field 18 indicators (e.g. NAV/, SUR/, etc.) as described in 12.2 below. It should however be recognised that since some flight data processing systems have limitations on the amount of Field 18 information permitted, there may be a loss of some data in downstream ATS units along the flight path.

Table 8 FF-ICE Data Item to ATS Message Field Mapping

ATS Message Field	FF-ICE Data Item	Reference
03a	Type of Request/Response	B-2.24 Type of Request/Response
03b	Message Identifier	B-2.26 Message Identifier
03c	Message Identifier	B-2.26 Message Identifier
07a	Aircraft Identification	B-2.6 Aircraft Identification
07b	n/a	n/a
07c	Mode A Code	B-2.25 Mode A Code
08a	Flight Rules	B-2.7 Flight Rules
08b	Type of Flight	B-2.19 Type of Flight
09a	Number of aircraft	B-2.5 Aircraft Type and Number *Note: In FF-ICE the aircraft type and the number of aircraft for each of the type designators will be presented as a combined field. In the case of formation flight, the sum of the number of aircraft of each individual type will provide the total number of aircraft in the formation.*

ATS Message Field	FF-ICE Data Item	Reference
09b	Type of Aircraft	B-2.5 Aircraft Type and Number
09c	Wake Turbulence Category	B-2.9 Wake Turbulence Category
10a	Navigation Equipment and Capability	B-2.10.3 Navigation Capability
	Communications Equipment and Capability	B-2.10.10 Voice Communications Capability
	Approach Aid Equipment and Capability	B-2.10.4 Approach Aid Equipment and Capability
	Data Application Equipment and Capability	B-2.10.11 Data Communications Capability
10b	Surveillance Equipment and Capability	B-2.10.13 Transponder Capability B-2.10.14 ADS-B Capability B-2.10.15 ADS-C Capability
13a	Departure Aerodrome	B-2.4.1Aerodrome
13b	Estimated Off-Block Time	B-2.22 Time
13b	Actual Departure Time	B-2.22 Time
15a	Requested Cruising Speed or Mach Number	B-3.1.4 Requested Cruising Speed
15b	Requested Level	B-3.1.5 Requested Cruising Level
15c	See below for each item in 15c	B-3.2 Route/Trajectory Element
15c1	Route to Next Element	B-3.2.6 Route to Next Element
15c2	Route to Next Element	B-3.2.6 Route to Next Element
15c3	Route Element Start Point	B-3.2.5 Route Element Start Point
15c4	Requested Change	B-3.3.2 Level Change

ATS Message Field	FF-ICE Data Item	Reference
		B-3.3.3 Speed Change
15c5	Requested Change	B-3.3.5 Change of Flight Rules
15c5	Route Truncation Indicator	B-3.2.4 Route Truncation Indicator
15c6	Cruise Climb	B-3.3.4 Cruise Climb
15c7	Route to Next Element	B-3.2.6 Route to Next Element
16a	Destination Aerodrome	B-2.4.1 Aerodrome
16b	Total Estimated Elapsed Time	B-3.1.6 Total Estimated Elapsed Time
16c	Destination Alternate Aerodrome	B-2.4.1 Aerodrome
17a	Arrival Aerodrome	B-2.4.1 Aerodrome
17b	Time of Arrival	B-2.22 Time
17c	Arrival Aerodrome	B-2.4.2 Aerodrome
18 STS/	Special Handling	B-2.20 Special Handling
18 PBN/	Equipment & Capability	B-2.10.5 through B-2.10.9
18 NAV/	Equipment & Capability	B-2.10.2 through B-2.10.4
18 COM/	Equipment & Capability	B-2.10.10
18 DAT/	Equipment & Capability	B-2.10.11
18 SUR/	Equipment & Capability	B-2.10.13 through B-2.10.16
18 DEP/	Aerodrome	B-2.4.2 Aerodrome (without ICAO Doc.7910 LOCID)
18 DEST/	Aerodrome	B-2.4.2 Aerodrome (without ICAO Doc.7910 LOCID)
18 DEP/	Supplementary Information Source	B-2.32 Supplementary Information Source

ATS Message Field	FF-ICE Data Item	Reference
18 DOF/	Time	B-2.22 Date included in Time *Note: In FF-ICE, EOBT and the absolute time will be represented as a combined date/time field. In translation, the date of flight will be therefore extracted either from the EOBT data or the absolute time at the Initial Prediction Point (e.g. in case of air-filed flight plan).*
18 REG/	Registration	B-2.17 Registration
18 EET/	Route/Trajectory Boundary Crossings	B-3.5.10 Trajectory Point Property and B-3.5.3 Time
18 SEL/	SELCAL	B-2.15 SELCAL Code
18 TYP/	Non-Standard Type of Aircraft	B-2.5.2 Aircraft Type and Number
18 CODE/	Aircraft Address	B-2.16 Aircraft Address
18 DLE/	Planned Delay	B-3.6 Planned Delay
18 OPR/	Operator	B-2.31 Operator Description
18 ORGN/	Flight Plan Originator Network Address Flight Plan Originator Contact Information	B-2.13 AFTN Address B-2.12 Contact Information
18 PER/	Aircraft Approach Category	B-2.18 Aircraft Approach Category
18 ALTN/	Destination Alternate Aerodrome	B-2.4.2 Aerodrome (without ICAO Doc. 7910 LOCID)
18 RALT/	En-Route Alternate Aerodrome	B-2.4 Aerodrome

ATS Message Field	FF-ICE Data Item	Reference
18 TALT/	Take-Off Alternate Aerodrome	B-2.4 Aerodrome
18 RIF/	Route to Revised Destination	B-2.4 Aerodrome B-2.30 Route string in PANS-ATM Field 15c format
18 RMK/	Remarks	B-2.30 Free Text Information
19	Supplementary Information	B-2.33 Supplementary Information

12.2 TRANSLATION GUIDANCE

12.2.1 This section describes how to construct an ATS message that corresponds with an FF-ICE message.

Notes:

a) When an instruction says to find codes that match those in PANS-ATM (rather than just copy the codes), it is to allow for the possibility that new codes could be added in the FF-ICE environment that do not exist in PANS-ATM Appendix 3.

b) For PANS-ATM Field 18 indicators, do not include the indicator if no data are found for it; i.e. do not include an indicator without any text after it.

c) Message Identifier information is not translated. Fields 3b & 3c of an ATS message are network specific and therefore have no relevance to an FF-ICE message identifier which would anyway be of no value to an aASP.

12.2.2 If syntax and semantic checks have been correctly applied upon reception of the flight plan data, and translation logic correctly described and implemented, then faults during translation should not normally occur. However, if it happens that a data item cannot be translated, for whatever reason, the item should be skipped and a fault condition logged for post-event analysis. The resultant translation may or may not be successful depending upon the compulsory or optional nature of the data item. A fault encountered in translation should not alter the flight plan status.

12.2.3 An ATS message can be derived from the associated message per Table 7 by translating the relevant PANS-ATM fields as follows:

a) Field 03a- set to “FPL” for a Filed Flight Plan, “DLA” or “CHG” for a Flight Plan Update (as appropriate), “CNL” for a Flight Cancellation, “DEP” for a Flight Departure, or “ARR” for a Flight Arrival.

b) Field 07a- set to the Aircraft Identification data item.

c) Field 08a- set to the Flight Rules data item.

d) Field 08b- set to the Type of Flight data item if provided, else omit.

e) Field 09a- set to the sum of the number of aircraft extracted from each Aircraft Type and Number data if the sum is greater than 1, else leave empty. If the sum of the number of aircraft is greater than 99 then insert the value 99.

f) Field 09b- if the sum of the number of aircraft (extracted from each Aircraft Type and Number data) is more than 1 and multiple aircraft types are indicated, or the single Aircraft Type Designator is identified as non-ICAO, then set to “ZZZZ”. Otherwise set to the specified ICAO Aircraft Type Designator.

g) Field 09c- set to the Wake Turbulence Category data item.
Note: If local rules do not recognize the category “J”, then alternate procedures may be required.

h) Field 10a- create the list of codes for Field 10a by finding the Equipment and Capabilities items that match existing codes in PANS-ATM Appendix 3, Field 10a. For example, in FIXM the relevant data items include:

   i. Flight→Aircraft→Capabilities→CommunicationCapabilities→CommunicationCapabilityCode

   ii. Flight→Aircraft→Capabilities→CommunicationCapabilities→DatalinkCommunicationCapabilityCode

   iii. Flight→Aircraft→Capabilities→NavigationCapabilities→NavigationCapabilityCode

   iv. Flight→Aircraft→Capabilities→StandardCapabilityIndicator

i) Field 10b- create the list of codes for Field 10b by finding the Equipment and Capabilities items that match existing codes in PANS-ATM Appendix 3, Field 10b. For example, in FIXM the relevant data items include:
Flight→Aircraft→Capabilities→SurveillanceCapabilityCode

j) Field 13a- set to the Departure Aerodrome data item if it contains an ICAO location indicator. Set to “ZZZZ” if Departure Aerodrome data item contains a name and/or geographical position. Otherwise set to “AFIL”.

k) Field 13b- set to the time of day hours and minutes of the *time*, using the format specified in PANS-ATM Appendix 3 (HHMM). The time should be rounded to the nearest minute if necessary.

   i. The *time* is the Estimated Off Block Time for FPL, CHG, CNL, ARR, RQS and RQP.

   ii. The *time* is Actual Departure Time for DEP and SPL.

   iii. The *time* is the new Estimated Off Block Time for a DLA.

l) Field 15a- set to the Requested Cruising Speed data item, converting the format as necessary.

m) Field 15b- set to the Requested Cruising Level data item, converting the format as necessary. Set to “VFR” if the Requested Cruising Level indicates “VFR” and the flight rules indicate the flight will at least begin as a VFR flight.

n) Field 15c- guidance for the creation of Field 15c is provided in Appendix H.

o) Field 16a- set to the Destination Aerodrome data item if it contains an ICAO location identifier, otherwise set to “ZZZZ”.

p) Field 16b- if a Total Estimated Elapsed Time has been provided, then set to that item. Otherwise find the Route Trajectory Element with a Trajectory Point that has the property End Prediction Point and set to the relative time associated with that Trajectory Point. Note: if total EET is not included, then the End Prediction Point must be the destination.

q) Field 16c- set to the Alternate Destination Aerodrome if one is provided and contains an ICAO location identifier. If it contains a non-ICAO location identifier, then set to “ZZZZ”. If a second Alternate Destination Aerodrome is provided then perform the same procedure, and append the result.

r) Field 17a- set to the Arrival Aerodrome data item if it contains an ICAO location identifier, otherwise set to “ZZZZ”.

s) Field 17b- set to the Actual Arrival Time data item in hours and minutes.

t) Field 17c- set to the Arrival Aerodrome if it contains a name but no ICAO location identifier; otherwise omit.

u) Field 18 STS/- Append the code(s) found in PANS-ATM Appendix 3, STS/ that matches to each of the codes in the Special Handling data item.

v) Field 18 PBN/- Append each of the PBN codes found in the Equipment and Capabilities data item that matches one of the codes in PANS-ATM Appendix 3, PBN/. If there are more than 8 PBN codes that result, filter them by applying the following rules (in the order provided below). Stop applying the rules once 8 codes is reached.

   i. If B2, B3, B4, and B5 are all present then replace with B1

   ii. If C2, C3, and C4 are all present then replace with C1

   iii. If D2, D3, and D4 are all present then replace with D1

   iv. If O2, O3, and O4 are all present then replace with O1

   v. If S1 and S2 are both present then retain only S2

   vi. If T1 and T2 are both present then retain only T1

   vii. If codes for both DME/DME and DME/DME/IRU are present; i.e. C3C4, D3D4, or O3O4, then retain the DME/DME/IRU code; i.e. C4, D4, or O4

   viii. If both GNSS and other codes are present, retain the GNSS code and remove the other (e.g. if C2C3 are present, retain only C2)

ix. If both RNAV 2 and RNAV 1 are present, retain only RNAV 1 (e.g. if C2D2 then retain D2)

w) Field 18 NAV/- the following navigation codes, if found in step h), should be translated to NAV/ entries as indicated:

(Note: these are examples of how the process would work and are not actual existing codes)

Code	NAV/	Meaning
Z1	*Z1*	*DME/DME*
Z2	*Z2*	*DME/DME/IRU*

The following performance based navigation codes, if found in step v), should be translated to NAV/ entries as indicated:

(Note: these are examples of how the process would work and are not actual existing codes)

Code	NAV/	Meaning
Q1	*RNP2A*	*RNP2 using all sensors*
Q2	*RNP2G*	*RNP2 using GNSS*
Q3	*RNP2D*	*RNP2 using DME/DME*
Q4	*RNP2I*	*RNP2 using DME/DME/IRU*

x) Field 18 COM/- TBD (will be like item w) NAV/)

y) Field 18 DAT/- TBD (will be like item w) NAV/)

z) Field 18 SUR/- the following codes, if found in step i), should be translated to SUR/ entries as indicated:

FF-ICE Code	SUR/	Meaning
TBD	RSP180	RSP 180 per B-2.10.15
TBD	RSP400	RSP 400 per B-2.10.15

Code	SUR/	Meaning	Comment / Airworthiness Approval
EA0	EA0	ADS-B Out	EASA AMC20-24 or CASA CAO20.18

aa) Field 18 DEP/- set to the Departure Aerodrome data item if:
   i. a non-ICAO departure aerodrome was provided, or
   ii. the aircraft has not taken off from an aerodrome, or
   - set to Supplementary Information Source data item if the flight plan was filed while in the air.

bb) Field 18 DEST/- set to the Destination Aerodrome data item if a non-ICAO destination aerodrome was provided.

cc) Field 18 DOF/- set to the date extracted from the Estimated Off-Block Time data or the absolute time at the Initial Prediction Point (e.g. in case of air-filed flight plan), using the format specified in PANS-ATM Appendix 3 (YYMMDD). If the message being translated provides an update to the Estimated Off-Block time which includes a change to the date e.g. a delay over midnight, this item shall be set to the existing date of flight, which is the date of flight prior to the application of the change.

dd) Field 18 REG/- set to the Registration data item.

ee) Field 18 EET/- Extract EET/ times by finding each trajectory point in the Route/Trajectory that has the property “Prescribed EET Point” and/or “FIR Boundary Crossing Point”. Then create the entry considering each of the following cases in order:

   i. If the point has the property “FIR Boundary Crossing Point” then create the EET entry from the concatenation of the FIR Boundary Crossing Point Reference Data and the time at the point expressed as a duration (HHMM).

   ii. If the trajectory point property has Reference Data then create the EET entry from the concatenation of the Reference Data and the time at the point expressed as a duration (HHMM).

   iii. If neither of the above are applicable then create the EET entry from the concatenation of the associated Route Element Start Point and the time at the point expressed as a duration (HHMM).

   iv. If none of the above cases are applicable then do not create an EET entry.

ff) Field 18 SEL/- set to the SELCAL Code data item.

gg) Field 18 TYP/- If Field 09b was set to “ZZZZ”, enter each provided Aircraft Type Designator preceded by the number of aircraft for that type (if greater than 1).

hh) Field 18 CODE/- set to the Aircraft Address data item.

ii) Field 18 DLE/- for each Planned Delay associated with a Route/Trajectory Element, append the associated Route Element Start Point followed by the amount of delay specified in the Planned Delay data element (expressed as hours and minutes, HHMM).

jj) Field 18 OPR/- set to the Operator data item.

kk) Field 18 ORGN/- set to the Flight Plan Originator data item.

ll) Field 18 PER/- set to the code specified for Aircraft Approach Category.

mm) Field 18 ALTN/- For each Alternate Destination Aerodrome (two allowed), if the aerodrome identifier is indicated as non-ICAO then include it in ALTN/.

nn) Field 18 RALT/- For each En-Route Alternate Aerodrome (20 allowed), if the aerodrome identifier is indicated as non-ICAO then include it in RALT/.

oo) Field 18 TALT/- For each Take-off Alternate Aerodrome (two allowed), if the aerodrome identifier is indicated as non-ICAO then include it in TALT/.

pp) Field 18 RIF/- Set to the Route to Revised Destination data item.

qq) Field 18 RVR/- RVR/ is a Field 18 indicator not documented in the PANS-ATM, but defined in ICAO Doc. 7030 in the European Region (EUR) Supplementary Procedures. RVR stands for Runway Visual Range. Set to the Required Runway Visual Range data item.

rr) Field 18 RMK/- There are several categories of information that may be inserted here:

i. If there are any Special Handling codes that have no equivalent PANS-ATM codes, insert them in RMK/. The special handling codes should be the first items in RMK/.

ii. Append Remarks if present.

ss) Field 19a- if Supplementary Information fuel endurance is defined, insert the endurance as hours and minutes preceded by “E/”.

tt) Field 19b- if Supplementary Information number of persons on board is defined, insert the numeric value preceded by “P/”.

uu) Field 19c- if Supplementary Information types of emergency radios is defined, insert (without spaces), preceded by “R/”:

i. “U” if UHF radio is included;

ii. “V” if VHF radio is included:

iii. “E” if Emergency Locator Transmitter is included.

vv) Field 19d- if Supplementary Information types of survival capabilities is defined, insert (without spaces), preceded by “S/”:

i. “P” if Polar is included;

ii. “D” if Desert is included;

iii. “M” if Maritime is included;

iv. “J” if Jungle is included.

ww) Field 19e- if Supplementary Information characteristics of life jackets is defined, insert (without spaces), preceded by “J/”:

i. “L” if Light is included;

ii. “F” if Fluorescence is included;

iii. “U” if UHF radio is included;

iv. “V” if VHF radio is included.

xx) Field 19f- if Supplementary Information dinghies on board is defined, insert the dinghy information preceded by “D/”; the dinghy items, presented in the following order, to be separated by spaces:

i. Number of dinghies carried;

ii. Capacity of the dinghies carried;

iii. The literal “C” if the dinghies are indicated as covered;

iv. The colour of the dinghies.

yy) Field 19g- if Supplementary Information aircraft colour and markings is defined, insert the aircraft colour and markings preceded by “A/”.

zz) Field 19h- if Supplementary Information other survival equipment or remarks is defined, insert the other information/remarks preceded by “N/”.

aaa) Field 19i- if Supplementary Information name of pilot is defined, insert the pilot name preceded by “C/”.

bbb) Field 22/7- FF-ICE does not support a change to the aircraft identification (see 6.4.2.2).

ccc) Field 22/8- if the update specifies a change to the flight rules, insert flight rules and (if present) type of flight per Field 08, preceded by “-8/”.

ddd) Field 22/9- if the update specifies a change to number and/or type of aircraft and/or the wake turbulence category, insert number and type of aircraft and wake turbulence category per Field 09, preceded by “-9/”.

eee) Field 22/10- if the update specifies a change to the flight equipment and capabilities codes, insert the equipment and capabilities per Field 10, preceded by “-10/”.

fff) Field 22/13- if the update specifies a change to the departure aerodrome or EOBT, insert the departure aerodrome and EOBT per Field 13, preceded by “-13/”.

ggg) Field 22/15- if the update specifies a change to that part of the route relevant to Field 15 (see Appendix H, Table 32), the requested cruising speed or the requested cruising level, insert the route per Field 15, preceded by “-15/”.

hhh) Field 22/16- if the update specifies a change to the destination aerodrome, total estimated elapsed time, or alternate destination aerodromes, insert the destination aerodromes, total estimated elapsed time, and destination alternates as applicable, preceded by “-16/”.

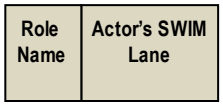
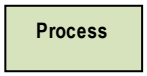
iii) Field 22/18- if the update specifies a change to one of the data elements listed below, insert the other information per Field 18, preceded by “-18/”. Data elements:

- Flight characteristics, special handling;
- PBN RNAV and RNP capabilities (B-2.10.5 – B-2.10.9);
- Other navigation capability (B-2.10.2);
- Other communication capability (B-2.10.2);

- Other datalink capability (B-2.10.2);
- Other surveillance capability (B-2.10.2);
- Departure aerodrome if not an ICAO code;
- Destination aerodrome if not an ICAO code;
- Date of Flight;
- Aircraft characteristics, registration;
- Aircraft characteristics, SELCAL code;
- Aircraft characteristics, number and type of aircraft, if not limited to a single aircraft type with an ICAO code;
- Aircraft characteristics, address;
- Route/trajectory group, planned delay;
- Flight characteristics, operator;
- Flight characteristics, flight plan originator;
- Aircraft characteristics, approach category;
- Alternate destination, aerodromes;
- Alternate en-route aerodromes;
- Alternate take-off aerodromes;
- Route to revised destination;
- Runway Visual Range;
- Flight characteristics, additional remarks.

APPENDIX A – Key to Swimlane Diagrams

SWIMLANE diagrams are used to illustrate the various procedures that have to be implemented in support of FF-ICE. The following table provides a key to the conventions used in the diagrams:

Key to notations used in diagrams	
	SWIMLANES are indicated on the diagrams as alternate grey and white rows. The left hand cell provides an indication of either an actor's role (e.g. Flight Plan Originator (FPO), eASP) or a system service (e.g. Translation) or a manual service (e.g. Manual Correction).
	Processes appear in the SWIMLANES. Different colours are used for the processes in different SWIMLANES.
	A yellow box indicates the initiation of a process.
	Data which is communicated between actors and services appear as a blue document symbol
	Published data appears as a blue database symbol. Published in this context means that the data are made available to all, or a subset of, registered and relevant data consumers.
	An inverted text box indicates that an entire nested procedure has to be executed at this point in the current procedure
	Control flows appear as solid lines.
	Data Flows appear as dashed lines
	A Callout box, provides additional information about a procedure or process.

APPENDIX B – FF-ICE Model & Data

B-1 Information and Data Exchange Models

B-1.1.1 The data exchange model shall use the data conventions specified in B-2.

The data exchange model shall support the information exchanges described in APPENDIX C – FF-ICE Messages

B-2 Data Conventions

B-2.1 Vertical Position of Aircraft

B-2.1.1 The expression of aircraft vertical position shall allow indication of a flight level or altitude as necessary, consistent with PANS-ATM section 4.10.

B-2.1.2 The expression of a flight level or altitude shall allow indication of meters or feet.

B-2.1.3 The expression of a flight level or altitude shall support precision appropriate for the operational use of the information. The vertical position of an aircraft when expressed within a trajectory should at least allow precision to within 1 meter or 1 foot as applicable.

B-2.1.4 The expression of an altitude shall support referencing to QFE or QNH as appropriate, and be consistent with PANS-ATM section 4.10.

B-2.1.5 A requested cruising level shall be expressed in even 100 foot increments when using units of feet.

B-2.1.6 A requested cruising level shall be expressed in even 10 meter increments when using units of meters.

B-2.1.7 The expression of aircraft vertical position shall allow indication of 'VFR' for a flight operated under VFR flight rules and for which a specific altitude has not been provided.

B-2.2 Position

B-2.2.1 The expression of a position (or predicted position) shall allow any of the forms described in PANS-ATM Appendix 3, section 1.6.3.

B-2.2.2 The expression of position as a latitude/longitude should be with respect to the WGS-84 reference ellipsoid.

