

System Wide Information Management (SWIM)

Instructional Example of How to Write a Service Requirements Document (SRD)

As prescribed by

FAA-STD-074, Preparation of Service Requirements Documents



February 11, 2021

Foreword

The Service Requirements Document (SRD) contained herein is an instructional example of a set of requirements developed as prescribed by [FAA-STD-074](#) for a fictitious “Flight Plan Service (FPS)”. It replaces a similar example written in accordance with an earlier standard, [FAA-STD-070](#), which has been superseded by FAA-STD-074.

The FAA Pilot/Controller Glossary (P/CG) defines a flight plan as “specified information relating to the intended flight of an aircraft that is filed orally or in writing with a Flight Service Station or an Air Traffic Control facility.” This example SRD simulates a scenario in which a new [service](#) is needed for filing and modifying a flight plan on-line.

This document does not attempt to model or suggest a new service. Therefore, while an effort was made to present realistic requirements for a service that could be developed for flight planning, a number of logical and technical components that a “real” service usually requires were purposely omitted to make it easier for a reader to perceive or understand the major notions presented in FAA-STD-074. For the same reason, all technological standards or protocols employed in this example should not be taken as endorsing, recommending, or favoring any technology used in implementing services.

To make this example complete, the SRD also includes a fictitious “Flight Plan Exchange Model” (FPXM) designed to enable the management and distribution of flight plan data in digital format (see more in [section 7.4](#) of this document). This model and associated artifacts, including a fictitious flight plan schema and diagram, do not represent any actual model or artifacts developed or being developed by FAA and should not be used for any purpose except as an instructional aide.

Questions about the example SRD may be directed to:

Federal Aviation Administration
SWIM Governance Team, AJM-316
800 Independence Avenue, SW
Washington, DC 20591

Typographical Conventions used in the Instructional Example

Page headers, page numbers, figure and table captions, etc. are in accordance with FAA-STD-074 Section 4, General Requirements.

FAA-STD-074 does not dictate other stylistic aspects of an SRD (e.g., font face, font size, page borders, etc.).

Instances of shaded and bordered paragraphs (like this) inserted at several points in this document represent **explanatory notes** that would not appear in an actual SRD.



U.S. Department of
Transportation
**Federal Aviation
Administration**

ESMG-FPS-SRD-1234
Revision A
February 1, 2021

Service Requirements Document Flight Plan Service (FPS)

Service Requirements Document Flight Plan Service (FPS)

NOTE: An Approval page may not be required based on the configuration management policies established within a given organization. This fictitious [service provider](#) organization does require one.

Approval Signatures

Name	Organization	Signature	Date Signed
John Smith	FAA En Route Services Modernization Group, ANG-X		January 19, 2021
James Jones	FAA Traffic Modernization Program (TMP), AJR-N		January 21, 2021

Table of Contents

1 SCOPE	1
1.1 BACKGROUND	1
2 APPLICABLE DOCUMENTS	2
2.1 GOVERNMENT DOCUMENTS	2
2.2 NON-GOVERNMENT STANDARDS AND OTHER PUBLICATIONS	2
3 DEFINITIONS	4
3.1 TERMS AND DEFINITIONS.....	4
3.2 ACRONYMS AND ABBREVIATIONS	6
4 SERVICE INFORMATION	8
4.1 SERVICE PROVIDER.....	8
4.2 SERVICE CONSUMERS	8
5 FUNCTIONAL REQUIREMENTS.....	9
6 NON-FUNCTIONAL REQUIREMENTS	10
6.1 SECURITY REQUIREMENTS.....	10
6.1.1 Authentication.....	10
6.1.2 Authorization.....	10
6.1.3 Integrity.....	11
6.1.4 Confidentiality	11
6.1.5 Non-Repudiation.....	11
6.1.6 Audit Capability	11
6.1.7 Other Security Requirements.....	12
6.2 QUALITY OF SERVICE REQUIREMENTS.....	12
6.3 SERVICE POLICIES REQUIREMENTS.....	12
6.4 PROCESSING REQUIREMENTS	12
6.5 OPERATIONAL ENVIRONMENT REQUIREMENTS	12
7 INTERFACE REQUIREMENTS	13
7.1 OPERATIONS REQUIREMENTS.....	13
7.1.1 Operation FileFlightPlan	13
7.1.2 Operation UpdateDestinationAerodrome	14
7.1.3 Operation CancelFlightPlan.....	15
7.2 MESSAGES REQUIREMENTS.....	16
7.3 FAULTS REQUIREMENTS	16
7.4 DATA REQUIREMENTS.....	17
8 INTEROPERABILITY REQUIREMENTS.....	20
8.1 DATA PROTOCOL REQUIREMENTS	20
8.2 MESSAGE PROTOCOL REQUIREMENTS.....	20
8.3 TRANSPORT PROTOCOL REQUIREMENTS	20
8.4 OTHER PROTOCOLS REQUIREMENTS	20
9 QUALITY ASSURANCE PROVISIONS	21

