

FLIGHT PLANNING – THE FUTURE

THE DISPATCHER AND ATC DELAY PROGRAMS



FF ICE (FLIGHT AND FLOW IN A COLLABORATIVE ENVIRONMENT)

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To capture the advantages of SWIM (System-Wide Information Management) regarding creating and filing ATC flight plans using XML (machine language... FIXM, AIXM and iWXXM), the ICAO ATMRPP (Air Traffic Management Requirements Performance Panel) has developed FF ICE, based on Trajectory Based Operations (TBO). These are essentially tools for the dispatcher's flight planning toolbox, to use at the discretion of the dispatcher to further the operator's business objectives by minimizing or mitigating air traffic delays. They have no effect on the dispatcher's operational flight plan.

TBO describes a flight trajectory with 4 elements (4DT):

1. Route of flight
2. Airspeed
3. Flight level
4. Time

In order for the air traffic control system to balance demand with capacity to avoid or minimize TMIs (Traffic Management Initiatives), there is a need to have a reasonably good idea in advance of the intent to use airspace, particularly at the air carrier level.

Some definitions first:

AU – Airspace user (legacy)...the dispatcher before FF ICE

eAU – Enhanced airspace user (FF ICE)...the enhanced dispatcher enabled after FF ICE

ASP – air-service provider

eASP – enhanced air-service provider (FF ICE)

CTOP - A traffic management program that manages demand through constrained airspace, while considering operator preference with regard to both route and delay as defined in a Trajectory Options Set (TOS). TFMS uses operator-submitted TOS to identify and assign either a route assignment that avoids the CTOP or a combination of assigned routes through the CTOP and controlled departure time.

TFMS – Traffic Flow Management System

pFPL – Preliminary Flight Plan – GUF1 assigned; flight becomes active in eASP system.

FPL or eFPL - Filed flight plan. The latest flight plan as filed with an ATS unit submitted by the pilot, an operator or a designated representative, without any subsequent changes for use by ATS units.

CPL Current flight plan. The flight plan, including changes, if any, brought about that reflects changes to the filed flight plan, if any, by subsequent ATC clearances.

Several tools are under development and in a recent ICAO State Letter, these tools are planned to be incorporated into the ICAO Annexes and Documents. IFALDA has been offered an opportunity to comment on their inclusion.

HERE'S THE WAY IT IS PLANNED TO WORK UNDER FF ICE:

1. An early intent (EI) message is submitted to TFMS, up to 24 hours before departure. This will be done through automation, most likely via the OAG. At this point the flight is still notional; it is not actually in the active stage yet. This gives TFMS a heads-up that an operator intends to use specific airspace between two points.
2. At some point after the EI is submitted, when the dispatcher has reason to believe that a TMI will affect the flight, one or more TOS messages can be sent to TFMS with variables as to route, altitude, speed and acceptable delay, biased and prioritized for the operator's business objectives. The TOS will be rejected if there is not an EI message for the flight on file. At this point, the flight remains notional and not actually in the eASP's system as an active flight. Currently, TOS is a U.S. NAS concept and is planned to be included in FF ICE as a NAS extension.
3. The dispatcher can also submit "what-if" messages into TFMS in the form of Trial Requests (TR) to see if any constraints exist on a specific route at that time. This can be done as often as deemed necessary and can also be done for actual flight plans already filed. Records of TRs are not maintained.
4. A preliminary Flight Plan (pFPL) can be submitted before the actual flight plan is submitted, including all information normally in a filed flight plan. When the pFPL is submitted, a GUFU is assigned, and the flight becomes an active flight. From that point onward, all reference to the flight will contain the GUFU, including subsequent TRs if used.
5. Once the dispatcher is satisfied that a flight plan has been developed that best meets the business objectives of the operator, the FPL (Flight Plan) is filed with the eASP.
6. If it should become necessary to update the filed flight plan, the dispatcher may do so up to any cut-off time determined by the eASP.
7. It is not the intention that personnel involved in the provision and use of the FF-ICE services see the whole content of FF-ICE messages, the majority of which is to be generated by computer systems. However, flight plan information shall be displayed or made available for verification, coordination and necessary modifications by those personnel, such as flight dispatcher/flight operations officer.