B-2.2.3 The expression of a position shall allow varying precision to be used, appropriate to the operational use of the data. The position of an aircraft when expressed within a trajectory should at least allow precision to within 1 second of latitude/longitude or its equivalent.

B-2.3 Route Identifier

B-2.3.1 The expression of a route identifier shall allow for the specification of an ATS Route, Standard Departure Route, and Standard Arrival Route as described in Appendices 2 and 3 of PANS-ATM.

B-2.3.2 When a Standard Departure Route or Standard Arrival Route is seven characters, it should be possible to include both the seven-character name and the shortened name as described in Annex 11, Appendix 3, paragraph 2.2. A note there states:

Note.— Limitations in the display equipment on board aircraft may require shortening of the basic indicator, if that indicator is a five-letter name-code, e.g. KODAP. The manner in which such an indicator is shortened is left to the discretion of operators.

In practice, the ARINC 424 specification contains an algorithm used to shorten seven character names. This algorithm results in publication of shortened names that are used in FMS databases and in some ground automation systems. Making both names available allows each system to use the designator consistent with their database. Note also that as automated uplink of clearances to aircraft is implemented a ground system using the seven-character name will need to upload the shorter name for it to load to the FMS successfully.

B-2.4 Aerodrome

B-2.4.1 The specification of an Aerodrome shall allow use of an appropriate location identifier per ICAO Doc. 7910.

B-2.4.2 The specification of an Aerodrome shall allow identification of an aerodrome that has no Doc. 7910 location identifier. For an aerodrome without a Doc. 7910 identifier, the data specification shall allow a name and/or a geographical position (per B-2.2.2) to be included.

B-2.4.3 A departure aerodrome should allow for identification of a flight that has filed its flight plan while in the air or for which the departure aerodrome is not known, beginning its route description from a specified point en-route, and therefore may not have provided a departure aerodrome.

B-2.4.4 The specification of an Aerodrome shall allow an IATA aerodrome identifier per the IATA City Code Directory to be included in addition to the ICAO identifier. (An aerodrome will never be identified only by the IATA identifier.)

B-2.5 Aircraft Type and Number

B-2.5.1 The specification of an aircraft type shall allow expression of a four-character type designator per ICAO Doc. 8643. Such indicators are two to four alphanumeric characters, starting with a letter.

B-2.5.2 The specification of an aircraft type shall allow expression of a type that has no Doc. 8643 identifier, with indication that it is not a standard identifier.

B-2.5.3 The specification of aircraft type shall allow expression of the number of aircraft for each of the various type designators involved in a formation flight.

B-2.5.4 Number of aircraft shall be represented as a positive integer number.

B-2.6 Aircraft Identification

B-2.6.1 An Aircraft Identification for purposes of communication with Air Traffic Services shall allow any of the following:

a) The ICAO designator for the aircraft operating agency as defined in ICAO Doc. 8585 followed by the flight identification (e.g. KLM511, NGA213, JTR25);

b) The nationality or common mark and registration mark of the aircraft consistent with Annex 7 (e.g. EIAKO, 4XBCD, N2567GA); or

c) A two to seven character identifier as specified by an ATM Service Provider.

B-2.6.2 The specification of an Aircraft Identification shall allow the IATA operator code and commercial flight identifier to be included in addition to the identifier for ATS purposes described in B-2.6.1. (An aircraft identification will never be identified only by the IATA identifier).

B-2.7 Flight Rules

B-2.7.1 A Flight Rules designator shall allow communication of the following types of flight rules:

a) Intention to operate the entire flight under the IFR;

b) Intention to operate the entire flight under the VFR;

c) Intention to operate initially under the IFR, followed by one or more subsequent changes of flight rules; or

d) Intention to operate initially under the VFR, followed by one or more subsequent changes of flight rules.

B-2.8 Dangerous Goods Information

B-2.8.1 Expression of information regarding dangerous goods being carried on a flight shall support all items defined in the Technical Instructions for the Safe Transport of Dangerous Goods by Air (ICAO Document 9284), Part 7, section 4.1.1.1.

B-2.9 Wake Turbulence Category

B-2.9.1 Expression of a Wake Turbulence Category shall support at a minimum the categories defined in PANS-ATM section 4.9.1. The category identified by the letter “J”, as recommended via State Letter (TEC/OPS/SEP – 08-0294.SLG), shall also be supported.

B-2.10 Equipment and Capability

B-2.10.1 Expression of Equipment and Capability shall allow derivation of the codes defined in PANS-ATM Item 10 where applicable. Note that new types of capability that have no corresponding PANS-ATM Appendix 3 designator may be lost on translation to PANS-ATM Appendix 3 ATS Message format.

B-2.10.2 Expression of Equipment and Capability shall allow for specification of capabilities that are not pre-defined. This is to allow for new capabilities or ANSP-specific capabilities that have not been designated standard codes but are required in a flight plan.

B-2.10.3 Expression of Navigation Capability shall allow identification of the following capabilities at a minimum:

a) Automatic Direction Finder (ADF)

b) VHF omnidirectional radio range (VOR)

c) UHF tactical air navigation aid (TACAN)

d) Distance Measuring Equipment (DME)

e) Global Navigation Satellite System (GNSS)

f) Indicate presence of Space Based Augmentation System (SBAS)

g) Indicate presence of Ground Based Augmentation System (GBAS)

h) Inertial Navigation (INS)

i) VOR/DME

j) DME/DME

k) DME/DME/Inertial Reference Unit (IRU)

l) Reduced Vertical Separation Minimum (RVSM)

B-2.10.4 Expression of Approach Capability shall allow identification of the following capabilities at a minimum:

a) Instrument Landing System (ILS)

b) Microwave Landing System (MLS)

c) Localizer Performance with Vertical Guidance (LPV)

d) Ground-Based Augmentation Landing System (GBAS Landing System)

B-2.10.5 Expression of PBN capability shall allow derivation of the codes defined in PANS-ATM Appendix 3, item 18 PBN/ where applicable.

B-2.10.6 Expression of PBN capability shall allow identification of the type of navigation capability used to achieve the performance (e.g. RNAV 1 achieved using GNSS).

B-2.10.7 Expression of PBN capability shall allow identification of optional functional capabilities described in ICAO Doc. 9613 Vol. 1, Attachment A, section 5 (e.g. Fixed Radius Path capabilities including RF legs and Fixed Radius Turns).

B-2.10.8 Expression of PBN capability shall allow identification of the type of Vertical Navigation required, as explained in ICAO Doc. 9613 Part A. section 1.1.4.2.

B-2.10.9 Expression of PBN capability shall allow capabilities defined in ICAO Doc. 9613 to be represented, at a minimum to include:

a) Minimum Navigation Performance Specifications (MNPS)

b) RNP 10 (RNAV 10)

c) RNP 4

d) RNAV 5

e) RNAV 2

f) RNAV 1

g) RNP 2 Continental

h) RNP 2 Oceanic

i) RNP 1

j) RNP 0.3

k) RNP Approach

l) RNP AR Approach, including the accuracy level approved (within the range indicated in ICAO Doc. 9613 Table II-A-1-1). The ability to default to the least-accurate specification should be accommodated.

B-2.10.10 Expression of Communication Capability shall allow at a minimum the following voice communication capabilities:

a) VHF Radiotelephone (RTF)

b) VHF RTF with 8.33 kHZ spacing

c) UHF RTF

d) HF RTF

e) Inmarsat Satcom RTF

f) MTSAT Satcom RTF

g) Iridium Satcom RTF

B-2.10.11 Expression of Communication Capability shall allow at a minimum the following data communication capabilities:

a) ATN Controller Pilot Data Communications (CPDLC)

i. Via VHF Data Link (VDL) Mode 2

b) FANS 1/A CPDLC

i. Via HF Data Link (HFDL)
ii. Via VHF Data Link, Mode 2 (VDL Mode 2)
iii. Via VDL Mode 0/a (ACARS)
iv. Via Satcom (Inmarsat)
v. Via Satcom (MTSAT)
vi. Via Satcom (Iridium)

c) ACARS

i. Waypoint Reporting (WPR)
ii. Digital Flight Information System (D-FIS)
iii. Pre-Departure Clearance (PDC)

B-2.10.12 Expression of Required Communication Performance shall support at a minimum the categories defined in ICAO Doc. 9869.

B-2.10.13 Expression of Surveillance Capability shall allow at a minimum indication of the following transponder capabilities. Sub-items indicate optional capabilities:

a) Mode A transponder

i. With Mode C altitude

b) Mode S transponder

i. With altitude encoding
ii. With aircraft ID
iii. With extended squitter (ADS-B)
iv. With enhanced Mode S

B-2.10.14 Expression of Surveillance Capability shall allow at a minimum indication of the following ADS-B capabilities including the ability to indicate whether certified against:

- EASA AMC20-24,
- CASA CA020.18,
- USA 14 CFR 91.227 / FAA AC 20-165 (all versions),
- EASA CS-ACNS.D.ADSB, and/or
- EASA CS-STAN 005 configuration 1.

a) VDL Mode 4

i. With “Out” Capability
ii. With “In” Capability

b) 1090 MHz

i. With “Out” Capability
ii. With “In” Capability

c) Universal Access Transceiver (UAT)

i. With “Out” Capability
ii. With “In” Capability

d) ADS-B In with the following capabilities / approvals:

i. Airborne traffic situational awareness (AIRB)
ii. Own Visual Separation in Approach (VSA)
iii. Traffic Situational Awareness on the Surface (SURF)
iv. Traffic Situational Awareness with Alerts (TSAA)
v. CDTI (Cockpit Display of Traffic Information) Assisted Visual Separation (CAVS) RTCA DO-317B / EUROCAE ED-194A
vi. Flight Deck based Interval Management for Spacing (FIM-S) RTCA DO-361 / EUROCAE ED-236
vii. Advanced Interval Management (A-IM) RTCA DO-361A / EUROCAE ED-236A
viii. Paired Approach (PA) RTCA DO-361A / EUROCAE ED-236A
ix. In trail Procedures (ITP) RTCA DO-317A / EUROCAE ED-194 (including subsequent versions)

B-2.10.15 Expression of Surveillance Capability shall allow at a minimum indication of the following ADS-C capabilities:

a) ATN

b) FANS 1/A

B-2.10.16 Expression of Surveillance Capability shall allow at a minimum indication of categories of Required Surveillance Performance as described in ICAO Doc. 9869 (Performance-Based Communication and Surveillance Manual).

B-2.11 Aircraft Speed

B-2.11.1 Expression of Aircraft Speed shall allow at a minimum indication of True Airspeed; Indicated Airspeed; Ground Speed and/or Mach Number

B-2.11.2 Expression of true airspeed, indicated airspeed, and ground speed shall support:

a) Speed in knots;

b) Speed in kilometers per hour,

c) Mach Number

B-2.11.3 The speed of an aircraft when expressed within a trajectory should at least allow precision to within 1 knot, 1 km/h or Mach Number to thousandths (0.001M), as applicable.

B-2.12 Contact Information

B-2.12.1 The expression of contact information shall allow for name, phone number, email, and/or physical address.

B-2.13 AFTN Address

B-2.13.1 An address in accordance with the PANS-ATM section 11.2.1.2.3 and Annex 10, volume 2.

B-2.14 Flight Plan Version

B-2.14.1 A flight plan version shall indicate uniquely the latest version of a flight plan submitted by an operator.

B-2.14.2 A flight plan version should be operationally usable for verification that the pilot or operator and ATM personnel are using the same information for the flight.

B-2.14.3 The format of a Flight Plan Version must allow it to be incremented so that a recipient knows whether a version just received is newer or older than a currently stored version.

B-2.15 SELCAL Code

B-2.15.1 Expression of a Selective Calling (SELCAL) code shall be four characters consistent with the definitions in Annex 10, Volume 3, Part II, chapter 3.

B-2.16 Aircraft Address

B-2.16.1 An aircraft address shall be expressed as a hexadecimal number in accordance with Annex 10, Volume 3, Part I, chapter 9.

B-2.17 Registration

B-2.17.1 An aircraft registration shall be expressed in accordance with the requirements and assignments in chapter 3 of Annex 7.

B-2.18 Aircraft Approach Category

B-2.18.1 Aircraft Approach Category shall be expressed as one of the aircraft categories specified in the Procedures for Air Navigation Services — Aircraft Operations (PANS-OPS, ICAO Doc 8168), Volume I, section 4, chapter 1, paragraph 1.3.

B-2.19 Type of Flight

B-2.19.1 Expression of type of flight shall be traceable to one of the following:

a) Scheduled Air Transport;

b) Non-Scheduled Air Transport;

c) General Aviation;

d) Military;

e) Other.

B-2.20 Special Handling

B-2.20.1 Expression of Special Handling designators shall at a minimum support the following categories. The abbreviated designators shown (e.g. “ALTRV”) are for ease of traceability to the PANS-ATM special handling categories, but are not a required part of the FF-ICE data item.

a) ALTRV: for a flight operated in accordance with an altitude reservation;

b) ATFMX: for a flight approved for exemption from ATFM measures by the appropriate ATS authority;

c) FFR: fire-fighting;

d) FLTCK: flight check for calibration of navaids;

e) HAZMAT: for a flight carrying hazardous material;

f) HEAD: a flight with Head of State status;

g) HOSP: for a medical flight declared by medical authorities;

h) HUM: for a flight operating on a humanitarian mission;

i) MARSA: for a flight for which a military entity assumes responsibility for separation of military aircraft;

j) MEDEVAC: for a life critical medical emergency evacuation;

k) NONRVSM: for a non-RVSM capable flight intending to operate in RVSM airspace;

l) SAR: for a flight engaged in a search and rescue mission; and

m) STATE: for a flight engaged in military, customs or police services.

B-2.21 Duration

B-2.21.1 Expression of a duration, the amount of elapsed time between two events, shall be expressed with a resolution appropriate to the operational use.

B-2.22 Time

B-2.22.1 Expression of a time should use a resolution appropriate to the operational use of the event being communicated.

B-2.22.2 Expression of an absolute time shall be in Universal Coordinated Time (UTC).

B-2.22.3 Expression of an absolute time shall include the date (expressed as year, month and day) on which it occurs.

B-2.23 Flight Status

B-2.23.1 Expression of Planning Status shall allow for the following indications:

a) Concur

b) Negotiating

c) Non-Concur

B-2.23.2 Expression of Filing Status shall allow for the following indications:

a) Acceptable

b) Not Acceptable

c) Pending

B-2.24 Type of Request/Response

B-2.24.1 Expression of a request or response shall allow for each identified message type in PANS-ATM chapter 17.

B-2.25 Mode A Code

B-2.25.1 Expression of a Mode A beacon code shall contain four octal digits consistent with Annex 10, Volume IV.

B-2.26 Message Identifier

B-2.26.1 A message identifier shall allow identification of a message sent between two parties.

B-2.26.2 A message identifier between two parties shall be unique for at least 24 hours.

B-2.26.3 Note that the message identifier is used in a response message to indicate the message to which it is responding. The message identifier may be implemented by the communications infrastructure as long as it is provided to the application for this purpose.

B-2.27 Submission Status

B-2.27.1 A submission status of “ACK” shall indicate that a message could be processed and acted on.

B-2.27.2 A submission status of “REJ” shall indicate that a message could not be processed and acted on, and was not retained by the receiving system.

B-2.27.3 A submission status of “MAN” shall indicate that a message could not be processed and acted on, and the receiving unit is attempting manual handling of the message.

B-2.28 FF-ICE Participant

B-2.28.1 Each FF-ICE Participant shall be identified by a unique code.

B-2.28.2 The FF-ICE participant identifiers will be dictated by the communications infrastructure.

B-2.29 Globally Unique Flight Identifier (GUFI)

B-2.29.1 A GUFI shall consist of a Version 4 Universally Unique Identifier (UUID) as described in IETF RFC 4122.

B-2.29.2 The GUFI should rely on proven algorithms published in standard libraries referring to UUID Version 4.

B-2.29.3 The GUFI should include a namespace identifier providing an indication of the GUFI generator (see 3.7.5.2).

B-2.29.4 The GUFI should include the creation timestamp to further decrease the chances of a GUFI collision (see 3.7.5.2).

B-2.30 Free-Text Information

B-2.30.1 The expression of free text information (e.g. Remarks) shall allow IA5 character strings.

B-2.30.2 The expression of free text information shall be translatable into text that is allowable in PANS-ATM Appendix 3, item 18. For example, special characters such as hyphen are not permissible within PANS-ATM Item 18. Reasonable size limitations must also be considered, and it should be clear how many characters are permitted before information will be truncated on translation.

B-2.31 Operator Description

B-2.31.1 An Operator Description is intended to identify the actual operator of a flight when it is not obvious from the aircraft identification.

B-2.31.2 Expression of an Operator Description shall be in the form of Free-Text information as described in B-2.30 and should not exceed 20 characters.

B-2.32 Supplementary Information Source

B-2.32.1 A Supplementary Information Source is intended to identify where search and rescue supplementary information for a flight can be obtained.

B-2.32.2 A Supplementary Information Source can be identified using an Addressee Indicator (from Doc. 7910 + Doc. 8585) for an ATS unit; an AFTN address; FF-ICE Participant identification per B-2.28; or appropriate contact information per B-2.12.

B-2.33 Supplementary Information

B-2.33.1 Expression of Supplementary Information shall allow specification of fuel endurance expressed as hours and minutes of flying time.

B-2.33.2 Expression of Supplementary Information shall allow specification of an integer number of persons on board.

B-2.33.3 Expression of Supplementary Information shall allow specification of the types of emergency radios carried on board, including at a minimum:

a) UHF radio

b) VHF radio

c) Emergency Locator Transmitter (ELT)

B-2.33.4 Expression of Supplementary Information shall allow specification of the types of Survival Capabilities on board, including at a minimum:

a) Polar

b) Desert

c) Maritime

d) Jungle

B-2.33.5 Expression of Supplementary Information shall allow specification of the characteristics of Life Jackets on board, including at a minimum:

a) Light

b) Fluorescence

c) UHF radio

d) VHF radio

B-2.33.6 Expression of Supplementary Information shall allow specification of the aircraft colour and markings as free text per B-2.30.

B-2.33.7 Expression of Supplementary Information shall allow specification of the name of the pilot in command as free text per B-2.30.

B-2.33.8 Expression of Supplementary Information shall allow specification of the Dinghies on board, including:

a) Number of dinghies

b) Capacity of all dinghies

c) Color of the dinghies

d) An indication if the dinghies are covered

B-2.33.9 Expression of Supplementary Information shall allow specification of clarifying remarks and other survival equipment carried that is not specified above.

B-2.34 Aircraft Mass

B-2.34.1 Expression of Aircraft Mass shall allow specification of predicted mass in either kilograms or pounds.

B-2.35 ASP Identification

B-2.35.1 Expression of an ASP shall include the identity, capability (FF-ICE or ATS Message), and relevant communication address(es).

B-2.36 General Flight Constraint

B-2.36.1 A general flight constraint is intended to express a constraint on the flight that cannot be associated with a specific trajectory point, either because it is not relevant to only a specific point or because it is not possible to identify the point.

B-2.36.2 Expression of a general flight constraint shall allow for identification of a reference to a published restriction that has generated the constraint; description of

applicability; and description of the constraint; i.e. the impact of the restriction on the flight. If a reference is provided, then the descriptive data are optional. If there is no reference to published information, then descriptive data are required.

B-2.36.3 As with other flight constraints, reference to a published restriction should allow reference to a NOTAM; advisory; or AIXM identifier as necessary.

B-2.36.4 Description of the applicability shall accommodate a free-text description.

B-2.36.5 Description of the constraint shall accommodate a free-text description.

B-2.37 Airport Slot

B-2.37.1 Departure and Arrival Airport Slot Identification contains information that, combined with other flight plan data, such as date of flight, time and departure (arrival) aerodrome code, facilitates the correlation between the flight plan and its allocated departure (arrival) airport slot.

B-2.38 AIRAC Reference

B-2.38.1 The AIRAC reference provides an indication of the AIRAC data set that has been used by the operator in the computation of the flight plan. The reference used is the AIRAC effective date.

B-2.39 Required Runway Visual Range

B-2.39.1 The minimum RVR value required by a flight in order to execute an approach to land at the destination aerodrome in accordance with the applicable ATM configuration.

B-2.39.2 The RVR should be indicated in units, either feet or meters, as appropriate for the eASP responsible for the destination aerodrome.

B-2.40 Actual Arrival Reference Data

B-2.40.1 The point on the arrival aerodrome to which the arrival time refers. The point is identified using an appropriate trajectory point property, such as Wheels-On or In-Block, and may include its geographical position.

B-2.41 Actual Departure Reference Data

B-2.41.1 The point on the departure aerodrome to which the departure time refers. The point is identified using an appropriate trajectory point property, such as Off-Blocks or Wheels-Off, and may include its geographical position.

B-2.42 Runway Identifier

B-2.42.1 The expression of a Runway Identifier shall allow for the specification of a runway designation as described in Annex 14, Vol 1.

B-2.43 Trajectory Purpose

B-2.43.1 An indication of the eASPs intended purpose in providing an Agreed R/T in a Filing Status. Allowed values are:

a) SYNCH – the Agreed R/T is provided to enable the operator to synchronise its trajectory with the ATS trajectory;

b) ATC CHANGE – the Agreed R/T contains a significant modification to the route that would alter the ATC clearance and must therefore be taken into consideration by the operator.

B-3 Flight Route/Trajectory Group

B-3.1 Flight Route/Trajectory Group

B-3.1.1 A Flight Route/Trajectory Group shall support the data elements and relationships shown in Figure 30.