9.1 RESPONSIBILITY FOR VERIFICATION	21
9.2 SPECIAL VERIFICATION REQUIREMENTS	21
9.3 VERIFICATION REQUIREMENTS TRACEABILITY MATRIX	21
APPENDIXES	24
APPENDIX A. FLIGHTPLAN.XSD	24
APPENDIX B. FLIGHTPLAN.XSD – DIAGRAM	28
APPENDIX C. FLIGHTPLAN.XML	30

List of Figures

Figure 6-1 FPS Roles Use Case Diagram	11
Figure 7-1 Operation FileFlightPlan Sequence Diagram	13
Figure 7-2 Operation UpdateDestinationAerodrome Sequence Diagram.....	14
Figure 7-3 Operation CancelFlightPlan Sequence Diagram	15
Figure 7-4 Flight Plan Exchange Conceptual Model.....	18

List of Tables

Table 5-1 FPS Business Functions	9
Table 6-1 FPS Roles	10
Table 6-2 FPS Qualities of Service	12
Table 7-1 FPS Interface Specification.....	13
Table 7-2 Operation FileFlightPlan Specification	14
Table 7-3 Operation UpdateDestinationAerodrome Specification	14
Table 7-4 Operation CancelFlightPlan Specification	15
Table 7-5 Messages Specification	16
Table 7-6 Faults Specification	16
Table 7-7 Flight Plan Data Element Definitions	18
Table 9-1 Verification Requirements Traceability Matrix	21

1 Scope

This Service Requirements Document (SRD) provides the requirements for the Flight Plan Service (FPS). It has been prepared in accordance with FAA-STD-074, Department of Transportation Federal Aviation Administration, *Preparation of Service Requirements Documents* [STD-074]. This [service](#) will give a [service consumer](#) the capability to file, modify, and cancel a flight plan operating under Instrument Flight Rules (IFR).

1.1 Background

In today's NAS environment, a flight plan specifies information that describes a desired route of flight between a well-defined departure and destination point within which separation services are required. Additional information provided in the flight plan shows that the flight meets the legal requirements of Instrument Flight Rules (IFR).

The intended outcome of filing an IFR flight plan is to receive air traffic control separation services between the departure and destination airports through a subsequent flight plan clearance.

As a part of transitioning toward the Next Generation Air Transportation System (NextGen), the En Route Services Modernization Group (ESMG) intends to implement this flight plan filing capability as a Web-enabled service.

2 Applicable Documents

2.1 Government Documents

NOTE: Documents [FPS-FRD], [FPS-POL], [FPS-CONOPS], [RUNTIME], and [FPXM] are fictitious.

- [STD-074] FAA-STD-074, Preparation of Service Requirements Documents, FAA, 20 July 2020.
<http://www.tc.faa.gov/its/worldpac/standards/faa-std-074.pdf>
- [FPS-FRD] Flight Plan Service Final Requirements Document (ESMG-123), FAA, January 2010.
(Available on request from En Route Services Modernization Group)
- [FPS-POL] Flight Plan Service (FPS) Policy Document Version 1 Reference, FAA, 4 November 2016.
<https://www.faa.gov/atm/policies/fps-policy.xml>
- [FPS-CONOPS] Flight Plan Service Concept of Operations, FAA, 1 August 2009.
<https://www.faa.gov/atm/policies/fps-conops.pdf>
- [RUNTIME] Runtime Policy Reference, FAA, 2 September 2018.
http://www.faa.gov/air_traffic/flight_info/operation_policy.pdf
- [FAA-1370] FAA Order 1370.121, FAA Information Security and Privacy Program & Policy, FAA, 23 December 2016.
https://www.faa.gov/regulations_policies/orders_notices/index.cfm/go/document.information/documentID/1030708
- [FAA-TEP] Acquisition Management System Guidance, Test and Evaluation (T&E) Process Guidelines Version 1.0, FAA, 10 July 2020.
<https://fast.faa.gov/docs/teguidelines.docx>
- [FPXM] Flight Plan Exchange Model (FPXM) Version 1.0, FAA, 10 January 2006.
<http://faa.gov/fpxm/2006/>
- [NIST-200] NIST FIPS Publication 200, Minimum Security Requirements for Federal Information and Information Systems, March 2006.
<https://csrc.nist.gov/csrc/media/publications/fips/200/final/documents/fips-200-final-march.pdf>