UNDER THE HOOD STUFF

EI (Early Intent)



Early Intent (EI) messages allow airlines to submit flight planning data to the TFMS (Traffic Flow Management System) before a formally filed Flight Plan is submitted. EI information is also available from within the OAG (Official Airline Guide) from airlines that submit their schedules to the OAG. OAG schedules provide information on flights of interest such as carrier, flight number, date, departure and arrival airport, departure time, and aircraft type. EI messages can be submitted up to 24 hours prior to a flight's proposed departure time, and are processed within TFMS similarly to a filed Flight Plan except in the following ways:

- The Enroute computer at the Air Route Traffic Control Center (ARTCC) will never receive EI messages
- Any Flight Plan data filed and forwarded by the eASP to TFMS will take precedence over EI data.
- EI flight data is notional since a flight plan does not yet exist. It is merely a "heads-up".

TOS (TRAJECTORY OPTIONS SET)

TOS is a message sent by participating airspace users (AUs) to the TFMS defining a prioritized group of options. These preferences are defined through a combination of routes, altitudes, and speeds with each trajectory weighted using flight operator submitted preferences, biased for cost (time or fuel). TOS messages allow airlines to submit a set of route options with user-defined precedence values to indicate which options are preferred based on the airline's business rules and objectives.

The flight must exist in the TFMS system from an EI source, or the TOS message will be rejected.

An example of a TOS option set for a flight from KDEN to KIAD...flight # ABC123.....

- The first column on the upper left is the RTC (relative trajectory cost). The upper left cell will always be zero since that is the baseline cost depending on the airline business objectives.

- The next column is the RMNT...the required minimum notification time required to file this route.
- The TVST column – trajectory valid start time
- The TVET column – trajectory valid end time
- The last 3 columns are the variables in terms of route, altitude and speed.

Unique Flight Data

| ACID | ORIG | DEST | IGTD | TYPE | ERTD |
|--------|------|------|---------|------|---------|
| ABC123 | DEN | IAD | 05/1945 | B757 | 05/1957 |

TRAJ_OPTION

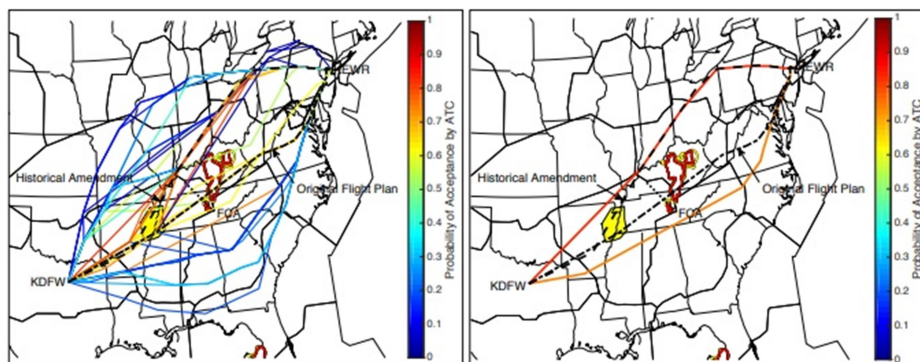
| RTC | RMNT | TVST | TVET | Route | ALT | SPEED |
|-----|------|------|------|--|-----|-------|
| 0 | | | | GLD SLN J24 MCI J24 STL J134 FLM J24 HVQ SHNON2 | 350 | 435 |
| 25 | | | | GLD SLN J24 MCI J80 VHP APE AIR J162 MGW VERNI ESL SHNON2 | 350 | 435 |
| 35 | | | | PLAIN4 HCT J128 OBH J10 IOW BDF J64 WHETT J30 APE AIR MGW MGW121 VERNI ESL ROYL2 | 310 | 430 |
| 50 | | 1945 | 2145 | YELLOW6 HANKI OBH J10 IOW BDF J64 WHETT J30 APE AIR MGW MGW121 VERNI ESL ROYL2 | 350 | 425 |
| 65 | | 2030 | 2200 | YELLOW6 HANKI ONL J148 MCW J16 BAE J34 AIR MGW MGW121 VERNI ESL ROYL2 | 310 | 430 |
| 90 | 45 | 1945 | 2145 | PIKES4 PUB J28 ICT FAM J78 HVQ SHNON2 DEN PIKES4 PUB TBE BGD IRW FSM BNA BKW ROYL2 IAD | 350 | 435 |
| 120 | 45 | 2045 | 2245 | PIKES4 PUB TBE BGD IRW FSM BNA BKW ROYL2 | 350 | 440 |

IGTD – Initial Gate Time of Departure; ERTD – Earliest Runway Time of Departure; } Optional values provided by the Flight Operator
 RTC – Relative Trajectory Cost RMNT- Required Minimum Notification Time;
 TVST – Trajectory Valid Start Time; TVET- Trajectory Valid End Time

- A dispatcher might want to use the same route for each trajectory and simply try different altitudes and speeds.