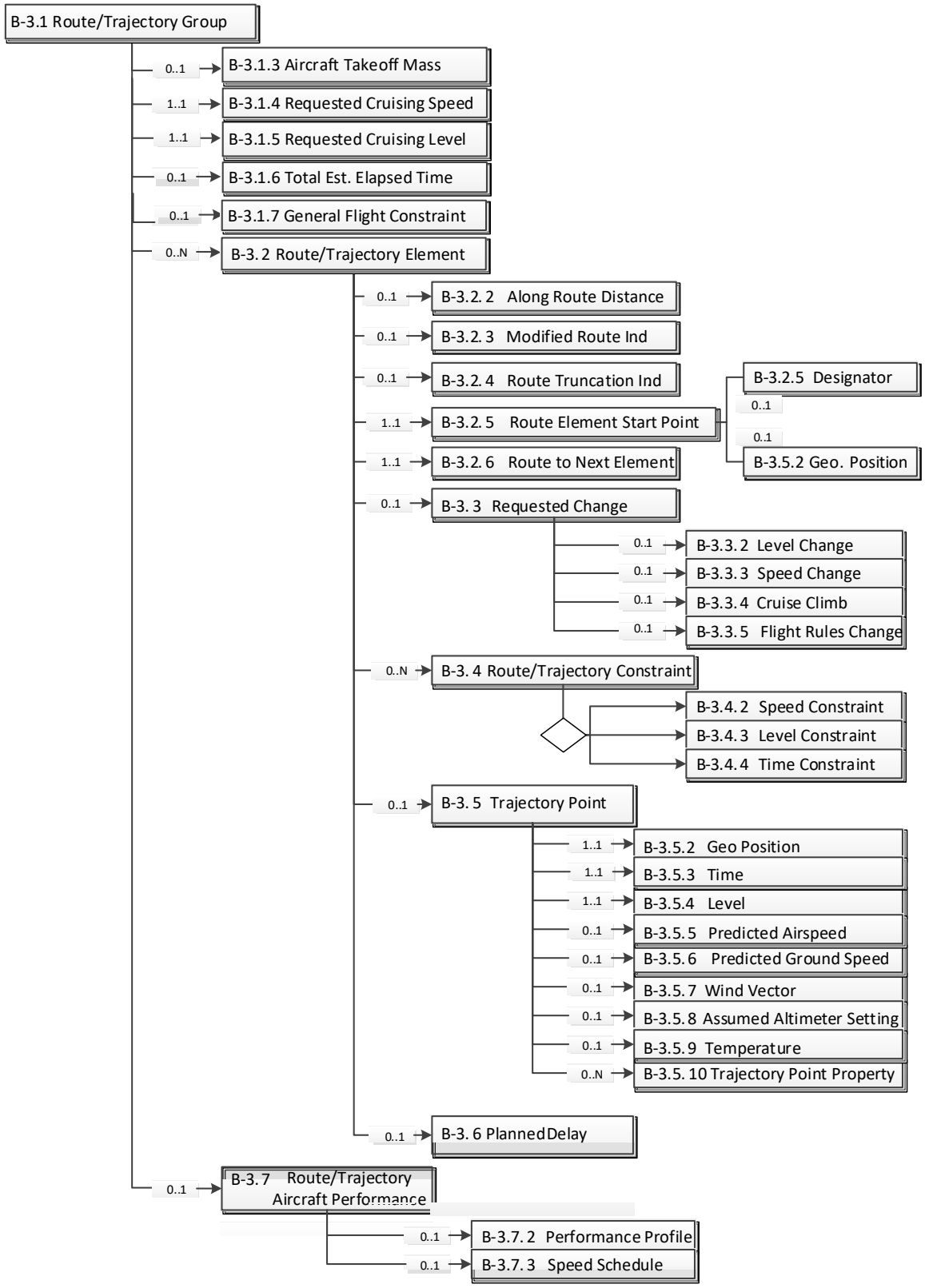


Figure 30: Route/Trajectory Group

B-3.1.2 A Flight Route/Trajectory Group shall be identified as one of the following, consistent with the definitions in section 10.1.1:

a) Desired;
b) Negotiating;
c) Agreed.

B-3.1.3 **Aircraft Take-Off Mass —** Predicted take-off mass shall be allowed for each Route/Trajectory Group submitted per B-2.34. Take-off mass is associated with the Route/Trajectory since each contemplated route/trajectory could have different fuel loads. There is no condition under which take-off mass should be required.

B-3.1.4 **Requested Cruising Speed —** The requested cruise speed shall be provided as per B-2.11. The requested cruise speed shall be required for each Route/Trajectory group submitted. If there are no requested changes or constraints along the route, this will be the sole cruising speed used for estimation.

B-3.1.5 **Requested Cruising Level —** The requested cruise level shall be provided as per B-2.1. The requested cruising level shall be required for each Route/Trajectory group submitted. If there are no requested changes or constraints along the route, this will be the sole cruising level used for estimation.

B-3.1.6 **Total Estimated Elapsed Time —** The total estimated elapsed time from take-off to arrival (see definition in PANS-ATM chapter 1) should be provided when a complete set of trajectory points are not included.

B-3.1.7 **General Flight Constraint –** the General Flight Constraint shall be allowed for each Route/Trajectory Group submitted per B-2.36 to express a constraint on the flight that cannot be associated with a specific trajectory point, either because it is not relevant to only a specific point or because it is not possible to identify the point.

B-3.2 Route/Trajectory Element

B-3.2.1 A Route/Trajectory Element defines a portion of the route and can be at one of three levels as described below:

a) A Route Element defined by a Significant Point and the ATS Route (or direct route) to be followed until a change in route.
b) An Expanded Route Element defined by a Significant point, and the ATS Route (or direct route) to be followed until the next Significant Point, which may be along the same ATS Route.
c) A Trajectory Element defined by a geographic point and the ATS Route (or direct route) followed until the next trajectory point.

B-3.2.2 **Along-Route Distance —** Each Route/Trajectory Element shall allow inclusion of the along-route distance of the start point of that element. Along-Route Distance may be specified in units of nautical miles or kilometres and should at least allow precision to within 1 meter or equivalent.

B-3.2.3 **Modified Route Indicator —** Each Route/Trajectory Element shall allow indication that the element is different from the operator submitted route. A reference to an ATFM program name may also be included (if applicable).

B-3.2.4 **Route Truncation Indicator —** A Route/Trajectory Element shall allow indication that the route provided is incomplete and ends (N.B. cannot be used to truncate the beginning of the route) at the current element. When a Route Truncation Indicator is set, the following conditions should hold:

a) A Route Element Start Point (B-3.2.5) should be included;
b) A Route To Next Element (B-3.2.6) should not be included; and

c) There should be no additional Route/Trajectory Elements.

B-3.2.5 **Route Element Start Point —** A Route Element Start Point shall be specified as a Position as specified in B-2.2, or as an Aerodrome as specified in B-2.4. When the Route Element Start Point is indicated by a coded designator assigned to an en-route point, the geographic position of the point may optionally be provided.

B-3.2.6 **Route to Next Element —** An indication that that route to the next element is either:

a) Direct

b) On an ATS Route (includes Standard Departure Route, Standard Arrival Route)

c) Unspecified (e.g. will be indicated as 'unspecified' on a route element with a planned delay)

When on an ATS Standard Departure, or Standard Arrival Route, a route identifier as described in the appropriate section of B-2.3 is included.

B-3.3 Requested Change

B-3.3.1 A Requested Change indicates Operator intent to change altitude, speed, and/or flight rules at the start point of a Route/Trajectory Element. Each Route/Trajectory Element may contain a requested change; which may specify speed, level, and/or flight rules.

B-3.3.2 **Cruising Level Change —** A Route/Trajectory Element may contain a change in cruising level (expressed as per B-2.1). The Level Change may also specify whether the change is expected to begin or to complete at the position associated with the Element. A Level Change may be associated with a Route Element, Expanded Route Element, or Trajectory Element.

B-3.3.3 **Cruising Speed Change —** A Route/Trajectory Element may contain a change in cruising speed (expressed per B-2.11). The Speed Change may also specify whether the change is expected to begin or to complete at the position associated with the Element. A Speed Change may be associated with a Route Element, Expanded Route Element, or Trajectory Element.

B-3.3.4 **Cruise Climb —** A Route/Trajectory Element may contain a Cruise Climb. The Cruise Climb must be indicated to start at the point associated with the Element. A Cruise Climb may be associated with a Route Element, Expanded Route Element, or Trajectory Element.

B-3.3.5 **Change of Flight Rules —** A Route/Trajectory Element may contain a change of flight rules (to IFR or to VFR). The Change of Flight Rules must be indicated to start at the point associated with the Element. A Change of Flight Rules may be associated with a Route Element or Expanded Route Element, but not with a Trajectory Element.

B-3.4 Route/Trajectory Constraint

B-3.4.1 Each Route/Trajectory Element may contain one or more constraints. Each constraint will specify a Speed, Level, or Time constraint. Each constraint may include identification of the source of the constraint and a textual description of the constraint.

B-3.4.2 Each Route/Trajectory Constraint may contain an indication that the constraint is relevant during the arrival or the departure phase.

B-3.4.3 **Level Constraint —** A level constraint shall be able to identify:

a) the constrained level (expressed as altitude or flight level per B-2.1);
b) the type of constraint (at, at or above, at or below, or between 2 levels);
c) optionally, whether the change to the level is to commence at or complete by the start point of the Route/Trajectory Element.

B-3.4.4 **Speed Constraint —** A speed constraint shall be able to identify:
a) the constrained speed as an indicated airspeed;
b) the type of constraint (at, at or above, at or below, or between 2 speeds);
c) optionally, whether the change to the speed is to commence at or complete by the start point of the Route/Trajectory Element.

B-3.4.5 **Time Constraint —** A time constraint shall be able to identify:
a) the constrained time (expressed as an absolute time per B-2.22); and
b) the type of constraint (at, at or before, at or after, or between 2 times).

B-3.5 Trajectory Point

B-3.5.1 A Trajectory Point may be specified as the start point of a Route/Trajectory Element. Note that a Trajectory Point may be specified along with a Route Element Start Point, in which case it is the Trajectory Point associated with the start of a Route Element or Expanded Route Element. If specified without a Route Element Start Point then it is for a Trajectory Element that is along a route Element but does not begin at the start of the Route Element.

B-3.5.2 **Geographic Position —** The position on the earth, expressed as a latitude/longitude per B-2.2.

B-3.5.3 **Time —** The predicted time at the Trajectory Point, expressed as a duration since the Initial Prediction Point, or as an absolute time, using format and content defined in B-2.21 and B-2.22 respectively.

B-3.5.4 **Level —** The predicted level at the Trajectory Point, expressed as an altitude level using the format and content defined in B-2.1.

B-3.5.5 **Predicted Airspeed —** The predicted indicated airspeed at the Trajectory Point, expressed using the format and content defined in B-2.11.

B-3.5.6 **Predicted Ground speed —** The predicted ground speed at the Trajectory Point, expressed using the format and content defined in B-2.11.

B-3.5.7 **Wind Vector —** The predicted wind vector at the Trajectory Point provided in accordance with Annex 3, Chapter 2 and the desired accuracy specified in Annex 3, Attachment B.

B-3.5.8 **Assumed Altimeter Setting —** The predicted altimeter setting at the Trajectory Point.

B-3.5.9 **Temperature —** The predicted temperature at the Trajectory Point.

B-3.5.10 **Trajectory Point Property —** Each Trajectory Point can indicate the flight events of interest that occur at that point, including all of the events identified in Table 6. Each Trajectory Point Property shall have the ability to include reference data and a textual description.

B-3.6 Planned Delay

B-3.6.1 A Planned Delay identifies a time duration for which a flight is expected to loiter; i.e. the flight will interrupt its progression along the route at the associated point and expect to request resumption of its progression along the filed route after the indicated duration.

B-3.6.2 A Planned Delay may be associated with a specified route point, meaning that the delay starts and ends at that point.

B-3.6.3 A Planned Delay may be associated with a specified route Element, meaning that the delay starts at the beginning of the Element and ends at the end of the Element.

B-3.6.4 Expression of a Planned Delay shall include an indication of the type and reason for the delay.

B-3.7 Route/Trajectory Aircraft Performance

B-3.7.1 For each Route/Trajectory it should be possible to include Aircraft Performance data to be assumed for trajectory modelling. Under no circumstances should Aircraft Performance Data be required.

B-3.7.2 Performance Profile

B-3.7.3 Aircraft performance data can be provided in the form of a zero-wind, standard atmosphere profile reflective of the flight capabilities and desired parameters. Separate profiles should be provided for climb and descent. The profile should not include any flight-specific constraints such as altitude or speed restrictions applicable to the route of flight. Constraints that are always applicable (e.g., a 250 knot constraint applicable to all flights below 10,000 feet), and gradients required for obstacle clearance along the route of flight should be incorporated into the profile.

B-3.7.4 A performance profile is expressed as a sequence of profile points each containing: distance, time duration, flight level or altitude, and optionally the true airspeed.

B-3.7.5 Climb profiles begin at take-off with distance and time expressed relative to the point associated with take-off, nominally the “Wheels Off” point. Climb profiles end at the maximum operational cruise altitude for the specific route/trajectory.

B-3.7.6 Descent profiles begin at a top-of-descent at the maximum operational cruise altitude for the specific route/trajectory. Time and distance are expressed relative to the top-of-descent. Descent profiles end at touchdown.

B-3.7.7 Speed Schedule

B-3.7.8 A climb and descent speed schedule may be provided as input for more accurate trajectory construction. Each speed schedule is comprised of a target Indicated Airspeed and, if applicable, Mach Number representing speed targets for the flight in transition assuming no flight-specific constraints.

APPENDIX C – FF-ICE Messages

The tables in this section detail the required and allowed data elements for each of the FF-ICE messages identified in the PANS-ATM, paragraph 17.3.

Note that the designator "message" is used in the general sense of a communication between two parties. The implementation of that communication could be through various means, for example web services or publish/subscribe. It is also possible that the content of what are described as two separate messages could be packaged into one communication. For example, a Submission Response and Planning Status might together form the basis of a web services response. (While later Planning Status updates could be delivered via another mechanism such as Publish/Subscribe).

These tables only show the data elements that must or can be included in specific types of exchanges.

Note that some of the data items are compound, most notably the Route/Trajectory. There will naturally be additional layers of logic to capture conditional data requirements, e.g. if a Trajectory Point is included then certain attributes and connected elements may be required always and others required conditionally. Any such rules that are universal will be captured in APPENDIX E – Logic Rules as global logic rules.

Data items identified in "Message Information" are information that should be made available to the application that processes the message; however some of the data elements could logically be implemented within the communications infrastructure, e.g. a header—analogous to the AFTN header described in Annex 10. For example, the list of relevant ANSPs for an existing flight may be obtained from existing data, possibly obtained via the communications infrastructure, and therefore does not need to be repeated in subsequent messages for that flight. Because a communications infrastructure has not been specified, only general data items can be defined at this time.

Some data items may be included more than once. The following limits should be observed:

a) **Alternate Destination Aerodrome:** Up to 2 alternate destination aerodromes may be specified.

b) **Alternate Take-Off Aerodrome:** Up to 2 alternate take-off aerodromes may be specified.

c) **Alternate En-Route Aerodrome:** Up to 20 alternate en-route aerodromes may be specified.

C-1 Submission Response

Table 9 Submission Response

Data Category	Data Item	Requirement	Reference	Guidance
Message Information	Recipient	Mandatory (Note 1)	B-2.28	Identify the recipient to whom the response is being provided.
	Message Originator	Mandatory (Note 1)	B-2.28	Identify who sent the message.

Data Category	Data Item	Requirement	Reference	Guidance
	Message Date-Time	Mandatory (Note 1)	B-2.22	Time that the message was sent.
	Message Identifier	Mandatory (Note 1)	B-2.26	Unique message identifier.
	Message Reference	Mandatory (Note 1)	B-2.26	Message identifier of the message being responded to.
	Type of Request/Response	Mandatory (Note 1)	B-2.24	Indicate that this is a Submission Response message.
	AFTN Address	Optional	B-2.13	AFTN address of the sender as an alternate means of contact.
	Contact Information	Optional	B-2.12	Phone, email or other appropriate contact information for the sender.
	Submission Response originator	Optional	B-2.28	Identifies the originator of the Submission Response, to be provided when forwarding SRs back to operator.
Flight Status	Submission Status	Mandatory	B-2.27	Indicate whether the referenced message was accepted or not.
	Submission Status Explanation	Optional	B-2.30	Mandatory when Submission Status is not ACK, otherwise optional.
Flight Identification	GUFI	Optional	B-2.29	When an accepted message contains a GUFI, the submission response can refer to the GUFI.

Note 1: Can be implemented by communications infrastructure.

C-2 Preliminary Flight Plan

Table 10 Preliminary Flight Plan

Data Category	Data Item	Requirement	Reference	Guidance
Message Information	List of Recipients	Mandatory (Note 1)	B-2.28	Identify each Relevant eASP for the flight.
	Message Originator	Mandatory (Note 1)	B-2.28	Identify who sent the message.
	Relevant ASPs	Mandatory	B-2.35	The entire list of Relevant ASPs for this flight.
	Message Date-Time	Mandatory (Note 1)	B-2.22	Time that the message was sent.
	Message Identifier	Mandatory (Note 1)	B-2.26	Unique message identifier

Data Category	Data Item	Requirement	Reference	Guidance
	Type of Request/Response	Mandatory (Note 1)	B-2.24	Should indicate that this is a Preliminary Flight Plan.
	AFTN Address	Optional	B-2.13	AFTN address of the sender as an alternate means of contact.
	Contact Information	Optional	B-2.12	Phone, email or other appropriate contact information for the sender.
Flight Identification	GUFI	Mandatory	B-2.29	
	Aircraft Identification	Mandatory	B-2.6	
Flight Status	Operator Flight Plan Version	Mandatory	B-2.14	An initial submission should be identified as version 1. A subsequent submission intending to replace the previous flight plan should indicate a version one greater than the previously submitted plan or update.
Flight Characteristics	Flight Rules	Mandatory	B-2.7	
	Type of Flight	Optional	B-2.19	
	Special Handling	Optional	B-2.20	Allow multiple expressions of special handling.
	Remarks	Optional	B-2.30	
	Flight Plan Originator	Optional	B-2.13 B-2.12	
	Operator	Optional	B-2.31	
	Equipment and Capabilities	Optional	B-2.10	
	Supplementary Information Source	Optional	B-2.32	
	Required Runway Visual Range	Optional	B-2.39	
Aircraft Characteristics				
	Registration	Optional	B-2.17	For formation flights, allow multiple registrations.
	Aircraft Address	Optional	B-2.16	
	SELCAL Code	Optional	B-2.15	
	Number and type of aircraft	Optional	B-2.5	For formation flights, allow multiple aircraft types and the number of each type.
	Wake Turbulence Category	Optional	B-2.9	
	Aircraft Approach Category	Optional	B-2.18	
Departure/Destination Data	Departure Aerodrome	Mandatory	B-2.4	
	Destination Aerodrome	Mandatory	B-2.4	
	Estimated Off-Block Time	Mandatory	B-2.22	
	Departure Airport Slot Identification	Optional	B-2.37	
	Destination Airport Slot Identification	Optional	B-2.37	
	Departure Runway	Optional	B-2.42	
	Destination Runway	Optional	B-2.42	
Alternates	Alternate Destination Aerodrome(s)	Optional	B.2-4	

Data Category		Data Item	Requirement	Reference	Guidance
		Alternate Take-Off Aerodrome(s)	Optional	B-2.4	
		Alternate En-Route Aerodrome(s)	Optional	B-2.4	
Desired Route/Trajectory	Desired Route/Trajectory Group		Optional	B-3	When provided, certain content indicated below is required.
	Route/Trajectory Group	Aircraft Take-off Mass	Optional	B-3.1.3	
		Requested Cruising Speed	Mandatory (note 2)	B-3.1.4	
		Requested Cruising Level	Mandatory (note 2)	B-3.1.5	
		Total Estimated Elapsed Time	Optional	B-3.1.6	
		General Flight Constraint	Optional	B-3.1.7	
	Route/Traj. Element	Along Route Distance	Optional	B-3.2.2	
		Route Element Start Point	Mandatory (note 2)	B-3.2.5	Required on each element that is part of the route definition, otherwise optional.
		Route to Next Element	Mandatory (note 2)	B-3.2.6	Required on each element except when the element is the last point of the route, or the route has been truncated.
		Route Truncation Indicator	Optional	B-3.2.4	
		Requested Change	Optional	B-3.3	
		Route/Trajectory Constraints	Optional	B-3.4	
		Trajectory Point	Optional	B-3.5	
		Planned Delay	Optional	B-3.6	
	Route/Traj. Aircraft Performance	Performance Profile	Optional	B-3.7.2	
		Speed Schedule	Optional	B-3.7.3	
Route to Revised Destination		Revised Destination	Optional	B-2.4	
		Route String to Revised Destination	Optional	B-2.30	Route string in PANS-ATM Field 15c format.
Dangerous Goods		Dangerous Goods Information	Optional	B-2.8	
AIRAC		AIRAC Reference	Optional	B-2.38	Indication of the data set used in the computation of the flight plan.
Supplementary Information		Fuel Endurance	Optional	B-2.33.1	
		Persons on Board	Optional	B-2.33.2	
		Emergency Radio	Optional	B-2.33.3	
		Survival Capability	Optional	B-2.33.4	
		Life Jacket Characteristics	Optional	B-2.33.5	
		Aircraft Colour and Markings	Optional	B-2.33.6	
		Pilot in Command	Optional	B-2.33.7	
		Dinghies	Optional	B-2.33.8	
		Remarks	Optional	B-2.33.9	

Note 1: Can be implemented by communications infrastructure.
Note 2: Mandatory Route/Trajectory items are required only when a Route/Trajectory is provided

C-3 Planning Status

Table 11 Planning Status

Data Category		Data Item	Requirement	Reference	Guidance
Message Information		Recipient	Mandatory (Note 1)	B-2.28	Identify the recipient to whom the status is being provided.
		Message Originator	Mandatory (Note 1)	B-2.28	Identify who sent the message.
		Message Date-Time	Mandatory (Note 1)	B-2.22	Time that the message was sent.
		Message Identifier	Mandatory (Note 1)	B-2.26	Unique message identifier.
		Type of Request/Response	Mandatory (Note 1)	B-2.24	Indicate that this is a Planning Status message.
		AFTN Address	Optional	B-2.13	AFTN address of the sender as an alternate means of contact.
		Contact Information	Optional	B-2.12	Phone, email or other appropriate contact information for the sender.
		Respond-By	Optional	B-2.22	The time by which the recipient is expected to respond.
Flight Identification		GUFI	Mandatory	B-2.29	GUFI of the flight to which the status applies.
		Aircraft Identification	Mandatory	B-2.6	
Flight Status		Operator Flight Plan Version	Mandatory	B-2.14	The operator flight plan version to which this status applies.
		Planning Status	Mandatory	B-2.23.1	The status of the submitted flight with respect to this eASP.
		Planning Status Explanation	Optional	B-2.30	Mandatory if the status is not “Concur”.
Departure/Destination Data		Departure Runway	Optional	B-2.42	Allow for indication of the runway in use expected by the eASP
		Destination Runway	Optional	B-2.42	Allow for indication of the runway in use expected by the eASP
Agreed or Negotiating Route/Traiectory Group	Negotiating, Agreed Route/Trajectory Group		Optional	B-3	When provided, certain content indicated below is required.
	Route/Trajectory Group	Aircraft Take-off Mass	Optional	B-3.1.3	
		Requested Cruising Speed	Mandatory (note 2)	B-3.1.4	
		Requested Cruising Level	Mandatory (note 2)	B-3.1.5	
		Total Estimated Elapsed Time	Optional	B-3.1.6	
		General Flight Constraint	Optional	B-3.1.7	

Data Category		Data Item	Requirement	Reference	Guidance
	Route/Traj. Element	Along Route Distance	Optional	B-3.2.2	
		Route Element Start Point	Mandatory (note 2)	B-3.2.5	Required on each element that is part of the route definition; otherwise optional.
		Route to Next Element	Mandatory (note 2)	B-3.2.6	Required on each element, except when the element is the last point of the route, or the route has been truncated.
		Modified Route Indicator	Optional	B-3.2.3	The eASP should indicate each route Element that is different from what was submitted by the operator.
		Route Truncation Indicator	Optional	B-3.2.4	
		Requested Change	Optional	B-3.3	
		Route/Trajectory Constraints	Optional	B-3.4	The eASP should identify known constraints.
		Trajectory Point	Optional	B-3.5	
		Planned Delay	Optional	B-3.6	
	Route/Traj. Aircraft Performance	Performance Profile	Optional	B-3.7.2	The eASP may provide the assumed performance that it used.
		Speed Schedule	Optional	B-3.7.3	The eASP may provide the assumed speed profile that it used.