2.2 Non-Government Standards and Other Publications

- [RFC-2119] RFC 2119, Key words for Use in RFCs to Indicate Requirement Levels, Network Working Group, March 1997.
<https://www.rfc-editor.org/rfc/rfc2119.txt>

- [XML-1.0] Extensible Markup Language (XML) 1.0 (Fifth Edition), W3C Recommendation 26, November 2008.
<https://www.w3.org/TR/2008/REC-xml-20081126/>
- [INCITS] ANSI/INCITS 359-2004, American National Standard for Information Technology - Role Based Access Control, Information Technology Industry Council, 3 February 2004.
<http://www.cs.purdue.edu/homes/ninghui/readings/AccessControl/ANSI+INCITS+359-2004.pdf>
- [RFC-2616] RFC 2616, Hypertext Transport Protocol – HTTP/1.1, Network Working Group, June 1999.
<http://www.w3.org/Protocols/rfc2616/rfc2616.html>
- [RFC-5246] RFC 5246, The Transport Layer Security (TLS) Protocol Version 1.2, Network Working Group, August 2008.
<http://tools.ietf.org/html/rfc5246>
- [SOAP] SOAP Version 1.2 Part 1: Messaging Framework (Second Edition), W3C Recommendation, 27 April 2007.
<http://www.w3.org/TR/soap12-part1/>
- [200401] Web Services Security, Username Token Profile 1.0, OASIS Standard 200401, March 2004.
<http://docs.oasis-open.org/wss/2004/01/oasis-200401-wss-username-token-profile-1.0.pdf>
- [XML-SIG] XML Signature Syntax and Processing (Second Edition), W3C Recommendation, 10 June 2008.
<http://www.w3.org/TR/xmlsig-core>

3 Definitions

3.1 Terms and Definitions

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119 [RFC-2119]. These keywords are capitalized when used to unambiguously specify requirements. When these words are not capitalized, they are meant in their natural-language sense.

Terms and definitions shown below are taken from FAA-STD-074 [STD-074] unless otherwise indicated.

<i>Access Control</i>	Protection of system resources against unauthorized access; a process by which use of system resources is regulated according to a security policy and is permitted only by authorized entities.
<i>Audit Trail</i>	A chronological record of system activities that is sufficient to enable the reconstruction and examination of the sequence of environments and activities.
<i>Authentication</i>	The process of verifying an identity claimed by or for a system entity.
<i>Authorization</i>	The granting of rights or permission to a system entity (mainly, but not always, a user or a group of users) to access a service .
<i>Business Function</i>	A characteristic action or activity that needs to be performed to achieve a desired objective, or in the context of this standard, to achieve a real world effect .
<i>Confidentiality</i>	Protective measures that ensure that information is not made available or disclosed to unauthorized individuals, entities, or processes (i.e., to any unauthorized system entity).
<i>Credentials</i>	Data that is transferred to establish the claimed identity of an entity.
<i>Data</i>	A reinterpretable representation of information in a formalized manner suitable for communication, interpretation, or processing .
<i>Fault</i>	A message that is returned as a result of an error that prevents a service from implementing a required function. A fault usually contains information about the cause of the error.
<i>Idempotent</i>	A term used to describe an operation in which a given message will have the same effect whether it is received once or multiple times; i.e., receiving duplicates of a given message will not cause any undesirable effect.
<i>Input</i>	Data entered into, or the process of entering data into, an information processing system or any of its parts for storage or processing .
<i>Integrity</i>	Protective measures that ensure that data has not been changed, destroyed, or lost in an unauthorized or accidental manner.
<i>Interface</i>	See Service Interface .