TOS is available now to U.S. NAS dispatchers (AUs). It will be offered as a FIXM extension under FF ICE.

Sample.... KDFW-KEWR



(a) all trajectory options

(b) chosen trajectory options

Estimated probability of acceptance for trajectory options in pre-departure sample application from KDFW to KEWR on July 12, 2015 at 1300Z.

PFPL (PRELIMINARY FLIGHT PLAN)

The introduction of the FF-ICE services required a new term “preliminary flight plan”, which can be submitted prior to filing a flight plan for a collaborative flight planning between a unit providing FF-ICE planning service and an operator or designated representative. Considering this new type of flight plan is not necessarily provided to an ATS unit, the proposal amends the definition of “flight plan” to make it generic about to whom the information is provided to accommodate the anticipated filing of flight plans using FF-ICE services.

The proposal takes account of the flight plan evolving into different types (operational, preliminary, filed and current flight plan), each of which has a specific audience and purpose, as this is an essential foundation for the FF-ICE and TBO concepts. In addition, the proposal intends to clarify the difference between the existing terms “filed flight plan” and “current flight plan”, which often led to different interpretations among controllers, dispatchers, and pilots.

With respect to the definition of “operational flight plan”, it was considered as a well-known term that refers to a flight plan that is prepared and managed solely by operators/dispatchers and that has no interaction with air traffic services units. In this regard, there was no need for adding any clarity to the existing definition contained in Annex 6, Part I.

PRELIMINARY FLIGHT PLAN (PFPL) MESSAGE

A pFPL message is a flight plan message filed by an operator or designated representative to each FF-ICE services unit from which evaluation is needed and that has indicated the availability of the service. Content of a pFPL message is shown and includes several minimum required items, as indicated by the red color font and (R) label. While the Desired Route Trajectory element is optional, there are several data items that are required if it is provided. The Desired Route Trajectory required data items are indicated by the orange font and (R) label. Data items with a (O) label are optional according to FF-ICE implementation guidance.

| Flight/Aircraft | Departure/Destination/Alternate | Desired Route Trajectory | Other Information |
|--|---|--|--|
| Flight Identification | Departure/Destination Data | Route/Trajectory Group (O) | Route to Revised Destination |
| - GUF1 (R) | - Departure Aerodrome (R) | - Aircraft Take-off Mass (O) | - Revised Destination (O) |
| - Aircraft Identification (R) | - Destination Aerodrome (R) | - Requested Cruising Speed (R) | - Route String to Revised Destination (O) |
| Flight Status | - Estimated Off-Block Time (R) | - Requested Cruising Level (R) | Dangerous Goods |
| - Operator Flight Plan Version (R) | - Departure Airport Slot Identification (O) | - Total Estimated Elapsed Time (O) | - Dangerous Goods Information (O) |
| Flight Characteristics | - Destination Airport Slot Identification (O) | Route/Trajectory Element (O) | Aeronautical Information Regulation and Control (AIRAC) |
| - Flight Rules (R) | Alternates | - Along Route Distance (O) | - AIRAC Reference (O) |
| - Type of Flight (O) | - Alternate Destination Aerodrome(s) (O) | - Route Element Start Point (R) | Supplementary Information |
| - Special Handling (O) | - Alternate Take-Off Aerodrome(s) (O) | - Route to Next Element (R) | - Endurance (O) |
| - Remarks (O) | - Alternate En-Route Aerodrome(s) (O) | - Route Truncation Indicator (O) | - Persons on Board (O) |
| - Flight Plan Originator (O) | | - Requested Change (O) | - Emergency Radio (O) |
| - Operator (O) | | - Route/Trajectory Constraints (O) | - Survival Capability (O) |
| - Equipment and Capabilities (O) | | - Trajectory Point (O) | - Life Jacket Characteristics (O) |
| - Supplementary Information Source (O) | | - Planned Delay (O) | - Aircraft Color and Markings (O) |
| - Required Runway Visual Range (O) | | Route/Trajectory Aircraft Performance (O) | - Pilot in Command (O) |
| Aircraft Characteristics | | - Performance Profile (O) | - Dinghies (O) |
| - Total number of aircraft (O) | | - Speed Schedule (O) | - Remarks (O) |
| - Registration (O) | | | |
| - Aircraft Address (O) | | | |
| - SELCAL Code (O) | | | |
| - Number and type of aircraft (O) | | | |
| - Wake Turbulence Category (O) | | | |
| - Aircraft Approach Category (O) | | | |