Note 1: Can be implemented by communications infrastructure.
Note 2: Mandatory Route/Trajectory items are required only when a Route/Trajectory is provided

C-4 Filed Flight Plan

Table 12 Filed Flight Plan

Data Category	Data Item	Requirement	Reference	Guidance
Message Information	List of Recipients	Mandatory (Note 1)	B-2.28	Identify each Relevant eASP for the flight.
	Message Originator	Mandatory (Note 1)	B-2.28	Identify who sent the message.
	Request for Translation and Delivery	Optional	B-2.28	Identifies an eASP that has been requested to translate and deliver the Flight Plan to identified Requested Recipients.
	Requested Recipients	Optional	B-2.35	If translation and delivery process is requested, this is the list of aASP recipients and their AFTN address data to which delivery is needed.
	Request for Forwarding	Optional	B-2.28	Identifies an eASP that has been requested to forward the Flight Plan to all Relevant ASPs.

Data Category	Data Item	Requirement	Reference	Guidance
	Relevant ASPs	Mandatory	B-2.35	The entire list of Relevant ASPs for this flight.
	Message Date-Time	Mandatory (Note 1)	B-2.22	Time that the message was sent.
	Message Identifier	Mandatory (Note 1)	B-2.26	Unique message identifier.
	Type of Request/Response	Mandatory (Note 1)	B-2.24	Should indicate that this is a Filed Flight Plan.
	AFTN Address	Optional	B-2.13	AFTN address of the sender as an alternate means of contact.
	Contact Information	Optional	B-2.12	Phone, email or other appropriate contact information for the sender.
Flight Identification	GUFI	Mandatory	B-2.29	
	Aircraft Identification	Mandatory	B-2.6	
Flight Status	Operator Flight Plan Version	Mandatory	B-2.14	An initial submission should be identified as version 1 except when a PFP was submitted before. A subsequent submission intending to replace the previous flight plan should indicate a version one greater than the previously submitted plan or update.
Flight Characteristics	Flight Rules	Mandatory	B-2.7	
	Type of Flight	Optional	B-2.19	
	Special Handling	Optional	B-2.20	Allow multiple expressions of special handling.
	Flight Plan Originator	Optional	B-2.13 B-2.12	
	Remarks	Optional	B-2.30	
	Operator	Optional	B-2.31	
	Equipment and Capabilities	Mandatory	B-2.10	
	Supplementary Information Source	Optional	B-2.32	
	Required Runway Visual Range	Optional	B-2.39	
Aircraft Characteristics				
	Registration	Optional	B-2.17	For formation flights, allow multiple registration numbers.
	Aircraft Address	Optional	B-2.16	
	SELCAL Code	Optional	B-2.15	
	Mode A Code	Optional	B-2.25	
	Number and type of aircraft	Mandatory	B-2.5	For formation flights, allow multiple aircraft types and the number of each type.
	Wake Turbulence Category	Mandatory	B-2.9	
	Aircraft Approach Category	Optional	B-2.18	

Data Category		Data Item	Requirement	Reference	Guidance
Departure/Destination Data		Departure Aerodrome	Mandatory	B-2.4	
		Destination Aerodrome	Mandatory	B-2.4	
		Estimated Off-Block Time	Mandatory	B-2.22	Required in each message except for flight plans filed while in the air or for which the departure aerodrome is not known.
		Departure Airport Slot Identification	Optional	B-2.37	
		Destination Airport Slot Identification	Optional	B-2.37	
		Departure Runway	Optional	B-2.42	
		Destination Runway	Optional	B-2.42	
Alternates		Alternate Destination Aerodrome(s)	Optional	B-2-4	
		Alternate Take-Off Aerodrome(s)	Optional	B-2.4	
		Alternate En-Route Aerodrome(s)	Optional	B-2.4	
Desired Route/Trajectory	Desired Route/Trajectory Group		Mandatory	B-3	
	Route/Traj. Group	Aircraft Take-off Mass	Optional	B-3.1.3	
		Requested Cruising Speed	Mandatory	B-3.1.4	
		Requested Cruising Level	Mandatory	B-3.1.5	
		Total Estimated Elapsed Time	Optional	B-3.1.6	Total EET can be provided here, or as a time attached to a Trajectory Point at the end of the route.
		General Flight Constraint	Optional	B-3.1.7	
	Route/Traj. Element	Along Route Distance	Optional	B-3.2.2	
		Route Element Start Point	Mandatory	B-3.2.5	Required on each element that is part of the route definition; otherwise optional.
		Route to Next Element	Mandatory	B-3.2.6	Required on each element, except when the element is the last point of the route, or the route has been truncated.
		Route Truncation Indicator	Optional	B-3.2.4	
		Requested Change	Optional	B-3.3	
		Route/Trajectory Constraints	Optional	B-3.4	
		Trajectory Point	Optional	B-3.5	
		Planned Delay	Optional	B-3.6	
	Route/Traj. Aircraft Performance	Performance Profile	Optional	B-3.7.2	
		Speed Schedule	Optional	B-3.7.3	
Route to Revised Destination		Revised Destination	Optional	B-2.4	
		Route String to Revised Destination	Optional	B-2.30	Route string in PANS-ATM Field 15c format.
Dangerous Goods		Dangerous Goods Information	Optional	B-2.8	

AIRAC	AIRAC Reference	Optional	B-2.38	Indication of the data set used in the computation of the flight plan.
Supplementary Information	Fuel Endurance	Optional	B-2.33.1	
	Persons on Board	Optional	B-2.33.2	
	Emergency Radio	Optional	B-2.33.3	
	Survival Capability	Optional	B-2.33.4	
	Life Jacket Characteristics	Optional	B-2.33.5	
	Aircraft Colour and Markings	Optional	B-2.33.6	
	Pilot in Command	Optional	B-2.33.7	
	Dinghies	Optional	B-2.33.8	
	Remarks	Optional	B-2.33.9	

Note 1: Can be implemented by communications infrastructure.

C-5 Filing Status

Table 13 Filing Status

Data Category	Data Item	Requirement	Reference	Guidance
Message Information	Recipient	Mandatory (Note 1)	B-2.28	Identify the recipient to whom the status is being provided.
	Message Originator	Mandatory (Note 1)	B-2.28	Identify who sent the message.
	Message Date-Time	Mandatory (Note 1)	B-2.22	Time that the message was sent.
	Message Identifier	Mandatory (Note 1)	B-2.26	Unique message identifier.
	Type of Request/Response	Mandatory (Note 1)	B-2.24	Indicate that this is a Filing Status message.
	AFTN Address	Optional	B-2.13	AFTN address of the sender as an alternate means of contact.
	Contact Information	Optional	B-2.12	Phone, email or other appropriate contact information for the sender.
	Respond-By	Optional	B-2.22	The time by which the recipient is expected to respond.
	Filing Status Originator	Optional	B-2.28	Identifies the originator of the Filing Status, to be provided when forwarding FSs back to operator.
Flight Identification	GUFI	Mandatory	B-2.29	GUFI of the flight to which the status applies.
	Aircraft Identification	Mandatory	B-2.6	
Flight Status	Operator Flight Plan Version	Mandatory	B-2.14	The operator flight plan version to which this status applies.

Data Category			Data Item	Requirement	Reference	Guidance
			Filing Status	Mandatory	B-2.23.2	The status of the submitted flight with respect to this eASP.
			Filing Status Explanation	Optional	B-2.30	Mandatory if the status is not “Acceptable”.
			Trajectory Purpose	Optional	B-2.43	An indication by the eASP of the intended purpose in providing the Agreed R/T.
			Expected Evaluation Time	Optional	B-2.22	The time at which the eASP expects to perform its first operational evaluation of the flight plan.
Departure/Destination Data			Departure Runway	Optional	B-2.42	Allow for indication of the runway in use expected by the eASP
			Destination Runway	Optional	B-2.42	Allow for indication of the runway in use expected by the eASP
Agreed or Negotiating Route/Trajectory Group (Note 3)	Agreed or Negotiating Route/Trajectory Group (Note 2)			Optional	B-3	Agreed Route/Trajectory can identify changes imposed by the eASP.
	Route/Trajectory Group		Aircraft Take-off Mass	Optional	B-3.1.3	
			Requested Cruising Speed	Mandatory (note 2)	B-3.1.4	
			Requested Cruising Level	Mandatory (note 2)	B-3.1.5	
			Total Estimated Elapsed Time	Optional	B-3.1.6	
			General Flight Constraint	Optional	B-3.1.7	
	Route/Traj. Element		Along Route Distance	Optional	B-3.2.2	
			Route Element Start Point	Mandatory (note 2)	B-3.2.5	Required on each element that is part of the route definition; otherwise optional.
			Route to Next Element	Mandatory (note 2)	B-3.2.6	Required on each element, except when the element is the last point of the route, or the route has been truncated.
			Modified Route Indicator	Optional	B-3.2.3	The eASP should indicate each route Element that is different from what was submitted by the operator.
			Route Truncation Indicator	Optional	B-3.2.4	
			Requested Change	Optional	B-3.3	
			Route/Trajectory Constraints	Optional	B-3.4	The eASP should identify known constraints.
			Trajectory Point	Optional	B-3.5	
			Planned Delay	Optional	B-3.6	

	Route/Traj. Aircraft Performance	Performance Profile	Optional	B-3.7.2	The eASP may provide the assumed performance that it used.
		Speed Schedule	Optional	B-3.7.3	The eASP may provide the assumed speed profile that it used.

Note 1: Can be implemented by communications infrastructure.
Note 2: Mandatory Route/Trajectory items are required only when a Route/Trajectory is provided.
Note 3: A Negotiating R/T may only be provided as an outcome of a re-evaluation process.

C-6 Trial Request

Table 14 Trial Request

Data Category	Data Item	Requirement	Reference	Guidance
Message Information	List of Recipients	Mandatory (Note 1)	B-2.28	Identify each Relevant eASP for the flight.
	Message Originator	Mandatory (Note 1)	B-2.28	Identify who sent the message.
	Relevant ASPs	Mandatory	B-2.35	The entire list of Relevant ASPs for this flight.
	Message Date-Time	Mandatory (Note 1)	B-2.22	Time that the message was sent.
	Message Identifier	Mandatory (Note 1)	B-2.26	Unique message identifier.
	Type of Request/Response	Mandatory (Note 1)	B-2.24	Should indicate that this is a Trial Request.
	AFTN Address	Optional	B-2.13	AFTN address of the sender as an alternate means of contact.
	Contact Information	Optional	B-2.12	Phone, email or other appropriate contact information for the sender.
Flight Identification	GUFI	Optional (Note 3)	B-2.29	
	Aircraft Identification	Mandatory	B-2.6	
Flight Characteristics	Flight Rules	Mandatory	B-2.7	
	Type of Flight	Optional	B-2.19	
	Special Handling	Optional	B-2.20	
	Remarks	Optional	B-2.30	
	Flight Plan Originator	Optional	B-2.13 B-2.12	
	Operator	Optional	B-2.31	
	Equipment and Capabilities	Optional	B-2.10	
	Supplementary Data Source	Optional	B-2.32	
	Required Runway Visual Range	Optional	B-2.39	
Aircraft Characteristics				
	Registration	Optional	B-2.17	For formation flights, allow multiple registrations.
	Aircraft Address	Optional	B-2.16	
	SELCAL Code	Optional	B-2.15	

Data Category		Data Item	Requirement	Reference	Guidance
		Number and type of aircraft	Optional	B-2.5	For formation flights, allow multiple aircraft types and the number of each type.
		Wake Turbulence Category	Optional	B-2.9	
		Aircraft Approach Category	Optional	B-2.18	
Departure/Destination Data		Departure Aerodrome	Mandatory	B-2.4	
		Destination Aerodrome	Mandatory	B-2.4	
		Estimated Off-Block Time	Mandatory	B-2.22	
		Departure Airport Slot Identification	Optional	B-2.37	
		Destination Airport Slot Identification	Optional	B-2.37	
		Departure Runway	Optional	B-2.42	
		Destination Runway	Optional	B-2.42	
Alternates		Alternate Destination Aerodrome(s)	Optional	B.2-4	
		Alternate Take-Off Aerodrome(s)	Optional	B-2.4	
		Alternate En-Route Aerodrome(s)	Optional	B-2.4	
Negotiating Route/Trajectory Group	Negotiating Route/Trajectory Group		Optional	B-3	
	Route/Traj. Group	Aircraft Take-off Mass	Optional	B-3.1.3	
		Requested Cruising Speed	Mandatory (note 2)	B-3.1.4	
		Requested Cruising Level	Mandatory (note 2)	B-3.1.5	
		Total Estimated Elapsed Time	Optional	B-3.1.6	
		General Flight Constraint	Optional	B-3.1.7	
	Route/Traj. Element	Along Route Distance	Optional	B-3.2.2	Only to be provided when trajectory data are not provided.
		Route Element Start Point	Mandatory (note 2)	B-3.2.5	Required on each element that is part of the route definition; otherwise optional.
		Route to Next Element	Mandatory (note 2)	B-3.2.6	Required on each element, except when the element is the last point of the route, or the route has been truncated.
		Route Truncation Indicator	Optional	B-3.2.4	
		Requested Change	Optional	B-3.3	
		Route/Trajectory Constraints	Optional	B-3.4	
		Trajectory Point	Optional	B-3.5	
		Planned Delay	Optional	B-3.6	
	Route/Traj. Aircraft Performance	Performance Profile	Optional	B-3.7.2	
		Speed Schedule	Optional	B-3.7.3	
		Revised Destination	Optional	B-2.4	

Data Category	Data Item	Requirement	Reference	Guidance
Route to Revised Destination	Route String to Revised Destination	Optional	B-2.30	Route string in PANS-ATM Field 15c format.
Dangerous Goods	Dangerous Goods Information	Optional	B-2.8	
AIRAC	AIRAC Reference	Optional	B-2.38	Indication of the data set used in the computation of the flight plan.
Supplementary Information	Fuel Endurance	Optional	B-2.33.1	
	Persons on Board	Optional	B-2.33.2	
	Emergency Radio	Optional	B-2.33.3	
	Survival Capability	Optional	B-2.33.4	
	Life Jacket Characteristics	Optional	B-2.33.5	
	Aircraft Colour and Markings	Optional	B-2.33.6	
	Pilot in Command	Optional	B-2.33.7	
	Dinghies	Optional	B-2.33.8	
	Remarks	Optional	B-2.33.9	

Note 1: Can be implemented by communications infrastructure.
Note 2: Mandatory Route/Trajectory items are required only when a Route/Trajectory is provided
Note 3: A GUFI is optional. However, if the request concerns a flight already provided as either a Preliminary or Filed Flight Plan then the relevant GUFI shall be provided.

C-7 Trial Response

Table 15 Trial Response

Data Category	Data Item	Requirement	Reference	Guidance
Message Information	Recipient	Mandatory (Note 1)	B-2.28	Identify the recipient to whom the status is being provided.
	Message Originator	Mandatory (Note 1)	B-2.28	Identify who sent the message.
	Message Date-Time	Mandatory (Note 1)	B-2.22	Time that the message was sent.
	Message Identifier	Mandatory (Note 1)	B-2.26	Unique message identifier
	Message Reference	Mandatory (Note 1)	B-2.26	Message identifier of the message being responded to.
	Type of Request/Response	Mandatory (Note 1)	B-2.24	Indicate that this is a Trial Response message.
	AFTN Address	Optional	B-2.13	AFTN address of the sender as an alternate means of contact.
	Contact Information	Optional	B-2.12	Phone, email or other appropriate contact information for the sender.
Flight Identification	GUFI	Optional (Note 3)	B-2.29	GUFI of the flight to which the status applies.
	Aircraft Identification	Mandatory	B-2.6	

Data Category		Data Item	Requirement	Reference	Guidance
Flight Status		Planning Status	Mandatory	B-2.23.1	The status of the submitted flight with respect to this eASP.
		Planning Status Explanation	Optional	B-2.30	Mandatory if the status is not Concur.
Departure/Destination Data		Departure Runway	Optional	B-2.42	Allow for indication of the runway in use expected by the eASP
		Destination Runway	Optional	B-2.42	Allow for indication of the runway in use expected by the eASP
Negotiating Route/Trajectory Group	Negotiating Route/Trajectory Group		Optional	B-3	When provided, certain content indicated below is required.
	Route/Traj. Group	Aircraft Take-off Mass	Optional	B-3.1.3	
		Requested Cruising Speed	Mandatory (Note 2)	B-3.1.4	
		Requested Cruising Level	Mandatory (Note 2)	B-3.1.5	
		Total Estimated Elapsed Time	Optional	B-3.1.6	
		General Flight Constraint	Optional	B-3.1.7	
	Route/Traj. Element	Along Route Distance	Optional	B-3.2.2	
		Route Element Start Point	Mandatory (Note 2)	B-3.2.5	Required on each element that is part of the route definition; otherwise optional.
		Route to Next Element	Mandatory (Note 2)	B-3.2.6	Required on each element, except when the element is the last point of the route, or the route has been truncated.
		Modified Route Indicator	Optional	B-3.2.3	The eASP should indicate each route Element that is different from what was submitted by the operator.
		Route Truncation Indicator	Optional	B-3.2.4	
		Requested Change	Optional	B-3.3	
		Route/Trajectory Constraints	Optional	B-3.4	The eASP should identify known constraints.
		Trajectory Point	Optional	B-3.5	
		Planned Delay	Optional	B-3.6	
	Route/Traj. Aircraft Performance	Performance Profile	Optional	B-3.7.2	
		Speed Schedule	Optional	B-3.7.3	The eASP may provide the assumed performance that it used.

Note 1: Can be implemented by communications infrastructure.
Note 2: Mandatory Route/Trajectory items are required only when a Route/Trajectory is provided
Note 3: The GUFI is optional – if it was present in the request then it should be included in the response

C-8 Flight Cancellation

Table 16 Flight Cancellation

Data Category	Data Item	Requirement	Reference	Guidance
Message Information	List of Recipients	Mandatory (Note 1)	B-2.28	Identify each Relevant eASP for the flight.
	Message Originator	Mandatory (Note 1)	B-2.28	Identify who sent the message.
	Request for Translation and Delivery	Optional	B-2.28	Identifies an eASP that has been requested to translate and deliver the Flight Plan to identified Requested Recipients.
	Requested Recipients	Optional	B-2.35	If translation and delivery process is requested, this is the list of aASP recipients and their AFTN address to which delivery is needed.
	Request for Forwarding	Optional	B-2.28	Identifies an eASP that has been requested to forward the Flight Plan to all Relevant ASPs.
	Relevant ASPs	Mandatory	B-2.35	The entire list of Relevant ASPs for this flight.
	Message Date-Time	Mandatory (Note 1)	B-2.22	Time that the message was sent.
	Message Identifier	Mandatory (Note 1)	B-2.26	Unique message identifier.
	Type of Request/Response	Mandatory (Note 1)	B-2.24	Should indicate that this is a Flight Cancellation.
	AFTN Address	Optional	B-2.13	AFTN address of the sender as an alternate means of contact.
	Contact Information	Optional	B-2.12	Phone, email or other appropriate contact information for the sender.
Flight Identification	GUFI	Mandatory	B-2.29	
	Aircraft Identification	Mandatory	B-2.6	
Departure/Destination Data	Departure Aerodrome	Mandatory	B-2.4	
	Destination Aerodrome	Mandatory	B-2.4	
	Estimated Off-Block Time	Mandatory	B-2.22	Required in each message except for flight plans filed while in the air or for which the departure aerodrome is not known.

Note 1: Can be implemented by communications infrastructure.

C-9 Flight Plan Update

Table 17 Flight Plan Update

Data Category	Data Item	Requirement	Reference	Guidance
Message Information	List of Recipients	Mandatory (Note 1)	B-2.28	Identify each Relevant eASP for the flight.
	Message Originator	Mandatory (Note 1)	B-2.28	Identify who sent the message.
	Request for Translation and Delivery	Optional	B-2.28	Identifies an eASP that has been requested to translate and deliver the Flight Plan to identified Requested Recipients.
	Requested Recipients	Optional	B-2.35	If translation and delivery process is requested, this is the list of aASP recipients and their AFTN adderess to which delivery is needed.
	Request for Forwarding	Optional	B-2.28	Identifies an eASP that has been requested to forward the Flight Plan to all Relevant ASPs.
	Relevant ASPs	Mandatory	B-2.35	The entire list of Relevant ASPs for this flight.
	Message Date-Time	Mandatory (Note 1)	B-2.22	Time that the message was sent.
	Message Identifier	Mandatory (Note 1)	B-2.26	Unique message identifier.
	Type of Request/Response	Mandatory (Note 1)	B-2.24	Should indicate that this is a Flight Plan Update.
	AFTN Address	Optional	B-2.13	AFTN address of the sender as an alternate means of contact.
	Contact Information	Optional	B-2.12	Phone, email or other appropriate contact information for the sender.
Flight Identification	GUFI	Mandatory	B-2.29	
	Aircraft Identification	Mandatory	B-2.6	This is the aircraft identification before the change.
Departure/Destination Data	Departure Aerodrome	Mandatory	B-2.4	This is the departure aerodrome before the change.
	Destination Aerodrome	Mandatory	B-2.4	This is the destination aerodrome before the change.
	Estimated Off-Block Time	Mandatory	B-2.22	This is the EOBT before the change.
Flight Status	Operator Flight Plan Version	Mandatory	B-2.14	The version should be one greater than the previous plan or update submitted.
Items to be changed should be included as necessary. It is necessary that the implementation allow items to be marked for deletion.				
Ite	Flight Characteristics	Flight Rules	Optional	B-2.7	
		Type of Flight	Optional	B-2.19	

Data Category			Data Item	Requirement	Reference	Guidance
			Special Handling	Optional	B-2.20	Allow multiple expressions of special handling.
			Remarks	Optional	B-2.30	
			Flight Plan Originator	Optional	B-2.13 B-2.12	
			Operator	Optional	B-2.31	
			Equipment and Capabilities	Optional	B-2.10	
			Supplementary Information Source	Optional	B-2.32	
			Required Runway Visual Range	Optional	B-2.39	
	Aircraft Characteristics					
			Registration	Optional	B-2.17	For formation flights, allow multiple registration numbers.
			Aircraft Address	Optional	B-2.16	
			SELCAL Code	Optional	B-2.15	
			Mode A Code	Optional	B-2.25	
			Number and types of aircraft	Optional	B-2.5	For formation flights, allow multiple aircraft types and the number of each type.
			Wake Turbulence Category	Optional	B-2.9	
			Aircraft Approach Category	Optional	B-2.18	
	Departure/Destination Data		Departure Aerodrome	Optional	B-2.4	
			Destination Aerodrome	Optional	B-2.4	
			Estimated Off-Block Time	Optional	B-2.22	
			Departure Airport Slot Identification	Optional	B-2.37	
			Destination Airport Slot Identification	Optional	B-2.37	
			Departure Runway	Optional	B-2.42	
			Destination Runway	Optional	B-2.42	
	Alternates		Alternate Destination Aerodrome(s)	Optional	B-2-4	
			Alternate Take-Off Aerodrome(s)	Optional	B-2.4	
			Alternate En-Route Aerodrome(s)	Optional	B-2.4	
	Desired Route/Trajectory	Desired Route/Trajectory Group		Optional	B-3	
		Route/Traj. Group	Aircraft Take-off Mass	Optional	B-3.1.3	
			Requested Cruising Speed	Optional	B-3.1.4	
			Requested Cruising Level	Optional	B-3.1.5	
			Total Estimated Elapsed Time	Optional	B-3.1.6	
			General Flight Constraint	Optional	B-3.1.7	
		Route/Traj. Element	Along Route Distance	Optional	B-3.2.2	
			Route Element Start Point	Optional	B-3.2.5	
			Route to Next Element	Optional	B-3.2.6	
			Route Truncation Indicator	Optional	B-3.2.4	
			Requested Change	Optional	B-3.3	

Data Category			Data Item	Requirement	Reference	Guidance
			Route/Trajectory Constraints	Optional	B-3.4	
			Trajectory Point	Optional	B-3.5	
			Planned Delay	Optional	B-3.6	
		Route/Traj. Aircraft Performance	Performance Profile	Optional	B-3.7.2	
			Speed Schedule	Optional	B-3.7.3	
	Route to Revised Destination		Revised Destination	Optional	B-2.4	
			Route String to Revised Destination	Optional	B-2.30	Route string in PANS-ATM Field 15c format.
	Dangerous Goods		Dangerous Goods Information	Optional	B-2.8	
	AIRAC		AIRAC Reference	Optional	B-2.38	Indication of the data set used in the computation of the flight plan.
	Supplementary Information		Fuel Endurance	Optional	B-2.33.1	
			Persons on Board	Optional	B-2.33.2	
			Emergency Radio	Optional	B-2.33.3	
			Survival Capability	Optional	B-2.33.4	
			Life Jacket Characteristics	Optional	B-2.33.5	
			Aircraft Colour and Markings	Optional	B-2.33.6	
			Pilot in Command	Optional	B-2.33.7	
			Dinghies	Optional	B-2.33.8	
			Remarks	Optional	B-2.33.9	

Note 1: Can be implemented by communications infrastructure.