Message	A basic unit of communication from one software agent to another sent in a single logical transmission.
Message Exchange Pattern (MEP)	A template, devoid of application semantics, that describes a generic pattern for the exchange of messages between agents . It describes the relationships (e.g., temporal, causal, sequential, etc.) of multiple messages exchanged in conformance with the pattern, as well as the normal and abnormal termination of any message exchange conforming to the pattern.
Method-Oriented	An interface that exposes service capabilities through a set of operations . Technologies that support this interface type are Web Service framework (WS*) and OGC Web Common Services.
Non-Repudiation	Protective measures against false denial of involvement in a communication.
Operation	A set of messages related to a single service action.
Organization	A unique framework of authority within which a person or persons act, or are designated to act, towards some purpose. Any department, service , or other entity within an organization which needs to be identified for information exchange.
Output	Data transferred out of, or the process by which an information processing system or any of its parts transfers data out of, that system or part.
Message Body	The actual (business) data transferred by a message ; also called message payload.
Processing	A set of algorithms, calculations, or business rules that operate on input data in order to produce the required output or to produce a change of internal state.
Protocol	A formal set of conventions governing the format and control of interaction among communicating functional units.
Quality of Service (QoS) Characteristic	A parameter that specifies and measures the value of a provided service .
Real World Effect	An ultimate purpose associated with the interaction with a particular service . It may be the response to a request for information or the change in the state of some entities shared between the participants in the interaction.
Resource	An information object identified by a Uniform Resource Identifier (URI).
Role	A collection of permissions to use resources made available by a service .
Role-Based Access Control (RBAC)	A form of identity-based access control where the system entities that are identified and controlled are functional positions in an organization or process.
Security	The protection of information and data so that unauthorized persons or systems cannot read or modify them and authorized persons or systems are not denied access to them.

Service	A mechanism to enable access to one or more capabilities, where the access is provided using a prescribed interface and is exercised consistent with constraints and policies as specified by the service description .
Service Consumer	An organization that seeks to satisfy a particular need through the use of capabilities offered by means of a service .
Service Description	The information needed in order to use, or consider using, a service .
Service Interface	An abstract boundary that a service exposes. It defines the types of messages and the message exchange patterns that are involved in interacting with the service, together with any conditions implied by those messages.
Service Provider	An organization that offers the use of capabilities by means of a service .
Software Agent	A running program that drives services , both to implement them and to access them.
Synchronous	An interaction is said to be synchronous when the participating agents must be available to receive and process the associated messages from the time the interaction is initiated until all messages are actually received or some failure condition is determined.
Token	A data object or a portable, user -controlled, physical device used to verify an identity in an authentication process.
User	A human, his/her agent , a surrogate, or an entity that interacts with information processing systems. A person, organization entity, or automated process that accesses a system, whether authorized to do so or not.

3.2 Acronyms and Abbreviations

ANSI	American National Standards Institute
ATS	Air Traffic Services
ESMG	FAA En Route Services Modernization Group
FAA	Federal Aviation Administration
FIPS	Federal Information Processing Standards
FPS	Flight Plan Service
FPXM	Flight Plan Exchange Model
HTTP	Hypertext Transport Protocol

ICAO	International Civil Aviation Organization
ID	Identifier
IFR	Instrument Flight Rules
INCITS	InterNational Committee for Information Technology Standards
MEP	Message Exchange Pattern
MSL	Mean Sea Level
NAS	National Airspace System
NextGen	Next Generation Air Transportation System
NIST	National Institute of Standards and Technology
OASIS	Organization for the Advancement of Structured Information Standards
QoS	Quality of Service
RBAC	Role-Based Access Control
RFC	Request For Comments
SOA	Service-Oriented Architecture
SOAP	Simple Object Access Protocol
SRD	Service Requirements Document
SWIM	System Wide Information Management
TLS	Transport Layer Security
TMP	Traffic Modernization Program
URL	Uniform Resource Locator
UTC	Coordinated Universal Time
VFR	Visual Flight Rules
W3C	World Wide Web Consortium
WS*	Web Service Framework
XML	eXtensible Mark-up Language

4 Service Information

NOTE: Section 4 must not contain any requirements.