TRIAL SERVICE

The trial service is an optional service provided by an eASP (enabled air traffic service provider) that offers a separate, standalone transaction which has no impact on existing data.

- A dispatcher can use the trial service to perform one or many “what-if” type of investigations for an existing flight plan, preliminary or filed.
- The dispatcher can even submit a request through trial service if the flight does not exist in TFM automation.
- The trial service is initiated through the submission of a Trial Request (TR) message,

which is discussed in the following section.



TRIAL REQUEST (TR) MESSAGE

The trial service allows dispatchers to submit a trial request and, in return, receive a response that includes constraint information relevant to that flight.

- eAUs (enabled dispatchers) can submit Trial Requests (TR) to evaluate route/trajectory options for the route or alternatives without a prior submitted filed flight plan.
- The eAU may use the results from the Trial Requests to update route by submitting a Flight Plan Update message.

- A TR that relates to an existing preliminary or Filed Flight Plan should contain the Globally Unique Flight Identifier (GUFI) to ensure that the same flight is not considered twice when assessing the impact of the request. (see below)
- When an eASP receives a TR, the same evaluations as those performed for a preliminary or Filed Flight Plan are conducted.

APPLICABLE SUBMISSION RESPONSE AND TRIAL RESPONSE MESSAGES ARE PROVIDED TO THE EAU.

A TR message must at the minimum include following data items:

- Aircraft ID
- Departure Aerodrome
- Estimated Off-Block Date & Time
- Destination Aerodrome

While this is the minimum, the more information provided (i.e., route of flight) will provide more accurate feedback.

GUFI (GLOBALLY UNIQUE FLIGHT IDENTIFIER)

The originator of a preliminary flight plan (PFP) or eFPL shall assign a single GUFI (pronounced-"goofy") to a flight for which the flight plan is to be submitted. The GUFI is a machine-language-generated set of alpha-numeric characters.



- The originator of a PFP or eFPL shall ensure that all FF-ICE messages submitted for a flight are identified by the same GUFI.
- When providing a response to an FF-ICE message, an FF-ICE services unit shall identify the subject flight using the GUFI contained in the message.
- An FF-ICE services unit shall reject an FF-ICE message if the message includes a GUFI identical to that of another flight known to the FF-ICE services unit.
- The format of a GUFI shall include a unique identification of the entity that generated the GUFI.
- The originator of a PFP or eFPL shall ensure that the GUFI assigned to the flight does not duplicate any other GUFI submitted by that originator within the past 10 years.

Thanks to Walt Disney

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

globally unique flight identification (GUFI) is intended to help identify the correct flight to which a message or transaction should be associated, as well as to distinguish between different flight plans.

FPL (FLIGHT PLAN)

The various tools described above will allow the enabled dispatcher to create a safe operational flight plan and accompanying ATC flight plan that best meets the operators business objectives while ensuring that any anticipated ATC traffic management initiatives are considered and mitigated.

(FPL-ZZZ1236-IS

-B38M/M-SADE3GHJ4RWXZ/LB1

-KIAH2240

-N0474F310 FLYZA5 KELPP A766 KEHLI/N0474F330 UA766

RORLA/N0467F350 UA766 SIGMA UM205 SPP UG447 PML/N0464F360 UM795

ILTUR/N0468F350 UQ122 TIRTO TIRT4E

-SKBO0430 SKCL

-PBN/A1L1B1C1D1O1S2T1 NAV/RNP2 DAT/1FANS2PDC SUR/260B

DOF/230127 REG/N12345 EET/MMFR0100 MHCC0145 MPZL0236 SKED0341

SEL/XXXX

OPR/ZZZ PER/D)

CODE/A2B10D