C-10 Flight Data Request

Table 18 Flight Data Request

Data Category	Data Item	Requirement	Reference	Guidance
Message Information	Recipient	Mandatory (Note 1)	B-2.28	Identify the recipient of the request. This should be the entity most likely to have the flight information being sought.
	Message Originator	Mandatory (Note 1)	B-2.28	Identify who sent the message.
	Message Date-Time	Mandatory (Note 1)	B-2.22	Time that the message was sent.
	Message Identifier	Mandatory (Note 1)	B-2.26	Unique message identifier.
	Type of Request/Response	Mandatory (Note 1)	B-2.24	Should indicate that this is a Flight Data Request.
	AFTN Address	Optional	B-2.13	AFTN address of the sender as an alternate means of contact.
	Contact Information	Optional	B-2.12	Phone, email or other appropriate contact information for the sender.

Data Category	Data Item	Requirement	Reference	Guidance
Flight Identification	GUFI	Optional	B-2.29	Provided when known. For a query of flight status, this should always be provided.
	Aircraft Identification	Mandatory	B-2.6	Always provide Aircraft Identification.
Departure /Destination Data	Departure Aerodrome	Optional	B-2.4	Provide departure, destination and EOBT when available and a GUFI is not known.
	Destination Aerodrome	Optional	B-2.4	
	Estimated Off-Block Time	Optional	B-2.22	
Requested Flight Data	Information Requested	Mandatory	B-2.30	Indicate what information about the flight is being requested Use **FlightPlan** to request the latest submitted flight plan from the user; **SupplementaryFlightPlan** to request the latest submitted search and rescue information; or **FlightStatus** to request the latest status (Planning or Filing) from an eASP. Any other codes allowed are to be established and published.

Note 1: Can be implemented by communications infrastructure.

C-11 Flight Data Response

Table 19 Flight Data Response

Data Category	Data Item	Requirement	Reference	Guidance
Message Information	Recipient	Mandatory (Note 1)	B-2.28	Identify the recipient to whom the response is being provided.
	Message Originator	Mandatory (Note 1)	B-2.28	Identify who sent the message.
	Message Date-Time	Mandatory (Note 1)	B-2.22	Time that the message was sent.
	Message Identifier	Mandatory (Note 1)	B-2.26	Unique message identifier.
	Message Reference	Mandatory (Note 1)	B-2.26	Message identifier of the message being responded to.
	Type of Request/Response	Mandatory (Note 1)	B-2.24	Indicate that this is a Flight Data Response message.
	AFTN Address	Optional	B-2.13	AFTN address of the sender as an alternate means of contact.
	Contact Information	Optional	B-2.12	Phone, email or other appropriate contact information for the sender.
Flight Identification	GUFI	Mandatory	B-2.29	GUFI of the flight to which the query relates.
	Aircraft Identification	Mandatory	B-2.6	
Remainder of response is defined according to the published description corresponding to the type of query. (Note 2)				

Note 1: Can be implemented by communications infrastructure.
Note 2: A service provider can provide a customised set of queries in addition to those specified in section 8.1

C-12 Flight Departure

Table 20 Flight Departure

Data Category	Data Item	Requirement	Reference	Guidance
Message Information	List of Recipients	Mandatory (Note 1)	B-2.28	Identify each Relevant eASP for the flight
	Message Originator	Mandatory (Note 1)	B-2.28	Identify who sent the message.
	Request for Translation and Delivery	Optional	B-2.28	Identifies an eASP that has been requested to translate and deliver the Flight Plan to identified Requested Recipients.
	Requested Recipients	Optional	B-2.35	If translation and delivery process is requested, this is the list of aASP recipients and their AFTN address to which delivery is needed.
	Request for Forwarding	Optional	B-2.28	Identifies an eASP that has been requested to forward the Flight Plan to all Relevant ASPs.
	Relevant ASPs	Mandatory	B-2.35	The entire list of Relevant ASPs for this flight.
	Message Date-Time	Mandatory (Note 1)	B-2.22	Time that the message was sent.
	Message Identifier	Mandatory (Note 1)	B-2.26	Unique message identifier.
	Type of Request/Response	Mandatory (Note 1)	B-2.24	Should indicate that this is a Flight Departure message.
	AFTN Address	Optional	B-2.13	AFTN address of the sender as an alternate means of contact.
	Contact Information	Optional	B-2.12	Phone, email or other appropriate contact information for the sender.
Flight Identification	GUFI	Mandatory	B-2.29	
	Aircraft Identification	Mandatory	B-2.6	
Departure/Destination Data	Departure Aerodrome	Mandatory	B-2.4	
	Destination Aerodrome	Mandatory	B-2.4	
	Estimated Off-Block Time	Mandatory	B-2.22	Required in each message except for flight plans filed while in the air or for which the departure aerodrome is not known.
	Actual Departure Time	Mandatory	B-2.22	
	Actual Departure Reference Data	Optional	B-2.41	The location on the aerodrome to which the departure time refers

Note 1: Can be implemented by communications infrastructure.

C-13 Flight Arrival

Table 21 Flight Arrival

Data Category	Data Item	Requirement	Reference	Guidance
Message Information	List of Recipients	Mandatory (Note 1)	B-2.28	Identify each Relevant eASP for the flight
	Message Originator	Mandatory (Note 1)	B-2.28	Identify who sent the message.
	Request for Translation and Delivery	Optional	B-2.28	Identifies an eASP that has been requested to translate and deliver the Flight Plan to identified Requested Recipients.
	Requested Recipients	Optional	B-2.35	If translation and delivery process is requested, this is the list of aASP recipients and their AFTN address to which delivery is needed.
	Request for Forwarding	Optional	B-2.28	Identifies an eASP that has been requested to forward the Flight Plan to all Relevant ASPs.
	Relevant ASPs	Mandatory	B-2.35	The entire list of Relevant ASPs for this flight.
	Message Date-Time	Mandatory (Note 1)	B-2.22	Time that the message was sent.
	Message Identifier	Mandatory (Note 1)	B-2.26	Unique message identifier.
	Type of Request/Response	Mandatory (Note 1)	B-2.24	Should indicate that this is a Flight Arrival message.
	AFTN Address	Optional	B-2.13	AFTN address of the sender as an alternate means of contact.
	Contact Information	Optional	B-2.12	Phone, email or other appropriate contact information for the sender.
Flight Identification	GUFI	Mandatory	B-2.29	
	Aircraft Identification	Mandatory	B-2.6	
Departure/Destination Data	Departure Aerodrome	Mandatory	B-2.4	
	Destination Aerodrome	Mandatory	B-2.4	
	Estimated Off-Block Time	Mandatory	B-2.22	Required in each message except for flight plans filed while in the air or for which the departure aerodrome is not known.
	Actual Arrival Time	Mandatory	B-2.22	
	Actual Arrival Reference Data	Optional	B-2.40	The location on the aerodrome to which the arrival time refers
	Arrival Aerodrome	Mandatory	B-2.4	

Note 1: Can be implemented by communications infrastructure.

APPENDIX D – Re-Evaluation Feedback

	Cause	Effect (Processing Result)[1]	Planning Status Feedback		Filing Status Feedback	
			Status	R/T	Status	R/T
A	Re-evaluation triggered by timer. No modification to the applicable Restrictions/Constraints or ATM Configuration	No change of status	No response			
B	Re-evaluation triggered by timer or by a modification. Modification to the applicable Restrictions/Constraints and/or ATM Configuration	Non-compliant[1]	Non-Concur	None / Negotiating	Not Acceptable	None / Agreed[5] / Negotiating[6]
C		Compliant[1]	Negotiate[2]	Negotiating	Acceptable	Agreed[3]
D			Concur	Agreed[4]		

[1] *The processing result is the discretion of the eASP. The result for one eASP may not be the same for another (see section 3.5.2).*

[2] *a) The modification causes a change to the trajectory anticipated by the eASP while remaining compliant with applicable restrictions/constraints, for example a change of runway/SID*

or

b) The modification may represent an opportunity for improvement. The negotiate response and associated negotiating route/trajectory is therefore a proposal which may improve the ATM network impact and/or flight efficiency.

[3] *An Agreed trajectory in Filing with an Acceptable status may indicate a difference compared to the trajectory previously existing as reference. The difference however should not impact the ATC clearance, such as a change to the en-route lateral (2D) route/trajectory, unless local agreements allow the assignment of a route by the eASP.*

[4] *An Agreed trajectory in Planning should not indicate a modification to the trajectory, this would be a Negotiate response. It may however indicate the removal of references to a restriction/constraint which has been cancelled or no longer applies to the flight. This would be similar to the scenario described in Note 2b but without making a proposal for change.*

[5] *An Agreed trajectory can be provided with a Not Acceptable response. It provides the trajectory as determined by the eASP with an indication of the reason(s) for it being assessed as non-compliant. It therefore provides the operator with an improved ability to understand the result of the assessment.*

[6] *A Negotiating trajectory may be provided as a proposed solution when re-evaluation has determined that the previously Agreed trajectory is no longer acceptable.*

APPENDIX E – Logic Rules

Note: This section provides some initial rules for consideration. Validation and demonstration activities and continued analysis should identify additional rules that should be checked.

E-1. Introduction

Rules for the content of data items in a message sometimes depend on relationships to other data items. These rules can take the form of required presence, e.g. if element 'A' is included then element 'B' must also be included, or can take the form that there is a relationship between the values, e.g. for an element 'A' with cardinality 0..n, the value associated with a specific sub-element (e.g. A.B—could be time, distance or some other numeric value) must be greater than the previous one.

E-2. Performance Based Navigation

Each PBN capability depends on certain navigational capabilities. When a PBN capability is based on a navigational capability, that navigational capability must also be present. The required relationships are shown in Table 22 below.

Table 22 PBN and Navigation Dependencies

PBN Capability	**Required Navigation Capability**	**PBN Capability**	**Required Navigation Capability**
RNAV 5 Using all permitted sensors	[G (GNSS) *and* D (DME) *and* I (Inertial)] *and* [O (VOR) or S (Standard)]	RNAV 1 Using GNSS	G (GNSS)
RNAV 5 Using GNSS	G (GNSS)	RNAV 1 Using DME/DME	D (DME)
RNAV 5 Using DME/DME	D (DME)	RNAV 1 Using DME/DME/IRU	D (DME) *and* I (Inertial)

PBN Capability	Required Navigation Capability	PBN Capability	Required Navigation Capability
RNAV 5 Using VOR/DME	D (DME) *and* [O (VOR) or S (Standard)]	RNP 1 Using all permitted sensors	G (GNSS) *and* D (DME) *and* I (Inertial)
RNAV 5 Using INS or IRS	I (Inertial)	RNP 1 Using GNSS	G (GNSS)
LORAN C	C (LORAN C)	RNP 1 Using DME/DME	D (DME)
RNAV 2 Using all permitted sensors	G (GNSS) *and* D (DME) *and* I (Inertial)	RNP 1 Using DME/DME/IRU	D (DME) *and* I (Inertial)
RNAV 2 Using GNSS	G (GNSS)	RNP APCH	G (GNSS)
RNAV 2 Using DME/DME	D (DME)	RNP APCH with Baro VNAV	G (GNSS)
RNAV 2 Using DME/DME/IRU	D (DME) *and* I (Inertial)	RNP AR APCH with RF capability	G (GNSS)
RNAV 1 Using all permitted sensors	G (GNSS) *and* D (DME) *and* I (Inertial)	RNP AR APCH without RF capability	G (GNSS)

If any of the Navigation Capabilities (S, O, D, I, G, C) are changed then the dependencies should be re-checked.

E-3. Route/Trajectory

A Route/Trajectory is distinguished by the type of route provided, and the type of trajectory information provided.

The route may be either:

1. **A Route.** In a Route, each significant point and route element that would be present in an FPL field 15c has a corresponding route/trajectory element; or
2. **An Expanded Route**. An expanded route contains every significant point that is in the route. While a Route has only the entry and exit point from each ATS route traversed, the expanded route contains each significant point traversed along each ATS route.

Additional trajectory points included may be either:

A. **None** (no additional trajectory points included);
B. **Selected trajectory points**. These are points that correspond to an event listed in Table 6, Trajectory Point Properties. ATM Service providers and Operators should work to identify the properties that will contribute to consistent modelling of trajectories between the parties; i.e. only a small set of properties, and their associated points, may be needed to achieve acceptable consistency.
   i. Example 1: Estimated Elapsed Time points (e.g. FIR boundary crossings) are specified as a separate list in the legacy ATS message but are better integrated with the route by inclusion as trajectory points.
   ii. Example 2: Inclusion of selected significant dynamics changes such as start of climb/start of descent/top of climb can allow a recipient to model a trajectory more consistent with user expectations.
C. **A complete trajectory** contains trajectory information that includes every turn; every start and completion of cruising level; and every change in airspeed. A complete trajectory must also contain each required EET point. Additional points may be added to achieve needed accuracy, the following is the minimum required to call a trajectory complete.
   i. Every significant point in the route;
   ii. Start and completion of each change in cruising level; and
   iii. Start and completion of each change in airspeed.

Different packages can be defined by the route option (1 or 2 above) and the trajectory option (A, B, or C above). For example:

1. **Package 1A** (Route and no trajectory points) shall be supported by all eASPs, to allow for easy initial transition by operators—they can repackage their existing route information into an FF-ICE flight plan.
2. **Package 1B** (Route with selected trajectory points) might similarly be useful in early implementations; an eASP can continue using their existing trajectory model, modified only to use specific defined points (e.g. top of climb, top of descent) to calibrate their model with the user provided data.
   a. Selected trajectory points in package 1B should include at a minimum required EET points as trajectory points in lieu of a separate list of EET points. Additional points are optional and based on understanding of what data relevant eASPs can take advantage of to synchronise trajectories.
3. Note that the idea of a **Package 1C** is invalid, since all turn points must be represented for a trajectory to be complete, meaning that all the significant points in an expanded route are required.
4. **Package 2A** could allow a recipient to process a route end to end (or simply beyond their current scope), even if they do not have full aeronautical data.
5. **Package 2B** would allow end to end processing, and facilitate consistency of trajectories as in 1B.
6. **Package 2C** can be used if the eASP can use the end-to-end trajectory provided by the operator (or can extract the portion relevant to their airspace).

While an operator can provide any of the packages listed, and an eASP must be able to accept any of them, an eASP may process data only from certain packages. For example, an initial implementation may process only Package 1A. The eASP must identify which data they will process, and work with regional users so that expectations are aligned with regard to what information will be helpful to provide, and avoid operators spending money to provide data that isn't used by the eASPs.

E-3.1. Content of a Route

When specifying a Route, the information content should include at least what is present in Field 15c of an FPL. The required content only includes the information that is required in the FPL today. Several optional elements are also identified which could enhance processing of the route, but they should not be required (particularly in initial implementations). A Route will include a series of Route Elements, included in the order in which they will be flown and with the following characteristics:

a) The first Route Element of a Route[7] must include at a minimum the following:

   a. Route Element Start Point= Departure aerodrome

   b. Route to Next Element= The SID to be flown; or indication of direct route

b) Each subsequent Route Element (except the last one) must have at a minimum the following:

   a. Route Element Start Point= a significant point in the route (as would appear in a Field 15c and consistent with PANS-ATM Appendix 3 section 1.6.3);

   b. Route to Next Element= the ATS route (or the STAR) the flight will be on after crossing the Route Element Start Point; or indication of Direct route; or indication of Unspecified following a delay point; and

   c. Optionally, each Route Element Start point can include the geographic location of the associated significant point or aerodrome. *This can be used by a recipient to disambiguate a named significant point, since the same name is often used for multiple waypoints or NAVAIDs throughout the world.*

c) The last Route Element should contain:

   a. Route Element Start Point= the destination aerodrome; and

   b. No Route to Next Element.

E-3.2. Content of an Expanded Route

An Expanded Route will include a series of Route Elements included in the order in which

[7] A route to be exchanged that starts at other than the departure aerodrome must follow the rules outlined in E-3.5

they will be flown and with the following characteristics:

a) The first Route Element[8] should include

   a. Route Element Start Point= Departure aerodrome

   b. Route to Next Element= The SID to be flown; or indication of direct route

   c. The geographic location of the departure aerodrome should be included for the Route Element Start Point.

b) Each subsequent Route Element should have

   a. Route Element Start Point= the next significant point in the route. (Even if it is a point being traversed on the same ATS route, SID, or STAR as the previous route element);

   b. Route to Next Element= the ATS route (or the STAR) the flight will be on after crossing the Route Element Start Point; or indication of Direct route; or indication of Unspecified following a delay point; and
   Note that in an expanded route, there may be a number of sequential elements all with the same Route to Next Element;

   c. The geographic location of the associated significant point must be included for the Route Element Start Point, and

   d. The along-route distance of the Route Element Start Point should be included.

c) The last Route Element should contain:

   a. Route Element Start Point= the destination aerodrome;

   b. No Route to Next Element, and

   c. The along-route distance for the Destination Aerodrome should be included.

E-3.3. Content of Selected Trajectory Points

Selected trajectory points to include should be driven by information published by relevant eASPs (as part of the service description, see guidance in 2.10.1 and 2.10.2). There is no reason to include data that the eASPs cannot make use of.

When selected trajectory points are provided with a Route, each Route/Trajectory Element must have an along-route distance (ARD) included so that the exact relative location of points can be established. The ARD starts at 0 at the Route/Trajectory Element Start Point.

[8] A route to be exchanged that starts at other than the departure aerodrome must follow the rules outlined in E-3.5

Any trajectory point not directly along the route (e.g. if trajectory accurately models a flyby turn) need to be projected onto the route to provide the Along Route Distance of that point. See section 10.4.3 and Figure 23 for more on turn modelling.

Remember that when only a Route is provided, there may be several unelaborated turn points along the ATS route identified for a segment. When a subsequent included trajectory point is somewhere along that ATS route it will not be clear between which two points along the route it falls. Including the ARD of the trajectory point will make the position clear when the route is expanded, by comparing the ARD to the ARD of each expanded significant point.

When selected trajectory points are provided with an Expanded Route, each trajectory point can be placed unambiguously between two significant points, i.e. ARD is not important for placing them.

A summary of the data included with each trajectory point is in the Table 23 below. Full descriptions of the data items can be found in Table 4 and Table 5.

When trajectory points are provided, the time of the initial prediction point must be an absolute time, and the time at any subsequent points must be relative times. It should be noted that when the initial prediction point is the departure aerodrome the associated absolute time is the airborne time, not the EOBT.

Table 23 Data associated with a Trajectory Point

Data Item	Required?
Along Route Distance (ARD)	The Route Element associated with a trajectory point must include an ARD. This is especially important when selected trajectory points are included in a Route, as the ARD will allow the recipient to properly order the trajectory point between significant route points. Note that while the ARD may be provided for the Route element start points as well, it is not required since the recipient can calculate those ARDs.
Geographical Position	Every trajectory point must include a geographical position. The geographical position may lie directly along the route of flight, or may not - for example a precise turn model can be reflected - but in any case the trajectory point position must be within required conformance bounds.
Time	Every trajectory point must include the predicted time at that point.
Level	A trajectory point must include the predicted level at that point.
Assumed Altimeter Setting	A trajectory point may optionally include an altimeter setting used by the trajectory modeller for barometric altitude determination at that point.

Data Item	Required?
Predicted Airspeed	A trajectory point may optionally include the predicted IAS or Mach Number at that point.
Predicted Ground speed	A trajectory point may optionally include the predicted ground speed at that point.
Wind Vector	A trajectory point may optionally include the predicted wind vector at that point.
Temperature	A trajectory point may optionally include the predicted temperature at that point.
Trajectory Point Property	A trajectory point must include applicable trajectory point property(ies) that describe the event that occurs at that point. Trajectory point properties to be included should be worked out with eASPs to ensure all properties needed are provided, and operators do not spend significantly to provide properties that will not be used.

E-3.4. Content of a Complete Trajectory

As described above, a complete trajectory will have a certain minimum number of points included—which is every significant point in the expanded route and every altitude cruising level and airspeed change; and all required EET points. This is the minimum content to be called a "complete trajectory", additional points for other events described by Trajectory Point Properties may also be included where accuracy needs warrant.

The actual data included for each point in a complete trajectory is as shown in Table 23 above.

E-3.5. Special Case: Route/Trajectory begins at a point en-route (not at departure point)

It could be possible that there is a need to share a partial route—one that has had the portion of the route prior to a certain point tailored out (removed). This is also needed to service a flight that has filed its flight plan while in the air or for which the departure aerodrome is not known. To do this there should be agreement on how to represent such a case.

1. The first Route Element Start Point must be the significant point where the tailored route begins. (In a full route, the Route always starts at the departure aerodrome.)
2. The first Route Element Start Point must have an associated Trajectory Point, indicated as the Initial Prediction Point, with an absolute time, indicating when the flight will be at that start point. The Trajectory Point must also have an associated level, since the trajectory at this point will typically not be at ground level but either at or transitioning to the expected cruising level.
3. The remainder of the Route/Trajectory will follow the rules as for a full route/trajectory.