Service Name:	Flight Plan Service (FPS)
Service Description:	Service for filing, deleting, and modifying an IFR flight plan for subsequent automatic submission to FAA flight data processing.
Service Identifier:	http://nsrr.faa.gov/services/fps
Service Version:	1.0.0
Service Criticality Level:	Essential
SWIM Service Category:	Flight
Geographical Extent of Data:	Not applicable

4.1 Service Provider

Organization Name:	FAA En Route Services Modernization Group (ESMG)
Organization Description:	A program within the FAA Air Traffic Organization responsible for developing SOA services.
Organization Web Page:	https://www.faa.gov/air_traffic/flight_info/

4.2 Service Consumers

NOTE: Section 4.2 Service Consumers is optional; however, describing potential consumers helps describe the nature of the service and is useful information to provide.

Organization Name:	FAA Traffic Modernization Program (TMP)
Organization Description:	The FAA-maintained program responsible for regulating traffic during arrival, departure, or approach stages of flights with the goal to avoid exceeding airport or air traffic control capacity.
Organization Web Page:	http://www.faa.gov/air_traffic/TMP/ *
Organization Name:	Alpha Airline
Organization Description:	A United States commercial air carrier headquartered in Atlanta, Georgia. Alpha Airline provides air transport services for passengers and freight.
Organization Web Page:	http://www.example.alpha.com *

* NOTE: The URLs in section 4.2 are provided as examples only and do not resolve to any resource.

5 Functional Requirements

1. The FPS SHALL allow [consumers](#) to file a flight plan as described in section 3.1.1 of the FPS Final Requirements Document [\[FPS-FRD\]](#).
2. The FPS SHALL allow consumers to change the destination aerodrome of a filed flight plan as described in section 3.1.2 of the FPS Final Requirements Document [\[FPS-FRD\]](#).
3. The FPS SHALL SHALL allow consumers to retract (i.e., cancel) a filed flight plan as described in section 3.1.3 of the FPS Final Requirements Document [\[FPS-FRD\]](#).

Table 5-1 addresses the above [business function](#) requirements in terms of [real world effects](#) as prescribed by FAA-STD-074 [\[STD-074\]](#).

Table 5-1 FPS Business Functions

Business Function	Real World Effect
File a flight plan.	A flight plan has been filed and persists in the FAA Web server for distribution to the FAA flight data processing application within some parameter time of the estimated departure time.
Change destination aerodrome of a flight plan.	The destination aerodrome of a filed flight plan has been changed.
Cancel a flight plan.	A previously filed flight plan has been retracted before being submitted to FAA ATS, thereby reducing the flight plan processing load and systemic workload of the FAA air traffic planning system.

6 Non-Functional Requirements

6.1 Security Requirements

6.1.1 Authentication

1. The FPS SHALL require each [service consumer](#) to [authenticate](#) itself to the FPS at the transport level by deploying a Username/[Token credential](#) in accordance with the Web Services Security Username Token Profile 1.0, OASIS Standard 200401 [\[200401\]](#).
2. The FPS SHALL comply with Identification and Authentication requirements set forth in NIST FIPS Publication 200, Minimum Security Requirements for Federal Information and Information Systems [\[NIST-200\]](#).
3. Password complexity and change management SHALL be in accordance with FAA Order 1370.121, FAA Information Security and Privacy Program & Policy [\[FAA-1370\]](#).

6.1.2 Authorization

1. The FPS SHALL use the credentials received as part of the authentication process (specified in section 6.1.1 of this SRD) for future determinations of whether or not a service consumer is [authorized](#) to invoke an [operation](#) it may request.
2. The FPS SHALL deploy [role-based access control](#) (RBAC) for implementing authorization.
3. RBAC SHALL be implemented in accordance with ANSI/INCITS 359-2004, American National Standard for Information Technology - Role Based Access Control [\[INCITS\]](#).
4. The FPS SHALL define two (2) [roles](#), "Reader" and "Originator" as described in Table 6.1 and further depicted in Figure 6-1.

Table 6-1 FPS Roles

Name	Description
Reader	A user who only has permission to read or examine ('view only') a filed flight plan.
Originator	A user, generally a pilot or operator, who submits a flight plan and has permission to file and subsequently modify or cancel the filed flight plan. Since the Reader role is derived from the Originator role, an Originator role inherently includes the "view" privileges.