E-3.6. Partial Route/Trajectory

The route/trajectory provided by an eASP in a Planning or Filing Status response will typically include only the portion of flight within its area of interest. Therefore, for an eASP located along the route of flight; i.e. not the departure or arrival eASP, the route prior to entry into its area of interest and subsequent to leaving its area of interest will not be included. In such a case:

1. The first route element start point will be the significant point where the tailored route begins; i.e. the point of entry into the area of interest of the eASP.
2. The first route element start point must have an associated Trajectory Point, indicated as the Initial Prediction Point, with an absolute time, indicating when the flight is estimated to be at that start point.
3. The Along Route Distance of the first element start point will indicate the estimated distance to that point from the departure aerodrome.
4. The route/trajectory within the area of interest will follow the rules as for a full route/trajectory.
5. The last route element start point will be the exit point from the area of interest. The route element will contain the Route Truncation Indicator. It may also have an associated Trajectory Point indicating it as the Final Prediction Point.

E-3.7. Example Data

Flight Description

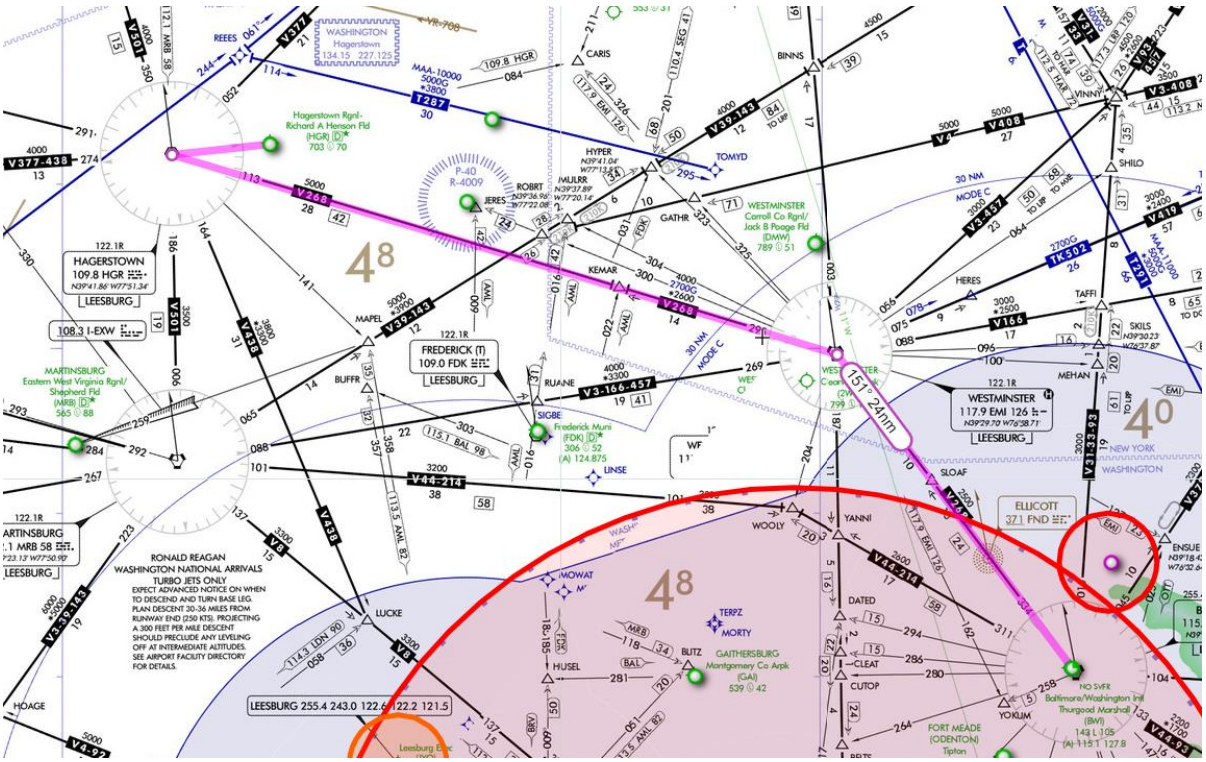


Figure 31: Example Route

The key flight plan elements corresponding to this route are:

Field 13 Departure Aerodrome: KHGR

Field 13 EOBT: 07:00
Field 16 Destination Aerodrome: KBWI
Field 16 Total EET: 00:27:15
Field 15 Route: DCT HGR V268 EMI DCT

Table 24 FF-ICE Route Elements

	Route Element (RE)			Route to Next Element
#	RE Start Point	Along Route Distance (optional)	RE Start Point Geographic Position (optional)	
1	KHGR	0.00 NM	N39:42:31 W077:43:35	Direct
2	HGR	6.12 NM	N39:41:52 W077:51:21	V268
3	EMI	48.67 NM	N39:29:42 W076:58:43	Direct
4	KBWI	72.47 NM	N39:10:33 W076:40:08	n/a

Table 25 FF-ICE Expanded Route Elements

	Route Element (RE)			Route to Next Element
#	RE Start Point	Along Route Distance	RE Start Point Geographic Position	
1	KHGR	--0.00 NM	N39:42:31 W077:43:35	Direct
2	HGR	6.12 NM	N39:41:52 W077:51:21	V268
3	KEMAR	34.48 NM	N39:33:45 W077:16:02	V268
4	EMI	48.67 NM	N39:29:42	Direct

	Route Element (RE)			Route to Next Element
#	RE Start Point	Along Route Distance	RE Start Point Geographic Position	
			W076:58:43	
5	KBWI	72.47 NM	N39:10:33 W076:40:08	n/a

There is one intermediate point published along route V268: KEMAR. So, the expanded route shows the original route elements plus KEMAR.

Table 26 Nominal FF-ICE Trajectory Elements

	Route Element (RE)			Route to Next Element	Trajectory Point				
#	RE Start Point	RE Start Point Geographic Position	Along Route Distance		Geographic Position	Point Property	Altitude (feet)	Ind. Air Speed	Time (HH:MM:SS)
1	KHGR	N39:42:31 W077:43:35	0.00 NM	Direct	N39:42:31 W077:43:35	Airport Reference Loc. Initial Prediction Point	703	125	Absolute: 07:00:00
2	HGR	N39:41:52 W077:51:21	6.02 NM	V268	N39:41:52 W077:51:21	TCP-Lateral	2732	125	Relative: 00:02:35
3			10.35 NM	V268	N39:40:38 W077:45:57		4389	125	Relative: 00:04:43
4			12.18 NM	V268	N39:40:06 W077:43:36	Top of Climb	5000	125	Relative: 00:05:35

	Route Element (RE)			Route to Next Element	Trajectory Point				
#	RE Start Point	RE Start Point Geographic Position	Along Route Distance		Geographic Position	Point Property	Altitude (feet)	Ind. Air Speed	Time (HH:MM:SS)
5			13.26 NM	V268	N39:39:48 W077:42:15	TCP-Speed	5000	160	Relative: 00:06:02
6	KEMAR	N39:33:45 W077:16:02	34.48 NM	V268	N39:33:45 W077:16:02		5000	160	Relative: 00:13:56
7	EMI	N39:29:42 W076:58:43	48.49 NM	Direct	N39:29:42 W076:58:43	TCP-Lateral	5000	160	Relative: 00:19:02
8			51.18 NM	Direct	N39:27:26 W076:56:30	Top of Descent	5000	160	Relative: 00:20:01
9			51.84 NM	Direct	N39:26:54 W076:55:59		4852	160	Relative: 00:20:15
10			71.52 NM	Direct	N39:11:16 W076:40:50		366	120	Relative: 00:26:55
11	KBWI	N39:10:33 W076:40:08	72.45 NM	n/a	N39:10:33 W076:40:08	Airport Reference Loc. End Prediction Point	143	100	Relative: 00:27:15

Notes:

1. *The geographic points, altitude, and time are shown in a display format and don't necessarily match any model representation such as FIXM.*
2. *A trajectory modeller may insert points to represent changes in dynamics, e.g. wind effects on ground speed. The set of Trajectory Point Properties do not describe every possible case, so there may be a trajectory point with no TPP.*
3. *The trajectory in this table follows the route of flight precisely, so the significant point and trajectory point geographic locations match exactly.*
4. *A trajectory point with no associated significant point will still show an Along Route Distance. This must be the projection of the trajectory point geographic position onto the relevant route segment. This projection should be perpendicular to the trajectory.*

5. *Points 3, 9, and 10 are examples of additional trajectory points to increase accuracy.*
6. *The example uses the airport reference location as the Start/End Prediction Points however, if known, the specific departure or arrival runway locations should be included using the appropriate point property (Wheels Off, Wheels On, Start of Take-Off Roll, etc.) as precise trajectory start/end points.*

E-4. Aircraft Data

The wake turbulence category specified for the aircraft should be consistent with the category(ies) associated with the aircraft type designator in ICAO Doc. 8643.

Two different flight plans with overlapping departure/arrival times should not have the same Registration or Aircraft Address.

Note 1: SELCAL codes are not unique to an airframe and so may be duplicated.

Note 2: In the case of an equipment swap, two flight plans may temporarily have the same aircraft data. Since this occurrence is inevitable, a check to reject entry of identical aircraft data in two different overlapping flights is not possible. However, a system could flag both flights so that neither may be cleared until the situation is resolved.

E-5. Requested Changes to Speed & Cruising Level

The FF-ICE trajectory allows a change of speed/level to be indicated at a trajectory point, as opposed to a published point. However, if provided on a trajectory point, then any need to provide the route description in Field 15 format, either within a FPL or for presentation to a person, will require a translation or transposition of the requested speed/level change such that it appears at a published point.
For the purposes of translation, local procedures may dictate at which point a change in speed/level is to be specified when the change is not planned at a published point. In this case some basic rules should be applied to ensure the route description and the trajectory are consistent.

Referring to Figure 32, the requested speed/level change may be indicated as a ‘Commence’ at the trajectory point T1 or at one of the published points P1 or P2. It should not be indicated prior to P1 or after P2. Similarly, the change may be indicated as an ‘Attain’ at the trajectory point T2 or at one of the points P3 or P4. It should not be indicated prior to P3 or after P4.

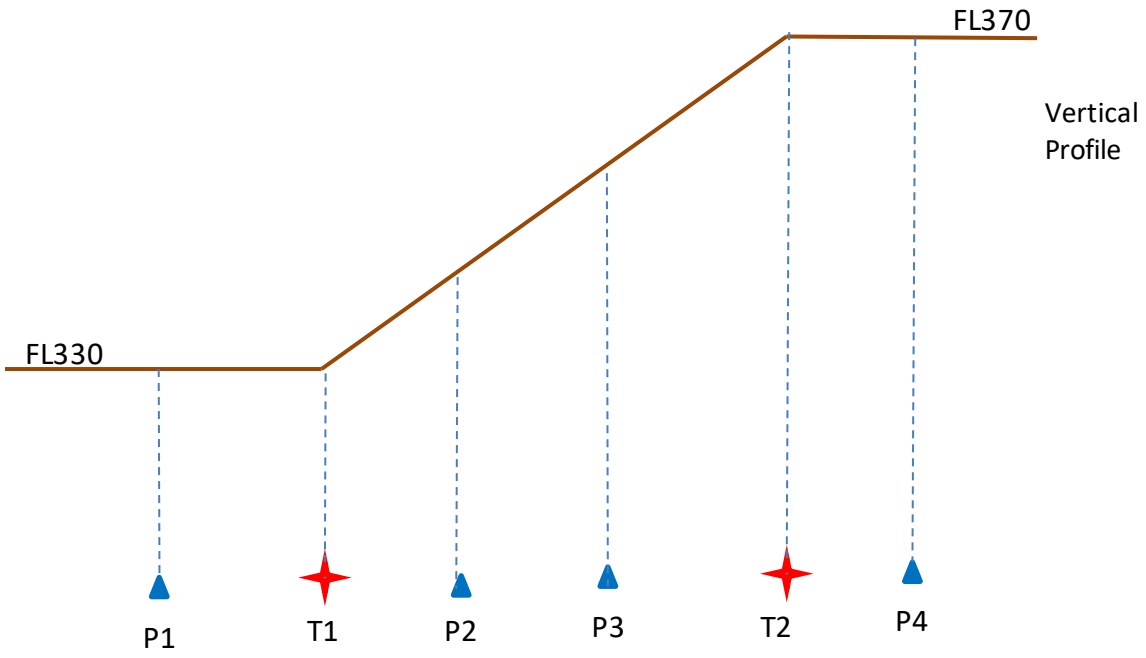


Figure 32: Example Speed/Level Change

It is recommended that requested speed/level changes should continue to be indicated at published points while the trajectory should indicate the precise trajectory points where the climb/descent is actually expected to begin/end. This means that a requested change may be shown twice: once as the requested RFL change tied to a significant point; and once as a trajectory point property showing the actual locations of the vertical change in the trajectory. An example is provided in Table 27.

Table 27 Example change of Request Flight Level

	Route Element (RE)							Trajectory Point				
#	RE Start Point	RE Start Point Geographic Position	Along Route Distance	Requested Change			Route to Next Element	Geographic Position	Point Property	Level	Ind. Air Speed	Time (HH:MM:SS)
				Cruising Level Change	Cruising Speed Change	Activation						
1	ZSNB	N30:42:31 E121:43:35	0.00 NM				Direct	N30:42:31 E121:43:35	Airport Reference Loc. Initial Prediction Point	FT 703	KT 125	Absolute: 07:00:00
2 *3* *4 etc.*	…… ….. …..	…… ….. …..	…… ….. …..	….. ….. …..	….. ….. …..	….. ….. …..	….. ….. …..	….. ….. …..	….. ….. …..	….. ….. …..	….. ….. …..	….. ….. …..
15	P1	N30:41:52 E114:51:21	233.02 NM	FL 370	Mach Number 0.84	Plan to Commence	UA461	N30:41:52 E114:51:21		FL 330.00	KT 480	Relative: 00:33:35
16 ("T1")			246.35 NM				UA461	N30:40:38 E114:45:57	TCP-Vertical	FL 330.00	KT 480	Relative: 00:35:03
17	P2	N30:40:52 E114:01:21	262.12 NM				UA461	N30:40:52 E114:01:21		FL 341.56	KT 480	Relative: 00:37:10
18	P3	N30:40:52 E113:21:21	278.34 NM				UA461	N39:40:52 E113:21:21		FL 358.89	KT 480	Relative: 00:39:43
19 ("T2")			294.18 NM				UA461	N30:40:06 E112:43:36	Top of Climb	FL 370.00	KT 480	Relative: 00:41:35
20 *21* *22 etc.*	….. ….. …..	….. ….. …..	….. ….. …..	….. ….. …..	….. ….. …..	….. ….. …..	….. ….. …..	….. ….. …..	….. ….. …..	….. ….. …..	….. ….. …..	….. ….. …..

Note: The requested change of speed/level is indicated at the published point "P1" while the actual change is predicted to commence at the trajectory point "T1" and predicted to complete at the trajectory point "T2".

The requested cruising level should be consistent with the assignable levels appropriate for the flight rules and airspace concerned. This will normally be a concern for the departure facility, as any different rules for later airspace would be accounted for by changes in clearance en-route.

When a requested cruising level is within airspace where specific capabilities or approvals are required, such as Reduced Vertical Separation Minimum (RVSM) airspace, the flight plan should also indicate the appropriate capability/approval or an indication that it has requested special handling; i.e. requests non-RVSM operation in RVSM airspace, if applicable. A flight requesting such a level without the appropriate capability, approval or request for special handling should be dealt with proactively, either by rejection of the flight plan or by flagging the flight for special attention by Air Traffic personnel.

APPENDIX F – Association Checks

F-1. General

All flight data processing systems will use an algorithm to determine to which flight plan a received message should be associated. Similarly, if the received message is a complete flight plan, it will be determined whether or not the same flight plan already exists.

This process of flight plan association is typically performed using several 'key' fields such as Aircraft Identification (Callsign), Departure Aerodrome, Estimated Off-Block date and time and perhaps the Destination Aerodrome. The eFPL has introduced the GUFI as a unique identifier of the flight plan, assuming only one flight plan per flight is permitted.

It therefore follows that it should be sufficient to use only the GUFI for association purposes. In a stable, fully automated and well tested environment exclusive use of the GUFI may be feasible. However, during early implementation of FF-ICE and its flight planning procedures, including correct allocation by the operator of the GUFI and its use by eASPs, it is considered unwise to rely exclusively upon the GUFI.

It is therefore recommended that the GUFI should initially be used as an additional key-field, helping to identify the correct flight plan in cases of multiple association, where the normal association algorithm has identified more than one matching flight plan.

On reception of an eFPL it is recommended that checks are performed to ensure the same GUFI doesn't already exist in the database for a different flight or the same flight doesn't already exist but with a different GUFI.

In determining 'same flight' it is important that ASPs have the same or at least similar association logic so that if one ASP along the route of flight considers two flight plans to be for the same flight, other ASPs will come to the same conclusion.

F-2. Association Logic

The process to determine if a received flight plan (with a unique GUFI) is in fact the same as an existing one (even with a different GUFI) requires a comparison of the key-fields, primarily the aircraft identification, departure airport and time but may also include the destination airport (see Table 28). Determination of 'same aircraft identification' and 'same departure airport' probably doesn't require further explanation. 'Same time' is less obvious. How far apart in time do two flight plans with the same aircraft identification and same departure airport have to be before they can be accepted as two different flights? The algorithm presented below is based on the principle that an FPDS will not want to have two flights with the same aircraft identification within its area of interest at the same time.

It is recommended that association between two flight plans should occur when the two main key-fields (aircraft identification (callsign) and departure airport) match, and where the flying period of the two flights overlap. The flying period is defined as follows:

a) where the departure airport and the destination airports are different:

Off-block date and time[9] plus twice the total estimated elapsed time or 20hrs whichever is less;

b) where the departure and destination are the same:
Off-block date and time plus the total estimated elapsed time or 6hrs whichever is less.

Note: the parameters (20hrs & 6hrs) mentioned above may need adapting depending upon the size of the area of interest.

Table 28 "Same Flight" Logic

Aircraft ID	Departure	Destination	Flying period	Conclusion
Different	-	-	-	Different flight
Same	Different	-	-	Different flight
Same	Same	Different	No Overlap	Different flight
Same	Same	Different	Overlaps	Same flight
Same	Same	Same	No Overlap	Different flight
Same	Same	Same	Overlaps	Same flight

The process to determine that a received flight plan or Flight Plan Update does not match with existing data despite having matching GUFIs requires a relatively simple comparison of the key-fields. If the key-fields don't match, then there is something wrong. See Table 29. Note that an update always contains the key-fields as they were before the proposed change, so that translation to an ATS message (e.g. CHG or DLA) is possible.

Table 29 Message Association Logic

Aircraft ID	Departure	Destination	EOBT*	Conclusion
Different	-	-	-	Mismatch
Same	Different	-	-	Mismatch
Same	Same	Different	-	Mismatch
Same	Same	Same	Different	Mismatch

[9] Date and time for a flight that starts at other than the departure aerodrome must be extracted from the rules outlined in E-3.5

Aircraft ID	Departure	Destination	EOBT*	Conclusion
Same	Same	Same	Same	Match

* some flexibility may be employed in determining whether or not two EOBTs match. For example, if the two values differ by 29 min or less (the current requirement to indicate a delay to the EOBT has a threshold of 30min) they may be considered as the same. Where ATFM procedures are applied the threshold may be less, typically 14 minutes.

APPENDIX G – GUFI Construction

G-1. Composition of the Namespace for a GUFI

The GUFI namespace is used to identify the originator of a GUFI. The GUFI originator is not necessarily the flight plan or message originator, although usually they would be the same entity. For example, it is possible that an independent GUFI creation service could be used by flight plan originators that do not wish to create their own GUFIs. The namespace associated with these GUFIs would be that of the creation service and would have no connection to the flight plan originator.

It is important to recognize these namespaces are simply a method to select a unique identifier for the originator of the GUFI, and they are not intended to represent information about the flight itself. The GUFI namespace should not be used as operational information about the flight.

After GUFI generation and its assignment to the flight, the GUFI must not change, even if the original source for the namespace content is changed in some way. Additionally, it is the intent that the GUFI originator should use a single consistent namespace when possible to allow uniqueness to be testable for the organisation.

The Table 31 provides the recommended namespace constructs. Each originator should choose the most suitable option.

Table 31 Composition of the GUFI namespace

#	Namespace Option	Description
1	Operating Agency Designator	An operating agency can be identified by its three letter Operating Agency Designator (ICAO Doc. 8585).
2	Four letter Location Indicator (LOCID)	An ATM unit can be identified by its corresponding four letter Location Indicator (LOCID as determined in ICAO Doc. 7910). A LOCID is available for each FIR or ACC, as well as for airport locations that operators are tied into. For example, the ATM unit “Washington ATC Center”, LOCID KZDC, assuming just one system generates GUFIs, might use the following namespace “KZDC”.
3	Fully Qualified Domain Name	An organisation can be identified from the registered specific internet Fully Qualified Domain Name (FQDN) of its organisation. The domain name can come from either the organisation’s email, or from the organisation’s website. The domain name used should uniquely identify the organisation. Example Fully Qualified Domain Name: For website https://www.example.com/ and email person@example.com, the domain name used for the namespace would be “example.com” Use of subdomains: The namespace can additionally utilize subdomains as needed to ensure proper uniqueness and allow for best implementation. This could be done by adding a numeric or regional subdomain.(i.e. east.example.com, region1.example.com, etc.)

APPENDIX H – Route/Trajectory Translation

H-1 Data Structure

H-1.1 Route/Trajectory Element

A route/trajectory element is described in Appendix B.3 and contains the following items. A route/trajectory is composed of a series of Route/Trajectory elements. All data items in the translation algorithm reference items in B.3, Figure 30: Route/Trajectory Group.

Table 32 Route/Trajectory Element

Route/Trajectory Element		
	Along Route Distance (B-3.2.2)	
	Modified Route Indicator (B-3.2.3)	
	Route Truncation Indicator (B-3.2.4)	
	Route Element Start Point (B-3.2.5)	Position
		Geographic Position
		Aerodrome
	Route to Next Element (B-3.2.6)	ATS Route or ‘Direct’ or ‘Unspecified’
	Requested Change (B-3.3)	Cruising Level Change
		Cruising Speed Change
		Cruise Climb
		Change of Flight Rules
	Route/Trajectory Constraint (B-3.4)	Speed Constraint
		Level Constraint
		Time Constraint
	Trajectory Point (B-3.5)	Geographic Position
		Time
		Level
		Predicted Airspeed
		Predicted Ground Speed
		Wind Vector
		Assumed Altimeter Setting
		Temperature
		Trajectory Point Property

	Planned Delay (B-3.6)

H-1.2 Data Items Needed for Translation Algorithm

Note that the information that is not relevant to a Field 15c route can be eliminated. That is:

- Along Route Distance
- Modified Route Indicator
- Route/Trajectory Constraint; and
- Trajectory Point
- Planned Delay

Thus, the data structure of interest is then:

Table 33 Route/Trajectory Data Items Used in Translation

Route/Trajectory Element		
	Route Truncation Indicator (B-3.2.4)	
	Route Element Start Point (B-3.2.5)	Position
		Geographic Position
		Aerodrome
	Route to Next Element (B-3.2.6)	ATS Route or ‘Direct’ or ‘Unspecified’
	Requested Change (B-3.3)	Cruising Level Change
		Cruising Speed Change
		Cruise Climb
		Change of Flight Rules

H-1.3 Additional Data Definitions

Additional definitions used in the algorithm:

A **significant point** is a Route Element Start Point that has been inserted into the translated route field.

A **geographic point** is a **significant point** that:

a) Is represented by a geographic position (i.e. Latitude/Longitude); or
b) Is represented by a bearing and distance from a designated point.

H-2 Assumptions

The FF-ICE Route/Trajectory data definition allows for a great deal of flexibility in terms of how the data items might be populated. In developing the algorithm it was found that translation could be compromised unless certain conventions are followed. Such requirements are listed here:

A. Every Route/Trajectory Element will have the Route To Next Element populated except for the final point in the route, which may be the destination or may be the final point in a truncated route. This means that a trajectory point should show the route segment it is part of.
    - If this convention is followed, the check as to whether a point is on the same route segment as the previous point is simplified.
B. When recording a change in speed or level, both the speed and level applicable at the point will be included.
    - The legacy format always shows both speed and level for a requested change at a significant point. Translation is simplified if the FF-ICE route/element includes both.
C. There will be exactly one Route/Trajectory element associated with the Departure Aerodrome, and one associated with the Destination Aerodrome, unless truncated or an air-file flight plan. The Route Element Start Point in each case is the Aerodrome Location Indicator, and an optional associated Trajectory Point can contain a point property, e.g. wheels off, and the appropriate location.

The algorithm assumes it will encounter only one point associated with the departure and destination.

H-3 Route Translation Algorithm

This algorithm translates an FF-ICE route/trajectory into an ATS Message Field 15c as documented in PANS-ATM Appendix 3.

The algorithm references data items in the Table 33 above. Referenced data items are shown in blue or **bolded** text as described.

For each Route/Trajectory Element:

Table 34 Route/Trajectory Translation Algorithm

For each Route Element perform the following steps:	Explanation of each step
1. Skip the **Route/Trajectory Element** if: 1.1. the **Route Element Start Point** is not defined, OR 1.2. the **Route To Next Element** and the **Route Truncation Indicator** are not defined,. See guidance in Appendix E-5 if the **Route Element** is to be skipped but has an associated **Requested Change** (of any type).	If a trajectory point is included that is not at a significant point on the route; then there will be no Route Element Start Point. Trajectory points are not included in a legacy FPL and therefore are immaterial to route translation. Destination Aerodromes are not part of the Field 15c, therefore should not be included in the route translation.

For each Route Element perform the following steps:	Explanation of each step
2. Insert the **Route Element Start Point** as a **Significant Point**, and include indicated additional data in the next rule, if: 2.1. The **Route/Trajectory Element** has an associated **Requested Change** (of type Speed and Level; Flight Rules; or Cruise Climb); OR 2.2. The **Route To Next Element** is 'Direct' and the previous **Route to Next Element** is defined, OR 2.3. The **Route To Next Element** is 'Unspecified' and the previous **Route to Next Element** is defined, OR 2.4. The **Route To Next Element** is different from the previous **Route To Next Element**, OR 2.5. the previous **Route to Next Element** is not defined and the **Departure Aerodrome** is AIRFILE	Any **significant point** with an associated requested change must be in the translated route. Any **significant point** that is part of a direct route segment must be in the translated route. Any **significant point** that indicates a route change from one ATS route to another must be in the translated route. Any **significant point** that is the first point in the route for air-filed flight plans must be in the translated route. Points not passing this rule will be points along an ATS route with no change in route at that point; and no requested change at that point. Note that the departure aerodromes will never pass this rule.
3. If the **Route Element Start Point** inserted in step 2 included **Requested Change** information, then modify the inserted **Significant Point** as follows: 3.1. Cruise Climb: Prepend to the characters "C/" and append the relevant altitudes consistent with PANS-ATM Appendix 3 Field 15c6; 3.2. Speed and Level Change: Append the speed and altitude consistent with PANS-ATM Appendix 3 Field 15c4; 3.3. Flight Rules Change: Append the characters "IFR" or "VFR" as indicated in the change, consistent with PANS-ATM Appendix 3 Field 15c5.	Each inserted **significant point** may have associated information prepended or appended per the items in PANS-ATM Field 15c. These rules govern inserting that information, which is based on the Requested Change element in the FF-ICE Flight Plan.

For each Route Element perform the following steps:	Explanation of each step
4. Insert the **Route To Next Element** if: 4.1. An ATS Route is specified as the **Route to Next Element**; AND 4.2. The **Route Element Start Point** is relevant, i.e. 4.2.1. The **Route Element Start Point** was inserted **OR** 4.2.2. The **Route Element Start Point** is the **Departure Aerodrome**.	After insertion of a **significant point**, the Route to Next Element will normally be inserted if one is specified. If the Route Element Start Point was not inserted then the Route to Next Element is also left out. A special case exists for the departure aerodrome, as it is not inserted in the legacy Field 15 route format, but the route from the aerodrome is.
5. Insert the characters "DCT" (consistent with PANS-ATM Appendix 3 field 15c5) : 5.1. The **Route to Next Element** is 'Direct' or 'Unspecified', AND 5.2. The **Route Element Start Point** is relevant, i.e. 5.2.1. The **Route Element Start Point** was inserted **OR** 5.2.2. The **Route Element Start Point** is the **Departure Aerodrome**. 5.3. Note that the "DCT" will be omitted if the previous and following inserted **significant points** are both **geographic points.**	This step is the same as the previous one, but covers the case of a direct route. An Unspecified route, as used within a Planned Delay, will be replaced by a DCT.
6. Insert the character "T" (consistent with PANS-ATM Appendix 3 Field 15c5) if: 6.1. The **Route Truncation Indicator** is set.	If the route is indicated as truncated, then the truncation indicator is inserted.

H-4 Algorithm Test

H-4.1 Sample FF-ICE Route/Trajectory

The following sample data will be used to help illustrate the steps of the algorithm.

Note:

- The Route Truncation Indicator is a special case, and is not included in the example.
- Along route distance, while not needed in the translation, is shown in the example data for reference.

Table 35 Sample FF-ICE Route/Trajectory

Route/Trajectory Element			
1	Along Route Distance	**0.0**	
	Route Element Start Point	Designator: **CYUL**	
	Route to Next Element	**Direct**	
	Trajectory Point	Geographic Position	**452405N/0705343W**
		Time	**(Absolute) 12:05:00**
		Level	**F384**
		Predicted Airspeed	**N0380**
		Traj. Point Property	**Initial Predict. Point**
		Reference Data	**Not included**
		Traj. Point Property	**Wheels Off**
		Reference Data	**Runway 06R**
Route/Trajectory Element			
2	Along Route Distance	**25.7**	
	Route Element Start Point	Designator: **KEBGO**	
		Geo. Position: **451629N/0731258W**	
	Route to Next Element	**Direct**	
Route/Trajectory Element			
3	Along Route Distance	**50.7**	
	Route Element Start Point	Designator: **RABIK**	
		Geo. Position: **451756N/0723637W**	
	Route to Next Element	**Q951**	
Route/Trajectory Element			
4	Along Route Distance	**117.4**	
	Route Element Start Point	Designator: **ANTOV**	
		Geo. Position: **452235N/0710215W**	
	Route to Next Element	**Q951**	
	Requested Change	Level Change	**FL 400**
		Speed Change	**N0380**
Route/Trajectory Element			
5	Along Route Distance	**123.4**	

	Route Element Start Point	Designator: **Not included**	
		Geo. Position: **[null]**	
	Route to Next Element	**Q951**	
	Trajectory Point	Geographic Position	**452405N/0705343W**
		Time	**(Relative) 00:37:21**
		Level	**F384**
		Predicted Airspeed	**N0380**
		Traj. Point Property	**FIR Boundary Crossing Point**
		Reference data	**KZBW**
Route/Trajectory Element			
6	Along Route Distance	**134.4**	
	Route Element Start Point	Designator: **KERVO**	
		Geo. Position: **452516N/0703823W**	
	Route to Next Element	**Q951**	
Route/Trajectory Element			
7	Along Route Distance	**255.8**	
	Route Element Start Point	Designator: **DANOL**	
		Geo. Position: **454154N/0674716W**	
	Route to Next Element	**Direct**	
Route/Trajectory Element			
8	Along Route Distance	**441.7**	
	Route Element Start Point	Designator: **4632N06330W**	
		Geo. Position: **463136N/0632946W**	
	Route to Next Element	**Direct**	
Route/Trajectory Element			
9	Along Route Distance	**567.4**	
	Route Element Start Point	Designator: **4659N06031W**	
		Geo. Position: **465916N/0603123W**	
	Route to Next Element	**Direct**	
Route/Trajectory Element			
10	Along Route Distance	**608.1**	
	Route Element Start Point	Designator: **Not included**	

		Geo. Position: **Not included**	
	Route to Next Element	**Direct**	
	Trajectory Point	Geographic Position	**452405N/0705343W**
		Time	**(Relative) 01:21:17**
		Level	**F400**
		Predicted Airspeed	**N0380**
		Traj. Point Property Reference data	**Top of Descent**
			Not included
Route/Trajectory Element			
11	Along Route Distance	**830.7**	
	Route Element Start Point	Designator: **MIVAD**	
		Geo. Position: **474046N/0540903W**	
	Route to Next Element	**AVALN3**	
Route/Trajectory Element			
12	Along Route Distance	**876.9**	
	Route Element Start Point	Designator: **GIBBY**	
		Geo. Position: **473641N/0530102W**	
	Route to Next Element	**AVALN3**	
Route/Trajectory Element			
13	Along Route Distance	**887.7**	
	Route Element Start Point	Designator: **CYYT**	
	Route to Next Element	**Not included**	

H-4.2 Processing of the sample route

The processing steps below show a section for the processing of each of the 13 route elements. For each element, the rules that applied are identified as well as the resulting text insertion to the translated route. Note: For a rule to pass, at least one of the logical sub-checks must pass.

Route Element 1. (CYUL direct)

Rule	Checks	Pass/Fail Step	Pass/Fail Rule	Update to Cumulative Inserted Text
1, Skip Element	1.1 Route Element Start Point is not defined, OR	Fail	Fail	
	1.2 the Route To Next Element and the Route Truncation Indicator are not defined	Fail		
2, Insert Significant Point	2.1 Route Element has a Requested Change OR	Fail	Fail	
	2.2 Route to Next Element is 'Direct' and the previous Route to Next Element is defined OR	Fail		
	2.3 Route to Next Element is 'Unspecified' and the previous Route to Next Element is defined OR	Fail		
	2.4 Route to Next Element is different from previous Route to Next Element, OR	Fail		
	2.5. the previous Route to Next Element is not defined and the Departure Aerodrome is AIRFILE	Fail		
3, Modify Significant Point	3.1 Cruise Climb	n/a	n/a	
	3.2 Speed and Level Change	n/a		
	3.3 Flight Rules Change	n/a		
4, Insert Route to Next Element (ATS Route Case)	4.1 ATS Route is specified as Route to Next Element; AND	Fail	Fail	
	4.2.1 Route Element Start Point was inserted OR	Fail		
	4.2.2 Route Element Start Point is the Departure Aerodrome	Pass		
5, Insert the characters "DCT" (Route to Next Element - Direct Route	5.1 The Route to Next Element is 'Direct' or' Unspecified', AND	Pass	Pass	DCT
	5.2.1 Route Element Start Point was inserted OR	Fail		
	5.2.2 Route Element Start Point is	Pass		

Rule	Checks	Pass/Fail Step	Pass/Fail Rule	Update to Cumulative Inserted Text
Case)	the Departure Aerodrome			
6, Truncate Route	6.1 Route Truncation is indicated	Fail	Fail	

Route Element 2. (KEBGO direct)

Rule	Checks	Pass/Fail Step	Pass/Fail Rule	Update to Cumulative Inserted Text
1, Skip Element	1.1 Route Element Start Point is not defined, OR	Fail	Fail	
	1.2 the Route To Next Element and the Route Truncation Indicator are not defined	Fail		
2, Insert Significant Point	2.1 Route Element has a Requested Change OR	Fail	Pass	DCT KEBGO
	2.2 Route to Next Element is 'Direct' and the previous Route to Next Element is defined, OR	Pass		
	2.3 Route to Next Element is 'Unspecified' and the previous Route to Next Element is defined, OR	Fail		
	2.4 Route to Next Element is different from previous Route to Next Element, OR	Fail		
	2.5. the previous Route to Next Element is not defined and the Departure Aerodrome is AIRFILE	Fail		
3, Modify Significant Point	3.1 Cruise Climb	n/a	n/a	
	3.2 Speed and Level Change	n/a		
	3.3 Flight Rules Change	n/a		
4, Insert Route to Next Element (ATS Route Case)	4.1 ATS Route is specified as Route to Next Element, AND	Fail	Fail	
	4.2.1 Route Element Start Point was inserted OR	Pass		
	4.2.2 Route Element Start Point is the Departure Aerodrome	Fail		
5, Insert the characters	5.1 The Route to Next Element is 'Direct' or' Unspecified', AND	Pass	Pass	DCT KEBGO DCT

Rule	Checks	Pass/Fail Step	Pass/Fail Rule	Update to Cumulative Inserted Text
"DCT" (Route to Next Element - Direct Route Case)	5.2.1 Route Element Start Point was inserted OR	Pass		
	5.2.2 Route Element Start Point is the Departure Aerodrome	Fail		
6, Truncate Route	6.1 Route Truncation is indicated	Fail	Fail	

Route Element 3. (RABIK Q951)

Rule	Checks	Pass/Fail Step	Pass/Fail Rule	Cumulative Inserted Text
1, Skip Element	1.1 Route Element Start Point is not defined	Fail	Fail	
	1.2 the Route To Next Element and the Route Truncation Indicator are not defined	Fail		
2, Insert Significant Point	2.1 Route Element has a Requested Change OR	Fail	Pass	DCT KEBGO DCT RABIK
	2.2 Route to Next Element is 'Direct' and the previous Route to Next Element is defined OR	Fail		
	2.3 Route to Next Element is 'Unspecified' and the previous Route to Next Element is defined OR	Fail		
	2.4 Route to Next Element is different from previous Route to Next Element, OR	Pass		
	2.5. the previous Route to Next Element is not defined and the Departure Aerodrome is AIRFILE	Fail		
3, Modify Significant Point	3.1 Cruise Climb	n/a	n/a	
	3.2 Speed and Level Change	n/a		
	3.3 Flight Rules Change	n/a		
4, Insert Route to Next Element (ATS Route Case)	4.1 ATS Route is specified as Route to Next Element, AND	Pass	Pass	DCT KEBGO RABIK Q951
	4.2.1 Route Element Start Point was inserted OR	Pass		
	4.2.2 Route Element Start Point is the Departure Aerodrome	Fail		

Rule	Checks	Pass/Fail Step	Pass/Fail Rule	Cumulative Inserted Text
5, Insert the characters "DCT" (Route to Next Element - Direct Route Case)	5.1 The Route to Next Element is 'Direct' or' Unspecified', AND	Fail	Fail	
	5.2.1 Route Element Start Point was inserted OR	Pass		
	5.2.2 Route Element Start Point is the Departure Aerodrome	Fail		
6, Truncate Route	6.1 Route Truncation is indicated	Fail	Fail	

Route Element 4. (ANTOV Q951)

Rule	Checks	Pass/Fail Step	Pass/Fail Rule	Cumulative Inserted Text
1, Skip Element	1.1 Route Element Start Point is not defined	Fail	Fail	
	1.2 the Route To Next Element and the Route Truncation Indicator are not defined	Fail		
2, Insert Significant Point	2.1 Route Element has a Requested Change OR	Pass	Pass	DCT KEBGO RABIK Q951 ANTOV
	2.2 Route to Next Element is 'Direct' and the previous Route to Next Element is defined, OR	Fail		
	2.3 Route to Next Element is 'Unspecified' and the previous Route to Next Element is defined, OR	Fail		
	2.4 Route to Next Element is different from previous Route to Next Element, OR	Fail		
	2.5. the previous Route to Next Element is not defined and the Departure Aerodrome is AIRFILE	Fail		
3, Modify Significant Point	3.1 Cruise Climb	n/a	Pass	DCT KEBGO RABIK Q951 ANTOV/N380F400
	3.2 Speed and Level Change	Pass		
	3.3 Flight Rules Change	n/a		
4, Insert Route to Next Element (ATS Route Case)	4.1 ATS Route is specified as Route to Next Element, AND	Pass	Pass	DCT KEBGO RABIK Q951 ANTOV/N380F400 Q951
	4.2.1 Route Element Start Point was inserted OR	Pass		
	4.2.2 Route Element Start Point is the	Fail		

Rule	Checks	Pass/Fail Step	Pass/Fail Rule	Cumulative Inserted Text
	Departure Aerodrome			
5, Insert the characters "DCT" (Route to Next Element - Direct Route Case)	5.1 The Route to Next Element is 'Direct' or' Unspecified', AND	Fail	Fail	
	5.2.1 Route Element Start Point was inserted OR	Pass		
	5.2.2 Route Element Start Point is the Departure Aerodrome	Fail		
6, Truncate Route	6.1 Route Truncation is indicated	Fail	Fail	

Route Element 5. (FIR Boundary Crossing)

Rule	Checks	Pass/Fail Step	Pass/Fail Rule	Cumulative Inserted Text
1, Skip Element	1.1 Route Element Start Point is not defined	Pass	Pass	(do not process this element for translation)
	1.2 the Route To Next Element and the Route Truncation Indicator are not defined	Fail		
2, Insert Significant Point	2.1 Route Element has a Requested Change OR			
	2.2 Route to Next Element is 'Direct' and the previous Route to Next Element is defined, OR			
	2.3 Route to Next Element is 'Unspecified' and the previous Route to Next Element is defined, OR			
	2.4 Route to Next Element is different from previous Route to Next Element, OR			
	2.5. the previous Route to Next Element is not defined and the Departure Aerodrome is AIRFILE			
3, Modify Significant Point	3.1 Cruise Climb			
	3.2 Speed and Level Change			
	3.3 Flight Rules Change			
4, Insert Route to Next Element	4.1 ATS Route is specified as Route to Next Element, AND			
	4.2.1 Route Element Start Point was inserted OR			

Rule	Checks	Pass/Fail Step	Pass/Fail Rule	Cumulative Inserted Text
(ATS Route Case)	4.2.2 Route Element Start Point is the Departure Aerodrome			
5, Insert the characters "DCT" (Route to Next Element - Direct Route Case)	5.1 The Route to Next Element is 'Direct' or' Unspecified', AND			
	5.2.1 Route Element Start Point was inserted OR			
	5.2.2 Route Element Start Point is the Departure Aerodrome			
6, Truncate Route	6.1 Route Truncation is indicated			

Route Element 6. (KERVO Q951)

Rule	Checks	Pass/Fail Step	Pass/Fail Rule	Cumulative Inserted Text
1, Skip Element	1.1 Route Element Start Point is not defined	Fail	Fail	
	1.2 the Route To Next Element and the Route Truncation Indicator are not defined	Fail		
2, Insert Significant Point	2.1 Route Element has a Requested Change OR	Fail	Fail	
	2.2 Route to Next Element is 'Direct' and the previous Route to Next Element is defined, OR	Fail		
	2.3 Route to Next Element is 'Unspecified' and the previous Route to Next Element is defined, OR	Fail		
	2.4 Route to Next Element is different from previous Route to Next Element, OR	Fail		
	2.5. the previous Route to Next Element is not defined and the Departure Aerodrome is AIRFILE	Fail		
3, Modify Significant Point	3.1 Cruise Climb	n/a	n/a	
	3.2 Speed and Level Change	n/a		
	3.3 Flight Rules Change	n/a		
4, Insert Route to Next	4.1 ATS Route is specified as Route to Next Element, AND	Pass	Fail	
	4.2.1 Route Element Start Point was	Fail		

Rule	Checks	Pass/Fail Step	Pass/Fail Rule	Cumulative Inserted Text
Element (ATS Route Case)	inserted OR			
	4.2.2 Route Element Start Point is the Departure Aerodrome	Fail		
5, Insert the characters "DCT" (Route to Next Element - Direct Route Case)	5.1 The Route to Next Element is 'Direct' or' Unspecified', AND	Fail	Fail	
	5.2.1 Route Element Start Point was inserted OR	Fail		
	5.2.2 Route Element Start Point is the Departure Aerodrome	Fail		
6, Truncate Route	6.1 Route Truncation is indicated	Fail	Fail	

Route Element 7. (DANOL direct)

Rule	Checks	Pass/Fail Step	Pass/Fail Rule	Cumulative Inserted Text
1, Skip Element	1.1 Route Element Start Point is not defined	Fail	Fail	
	1.2 the Route To Next Element and the Route Truncation Indicator are not defined	Fail		
2, Insert Significant Point	2.1 Route Element has a Requested Change OR	Fail	Pass	DCT KEBGO RABIK Q951 ANTOV/N380F400 Q951 DANOL
	2.2 Route to Next Element is 'Direct' and the previous Route to Next Element is defined, OR	Pass		
	2.3 Route to Next Element is 'Unspecified' and the previous Route to Next Element is defined, OR	Fail		
	2.4 Route to Next Element is different from previous Route to Next Element, OR	Pass		
	2.5. the previous Route to Next Element is not defined and the Departure Aerodrome is AIRFILE	Fail		
3, Modify Significant Point	3.1 Cruise Climb	n/a	n/a	
	3.2 Speed and Level Change	n/a		
	3.3 Flight Rules Change	n/a		
4, Insert	4.1 ATS Route is specified as	Fail	Fail	

Rule	Checks	Pass/Fail Step	Pass/Fail Rule	Cumulative Inserted Text
Route to Next Element (ATS Route Case)	Route to Next Element, AND			
	4.2.1 Route Element Start Point was inserted OR	Pass		
	4.2.2 Route Element Start Point is the Departure Aerodrome	Fail		
5, Insert the characters "DCT" (Route to Next Element - Direct Route Case)	5.1 The Route to Next Element is 'Direct' or' Unspecified', AND	Pass	Pass	DCT KEBGO RABIK Q951 ANTOV/N380F400 Q951 DANOL DCT
	5.2.1 Route Element Start Point was inserted OR	Pass		
	5.2.2 Route Element Start Point is the Departure Aerodrome	Fail		
6, Truncate Route	6.1 Route Truncation is indicated	Fail	Fail	

Route Element 8. (Lat./Long. Waypoint direct)