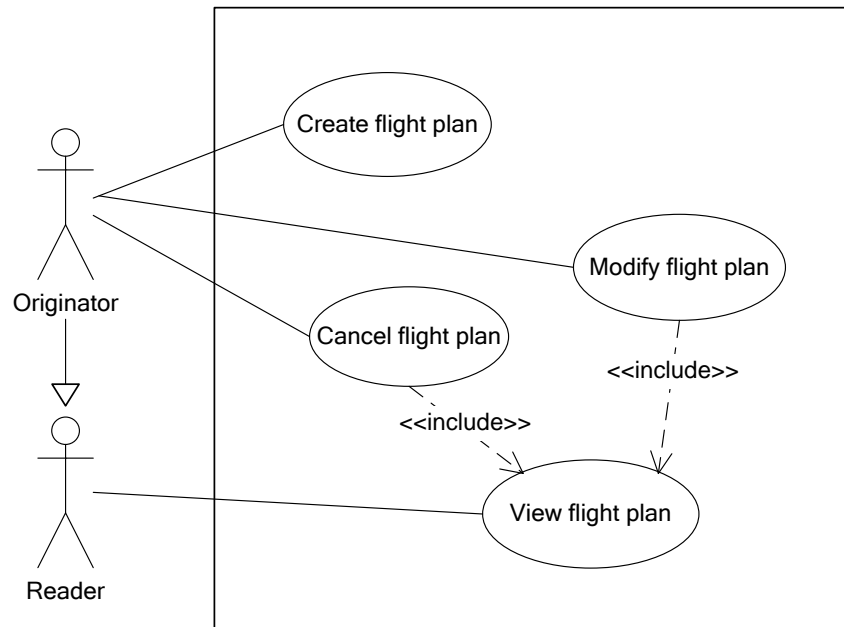


Figure 6-1 FPS Roles Use Case Diagram

6.1.3 Integrity

1. To ensure data [integrity](#) is maintained, i.e., the [data](#) is checked for possible corruption, the FPS SHALL deploy Transport Layer Security (TLS) Protocol Version 1.2, RFC 5246 [\[RFC-5246\]](#).

6.1.4 Confidentiality

This SRD does not impose any [confidentiality](#) requirements.

6.1.5 Non-Repudiation

1. The FPS SHALL require that each [user's message](#) be digitally signed in accordance with XML Signature Syntax and Processing Version 1.1, W3C Recommendation [\[XML-SIG\]](#).

6.1.6 Audit Capability

1. The FPS SHALL require that each [service](#) request include a timestamp that indicates the date and time the request was made.
2. The FPS SHALL provide an [audit trail](#) of all service requests.
3. Each audit trail record SHALL include user ID (using credentials received as part of the authentication process), date, time, operation requested, and an error description if the operation failed.
4. Access to the audit trail SHALL be internal, i.e., inaccessible via a Web [service interface](#).
5. Access to the audit trail SHALL be limited to [users](#) with system administrator privileges.

6.1.7 Other Security Requirements

This SRD does not impose any other [security](#) requirements.

6.2 Quality of Service Requirements

1. The FPS SHALL meet the required values shown for the [QoS parameters](#) listed in Table 6-1.

Table 6-2 FPS Qualities of Service

QoS Parameter Name	Definition	Calculation Method	Unit of Measure	Required Value
Availability	Probability that the service will be operational during any randomly selected period of time, or, alternatively, the fraction of the total available operating time that the service is operational.	(Total Time in an interval - Total Outage Time in the interval) / Total Time in the interval.	Probability expressed to 3 decimal places.	≥0.999
Capacity	Number of service requests that the service can accommodate within a given time period.	Simple count.	Whole positive number, per period of time.	20 per minute
Response Time	Maximum time required to complete a service request.	Measured from the time the service provider receives the request to the time the service provider transmits the response.	Seconds.	3

6.3 Service Policies Requirements

1. The FPS SHALL comply with the requirements expressed in the following [consumer](#) policies:
 - a) FAA Order 1370.121A, FAA Information Security and Privacy Program & Policy [\[FAA-1370\]](#).
 - b) Flight Plan Service (FPS) Policy Document Version 1 Reference [\[FPS-POL\]](#).
 - c) Runtime Policy Reference [\[RUNTIME\]](#).

6.4 Processing Requirements

This SRD does not impose any [processing](#) requirements.