Rule	Checks	Pass/Fail Step	Pass/Fail Rule	Cumulative Inserted Text
1, Skip Element	1.1 Route Element Start Point is not defined	Fail	Fail	
	1.2 the Route To Next Element and the Route Truncation Indicator are not defined	Fail		
2, Insert Significant Point	2.1 Route Element has a Requested Change OR	Fail	Pass	DCT KEBGO RABIK Q951 ANTOV/N380F400 Q951 DANOL DCT 4632N06330W
	2.2 Route to Next Element is 'Direct' and the previous Route to Next Element is defined, OR	Pass		
	2.3 Route to Next Element is 'Unspecified' and the previous Route to Next Element is defined, OR	Fail		
	2.4 Route to Next Element is different from previous Route to Next Element, OR	Fail		
	2.5. the previous Route to Next Element is not defined and the Departure Aerodrome is AIRFILE	Fail		
3, Modify Significant Point	3.1 Cruise Climb	n/a	n/a	
	3.2 Speed and Level Change	n/a		
	3.3 Flight Rules Change	n/a		
4, Insert	4.1 ATS Route is specified as Route	Fail	Fail	

Rule	Checks	Pass/Fail Step	Pass/Fail Rule	Cumulative Inserted Text
Route to Next Element (ATS Route Case)	to Next Element, AND			
	4.2.1 Route Element Start Point was inserted OR	Pass		
	4.2.2 Route Element Start Point is the Departure Aerodrome	Fail		
5, Insert the characters "DCT" (Route to Next Element - Direct Route Case)	5.1 The Route to Next Element is 'Direct' or' Unspecified', AND	Pass	Pass	DCT KEBGO RABIK Q951 ANTOV/N380F400 Q951 DANOL DCT 4632N06330W DCT
	5.2.1 Route Element Start Point was inserted OR	Pass		
	5.2.2 Route Element Start Point is the Departure Aerodrome	Fail		
6, Truncate Route	6.1 Route Truncation is indicated	Fail	Fail	

Route Element 9. (Lat./Long. Waypoint direct)

Rule	Checks	Pass/Fail Step	Pass/Fail Rule	Cumulative Inserted Text
1, Skip Element	1.1 Route Element Start Point is not defined	Fail	Fail	
	1.2 the Route To Next Element and the Route Truncation Indicator are not defined	Fail		
2, Insert Significant Point	2.1 Route Element has a Requested Change OR	Fail	Pass	DCT KEBGO RABIK Q951 ANTOV/N380F400 Q951 DANOL DCT 4632N06330W ~~DCT~~ 4659N06031W *Note that exception case in step 5 applies and the DCT between the two geographic points can be removed.*
	2.2 Route to Next Element is 'Direct' and the previous Route to Next Element is defined, OR	Pass		
	2.3 Route to Next Element is 'Unspecified' and the previous Route to Next Element is defined, OR	Fail		
	2.4 Route to Next Element is different from previous Route to Next Element, OR	Fail		
	2.5. the previous Route to Next Element is not defined and the Departure Aerodrome is AIRFILE	Fail		

Rule	Checks	Pass/Fail Step	Pass/Fail Rule	Cumulative Inserted Text
3, Modify Significant Point	3.1 Cruise Climb	n/a	n/a	
	3.2 Speed and Level Change	n/a		
	3.3 Flight Rules Change	n/a		
4, Insert Route to Next Element (ATS Route Case)	4.1 ATS Route is specified as Route to Next Element, AND	Fail	Fail	
	4.2.1 Route Element Start Point was inserted OR	Pass		
	4.2.2 Route Element Start Point is the Departure Aerodrome	Fail		
5, Insert the characters "DCT" (Route to Next Element - Direct Route Case)	5.1 The Route to Next Element is 'Direct' or' Unspecified', AND	Pass	Pass	DCT KEBGO RABIK Q951 ANTOV/N380F400 Q951 DANOL DCT 4632N06330W 4659N06031W DCT
	5.2.1 Route Element Start Point was inserted OR	Pass		
	5.2.2 Route Element Start Point is the Departure Aerodrome	Fail		
6, Truncate Route	6.1 Route Truncation is indicated	Fail	Fail	

Route Element 10. (Top of Descent)

Rule	Checks	Pass/Fail Step	Pass/Fail Rule	Cumulative Inserted Text
1, Skip Element	1.1 Route Element Start Point is not defined	Pass	Pass	(do not process this element for translation)
	1.2 the Route To Next Element and the Route Truncation Indicator are not defined	Fail		
2, Insert Significant Point	2.1 Route Element has a Requested Change OR			
	2.2 Route to Next Element is 'Direct' and the previous Route to Next Element is defined, OR			
	2.3 Route to Next Element is 'Unspecified' and the previous Route to Next Element is defined, OR			
	2.4 Route to Next Element is different from previous Route to Next Element, OR			

Rule	Checks	Pass/Fail Step	Pass/Fail Rule	Cumulative Inserted Text
	2.5. the previous Route to Next Element is not defined and the Departure Aerodrome is AIRFILE			
3, Modify Significant Point	3.1 Cruise Climb			
	3.2 Speed and Level Change			
	3.3 Flight Rules Change			
4, Insert Route to Next Element (ATS Route Case)	4.1 ATS Route is specified as Route to Next Element, AND			
	4.2.1 Route Element Start Point was inserted OR			
	4.2.2 Route Element Start Point is the Departure Aerodrome			
5, Insert the characters "DCT" (Route to Next Element - Direct Route Case)	5.1 The Route to Next Element is 'Direct' or' Unspecified', AND			
	5.2.1 Route Element Start Point was inserted OR			
	5.2.2 Route Element Start Point is the Departure Aerodrome			
6, Truncate Route	6.1 Route Truncation is indicated			

Route Element 11. (MIVAD AVALN3)

Rule	Checks	Pass/Fail Step	Pass/Fail Rule	Cumulative Inserted Text
1, Skip Element	1.1 Route Element Start Point is not defined	Fail	Fail	
	1.2 the Route To Next Element and the Route Truncation Indicator are not defined	Fail		
2, Insert Significant Point	2.1 Route Element has a Requested Change OR	Fail	Pass	DCT KEBGO RABIK Q951 ANTOV/N380F400 Q951 DANOL DCT 4632N06330W 4659N06031W DCT MIVAD
	2.2 Route to Next Element is 'Direct' and the previous Route to Next Element is defined, OR	Fail		
	2.3 Route to Next Element is 'Unspecified' and the previous Route to Next Element is defined, OR	Fail		

Rule	Checks	Pass/Fail Step	Pass/Fail Rule	Cumulative Inserted Text
	2.4 Route to Next Element is different from previous Route to Next Element, OR	Pass		
	2.5. the previous Route to Next Element is not defined and the Departure Aerodrome is AIRFILE	Fail		
3, Modify Significant Point	3.1 Cruise Climb	n/a	n/a	
	3.2 Speed and Level Change	n/a		
	3.3 Flight Rules Change	n/a		
4, Insert Route to Next Element (ATS Route Case)	4.1 ATS Route is specified as Route to Next Element, AND	Pass	Pass	DCT KEBGO RABIK Q951 ANTOV/N380F400 Q951 DANOL DCT 4632N06330W 4659N06031W DCT MIVAD AVALN3
	4.2.1 Route Element Start Point was inserted OR	Pass		
	4.2.2 Route Element Start Point is the Departure Aerodrome	Fail		
5, Insert the characters "DCT" (Route to Next Element - Direct Route Case)	5.1 The Route to Next Element is 'Direct' or' Unspecified', AND	Fail	Fail	
	5.2.1 Route Element Start Point was inserted OR	Pass		
	5.2.2 Route Element Start Point is the Departure Aerodrome	Fail		
6, Truncate Route	6.1 Route Truncation is indicated	Fail	Fail	

Route Element 12. (GIBBY AVALN3)

Rule	Checks	Pass/Fail Step	Pass/Fail Rule	Cumulative Inserted Text
1, Skip Element	1.1 Route Element Start Point is not defined	Fail	Fail	
	1.2 the Route To Next Element and the Route Truncation Indicator are not defined	Fail		
2, Insert Significant Point	2.1 Route Element has a Requested Change OR	Fail	Fail	
	2.2 Route to Next Element is 'Direct'	Fail		

Rule	Checks	Pass/Fail Step	Pass/Fail Rule	Cumulative Inserted Text
	and the previous Route to Next Element is defined, OR			
	2.3 Route to Next Element is 'Unspecified' and the previous Route to Next Element is defined, OR	Fail		
	2.4 Route to Next Element is different from previous Route to Next Element, OR	Fail		
	2.5. the previous Route to Next Element is not defined and the Departure Aerodrome is AIRFILE	Fail		
3, Modify Significant Point	3.1 Cruise Climb	n/a	n/a	
	3.2 Speed and Level Change	n/a		
	3.3 Flight Rules Change	n/a		
4, Insert Route to Next Element (ATS Route Case)	4.1 ATS Route is specified as Route to Next Element, AND	Pass	Fail	
	4.2.1 Route Element Start Point was inserted OR	Fail		
	4.2.2 Route Element Start Point is the Departure Aerodrome	Fail		
5, Insert the characters "DCT" (Route to Next Element - Direct Route Case)	5.1 The Route to Next Element is 'Direct' or' Unspecified', AND	Fail	Fail	
	5.2.1 Route Element Start Point was inserted OR	Fail		
	5.2.2 Route Element Start Point is the Departure Aerodrome	Fail		
6, Truncate Route	6.1 Route Truncation is indicated	Fail	Fail	

Route Element 13. (CYYT)

Rule	Checks	Pass/Fail Step	Pass/Fail Rule	Cumulative Inserted Text
1, Skip Element	1.1 Route Element Start Point is not defined	Fail	Pass	(do not process this element for translation)
	1.2 the Route To Next Element and the Route Truncation Indicator are not defined	Pass		

Rule	Checks	Pass/Fail Step	Pass/Fail Rule	Cumulative Inserted Text
2, Insert Significant Point	2.1 Route Element has a Requested Change OR	Fail		
	2.2 Route to Next Element is 'Direct' and the previous Route to Next Element is defined, OR	Fail		
	2.3 Route to Next Element is 'Unspecified' and the previous Route to Next Element is defined, OR	Fail		
	2.4 Route to Next Element is different from previous Route to Next Element, OR	Fail		
	2.5. the previous Route to Next Element is not defined and the Departure Aerodrome is AIRFILE	Pass		
3, Modify Significant Point	3.1 Cruise Climb	n/a		
	3.2 Speed and Level Change	n/a		
	3.3 Flight Rules Change	n/a		
4, Insert Route to Next Element (ATS Route Case)	4.1 ATS Route is specified as Route to Next Element; AND	Fail		
	4.2.1 Route Element Start Point was inserted OR	Fail		
	4.2.2 Route Element Start Point is the Departure Aerodrome	Fail		
5, Insert the characters "DCT" (Route to Next Element - Direct Route Case)	5.1 The Route to Next Element is 'Direct' or' Unspecified', AND	Fail		
	5.2.1 Route Element Start Point was inserted OR	Fail		
	5.2.2 Route Element Start Point is the Departure Aerodrome	Fail		
6, Truncate Route	6.1 Route Truncation is indicated	Fail		

The final translated route is then:

```
DCT KEBGO DCT RABIK Q951 ANTOV/N0380F400 Q951 DANOL DCT 4632N06330W
4659N06031W DCT MIVAD AVALN3
```

APPENDIX I – FF-ICE 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 be the catalyst to bring about a step change in global air traffic management (ATM) towards ICAO's vision of an integrated, harmonised 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 ICAO Global ATM Operational Concept (GATMOC, Doc 9854). Given its scalable nature, FF-ICE will be the de facto mechanism upon which global aviation will utilise for flight planning and related functions as ATM evolves, enabling future 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", in 2012, this document aims to lay down a strategy to guide ICAO Member States and regions in planning the implementation of FF-ICE to reduce any potential challenges arising from mixed mode operations, as well as to ensure a smooth, harmonised global transition to FF-ICE.

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

I-1.2.1. FF-ICE, supported by a System Wide Information Management (SWIM) environment, acts as an enabler for many of the features identified in the GATMOC. Flight information exchange using FF-ICE will improve ATM stakeholders' decision-making process at both the individual and at the network level. Globally harmonised procedures in ATM planning using FF-ICE will enable seamless and collaborative decision-making among ATM actors, bringing about overall increase in system wide ATM efficiency.

I-1.2.2. The FF-ICE planning service and earlier submission of flight plan with trajectory information enables ASPs to more accurately forecast traffic demand, analyse traffic patterns and adjust traffic flow management plans and measures. Through negotiation mechanisms, ASPs and 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 first release of FF-ICE (FF-ICE/R1) will help to overcome many limitations of FPL 2012, allowing ASPs to optimise their resources and AUs to fly closer to their preferred trajectories. For example, FF-ICE allows for a flexible information set which 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 minimally 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 optimise flight operations earlier and more accurately. The use of SWIM technology with globally harmonised 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 which allows for the submission of flight intent in advance (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 feedback on the restrictions and associated constraints applicable to that flight, hence allowing a collaborative and iterative planning process to optimise 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 organisation and availability, and staffing allocation accordingly. Requirements for the advanced submission of flight plan information will be balanced against the need to ensure 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 flight plans 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 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 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. Anecdotally, for the transition to FPL2012, while States and ANSPs were given lead time to prepare for the cutover, changing of 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 realised 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 of the FPL2012 implementation, it may be worthwhile to consider the issues from the perspectives of key stakeholders and potential users of FF-ICE. Broadly, two issues that might potentially hinder the acceptance of FF-ICE – 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, to date a significant amount of FF-ICE related provisions and guidance materials have been

developed or refined. Once ready, they will provide the necessary references from which stakeholders can take guidance to ensure harmonised understanding and standardised implementation globally. Equally important is the need to have some working systems to demonstrate the feasibility of FF-ICE, and to make apparent the positive opportunities offered by FF-ICE. While not everyone may choose to implement FF-ICE at the onset, it is conceivable that small group(s) of likeminded ATM actors can work together to implement FF-ICE early. As time progresses, others would take the reference cases for their own assessment and may find FF-ICE 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.

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

I-2.4. FF-ICE Availability

I-2.4.1. ***Provisions*** – to support the transition to FF-ICE, ICAO had been working on the FF-ICE Concept Document and Implementation Guidance (Doc 9965), as well as consequential amendments to ICAO Annexes and Procedures for Air Navigation Services (PANS) which would be required by FF-ICE. The first installation of the FF-ICE provisions, i.e. FF-ICE/R1, would focus on the pre-departure planning and negotiation procedures between the ASPs and AUs. This is expected to be made applicable by 2024.

I-2.4.2. The implementation of FF-ICE/R1 would allow AUs and ASPs to file and process flight plans using FF-ICE processes. Future package would focus on the flight execution phase and would be able to broaden the exchange, management and use of flight information throughout the lifecycle of a flight in such a manner as to enable TBO.

I-2.4.3. ***Minimum Capability*** – in FF-ICE/R1, there are a total of six FF-ICE services, structured and designed to be implemented independently. The implementation of 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 needs of the ASPs and AUs. The incremental implementation would ease transition challenges and lower the risks of operational and system issues.

I-2.4.4. ***Translation*** – it is likely that vendors will create translators to allow an ASP to accept a FF-ICE flight plan without changing their underlying system, and to allow an AU to generate a flight plan which would be sent in a 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-2.4.5. 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, recognising the full benefits of FF-ICE, work towards a more reliable and operationally sustainable solution.

I-2.4.6. ***Systems Availability Timelines*** – for customised systems, ASPs and AUs would need to schedule changes and/or upgrades to support FF-ICE implementation. A cost/benefits case would need to be investigated by the ASPs and AUs in order 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 would be implemented.

I-2.4.7. For vendor-provided commercial systems, ASPs and AUs would need to be aware of the readiness timeline for various FF-ICE capabilities and services in order 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 FF-ICE capability at the time of the next upgrade of their system when the vendor has made FF-ICE 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 with have access to the applicable SWIM services.

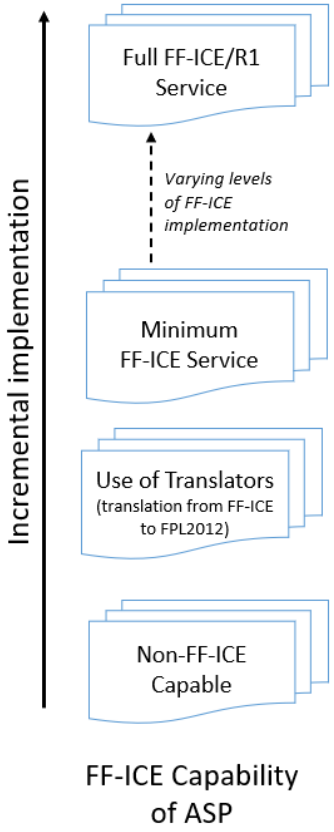
I-2.6. Phased Implementation Considerations

I-2.6.1. ***Mixed Environment Considerations*** – ASPs and AUs could adopt a phased approach to transition to FF-ICE in accordance to 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 period of time. 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 transit 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. At the initial stage when FF-ICE is 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 optimised 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 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 2.4.5). 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 capabilities and corresponding 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.



FPL2012	FF-ICE Flight Plan	FF-ICE Services Provided
Accepted	Accepted	All 6 FF-ICE/R1 services
Accepted	Accepted	• Filing Service • Flight Data Request Service • *One or more of other additional FF-ICE/R1 services*
Accepted	Accepted	• Filing Service • Flight Data Request Service
Accepted	Accepted but flight plan details will be processed after translation (Trajectory information within FF-ICE flight plan would not be used for FF-ICE services)	• Filing Service • Flight Data Request Service* *eASPs should publish data fields that are available for request
Accepted	Not Accepted	None

Acceptance of flight plans and availability of FF-ICE services

Figure 33 – Varying Degrees of FF-ICE Implementation

I-2.6.4. ***Incremental Implementation Considerations*** – FF-ICE had been designed to be introduced and implemented based on national and regional needs and timelines, but in a standardised manner. The minimum service requirement for implementation would be Filing Service and Flight Data Request Service, which will 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 seem necessary to take into consideration the potential different stages of FF-ICE implementation across the regions in order 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 where 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 of flight plans would be vastly different under the FF-ICE concept. For FF-ICE/R1, relevant personnel (such as flight dispatches of AUs or personnel of ASPs performing as little manual intervention as possible) who needs to understand how FF-ICE services work is 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 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 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 recognise 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 work towards the wide adoption of the FF-ICE concept and FF-ICE/R1 services, ICAO could play a leading role in spearheading awareness campaigns, technical briefings and workshops. These would serve to introduce the main features of FF-ICE/R1 and its benefits, the need for change in support of future ATM, and to 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 minimise processing errors.

I-3.1.3. Ideally, such campaigns, workshops and briefings should be carried out from now till 2024, i.e. the applicability date of FF-ICE/R1 provisions.

I-3.1.4. ***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 have 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 sunsetting of FPL2012 will therefore be expected (see Section 4 for more details). Once past the agreed sunset date, ICAO would stop supporting all amendments to provisions related to ICAO FPL 2012.

I-3.1.5. ***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, use of 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 favourable and attractive proposition for stakeholders to consider implementing more of the FF-ICE services. Notwithstanding, it is recognised 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 harmonised approach to FF-ICE implementation would be necessary to maximise 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 will 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 likeminded ASPs and stakeholders come together to start on an initiative, thus encouraging others 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 harmonised 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 upgrade typically occurs once every 10-15 years, a long lead time would thus be required by ASPs to allow phasing in of 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*** – regional engagements could start even before FF-ICE/R1 provisions are applicable (i.e. before end 2024). Unlike global engagements, the regional engagements should have more in-depth and practical discussions, workshops and demonstrations where States, ASPs, AUs, industry and all other relevant stakeholders would be 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 to work together closely and move 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 to keep track of progress at the regional levels. Engagements between the task forces between regions would be required to ensure harmonised implementation across neighbouring regions.

I-3.2.6. Within a region, sunset dates for FPL 2012 provisions could also be determined for a more harmonised 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. Rather, it should be recognised and decided at an earlier stage that appropriate efforts and resources can be better channelled in a more pragmatic way to accelerate the advancement of FF-ICE which is beneficial to global ATM in the long run.

I-4.1.2. Once ICAO began familiarising the regions, industry and other stakeholders on the FF-ICE concept, needs and requirements from now till 2024, and when FF-ICE provisions, concept document and implementation guidance are finalised and made applicable by end 2024, regions could start to develop 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 on specifying and finalising their respective system requirements to incorporate FF-ICE capabilities. Following which, 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 be familiar 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 harmonised transition plan and to minimise duration of mixed mode operations, all regions should consider setting a sunset date for FPL 2012 by 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. Please refer to Figure 34 for an overview of the transition strategy to FF-ICE and the indicative timelines. Review of the timelines will be conducted 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 beyond the minimum level. To optimise 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 to consider planning the cessation of these services once FF-ICE and other supporting means are in place.

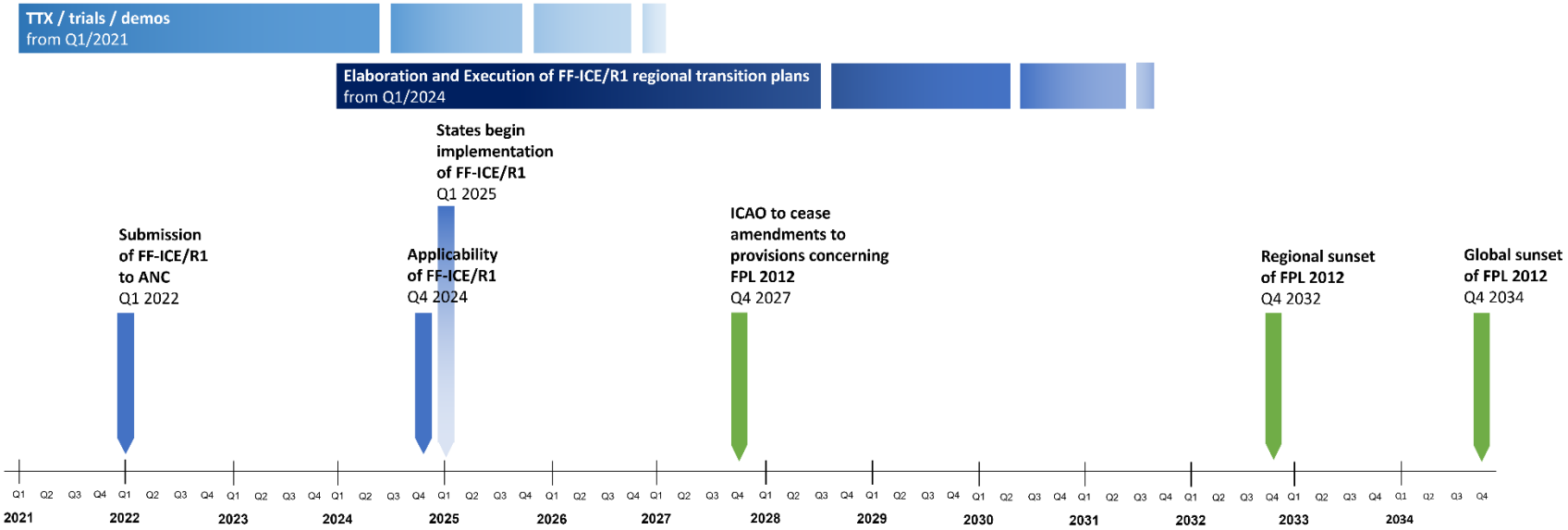


Figure 34– Overview of Implementation Strategy of FF-ICE

— END —