6.5 Operational Environment Requirements

1. The FPS SHALL operate within the FAA Telecommunications Infrastructure (FTI) and is subject to its performance constraints.
2. All FPS requests and responses SHALL be brokered via the NAS Enterprise Messaging Service (NEMS).

7 Interface Requirements

1. In accordance with recommendations put forth in the FPS Concept of Operations [\[FPS-CONOPS\]](#), the FPS SHALL employ a [method-oriented](#) interface type.
2. The FPS SHALL implement a single [interface](#) called “FlightPlanInterface” which includes three (3) [operations](#), as described in Table 7-1.

Table 7-1 FPS Interface Specification

Name	Description	Operations
FlightPlanInterface	FlightPlanInterface allows a service consumer to file and subsequently modify or cancel a flight plan.	FileFlightPlan UpdateDestinationAerodrome CancelFlightPlan

7.1 Operations Requirements

1. The FPS SHALL perform [operation](#) FileFlightPlan as specified in section 7.1.1 below.
2. The FPS SHALL perform operation UpdateDestinationAerodrome as specified in section 7.1.2 below.
3. The FPS SHALL perform operation CancelFlightPlan as specified in section 7.1.3 below.

[Messages](#) to be exchanged during execution of the operations are specified in [section 7.2](#) of the SRD.

[Faults](#) to be generated as a result of operation failure are specified in [section 7.3](#) of the SRD. [Data](#) to be retrieved is specified in [section 7.4](#) of the SRD.

7.1.1 Operation FileFlightPlan

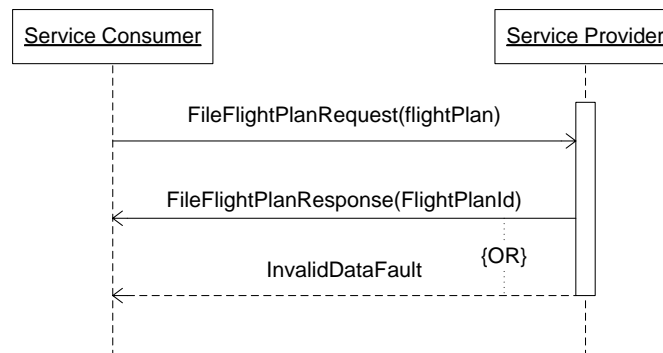


Figure 7-1 Operation FileFlightPlan Sequence Diagram

Table 7-2 Operation FileFlightPlan Specification

Name	FileFlightPlan
Description	The FileFlightPlan operation allows the creation of persistent information defining an intended flight (flight plan).
MEP	In-Out
Operation Type	Synchronous
Idempotency	Idempotent
Input	Message FileFlightPlanRequest containing required flight plan information encapsulated in FlightPlan element.
Output	Message FileFlightPlanResponse containing FlightPlanId for filed flight plan.
Faults	Fault InvalidDataFault is returned when submitted flight plan data is not valid and service is unable to process the flight plan.

7.1.2 Operation UpdateDestinationAerodrome

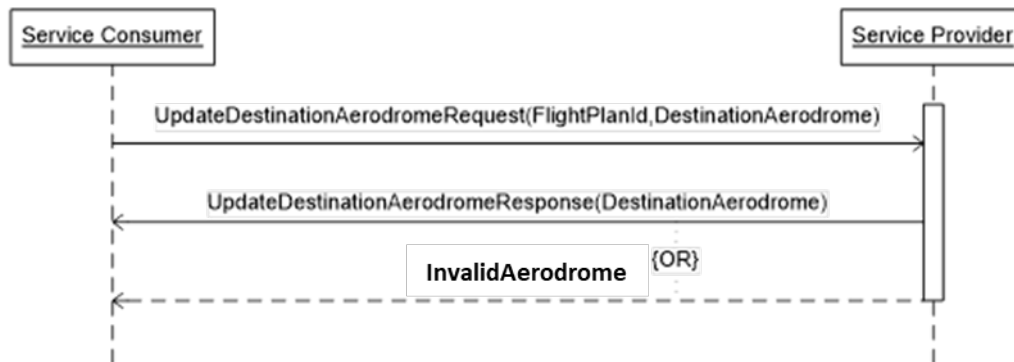


Figure 7-2 Operation UpdateDestinationAerodrome Sequence Diagram

Table 7-3 Operation UpdateDestinationAerodrome Specification

Name	UpdateDestinationAerodrome
Description	The UpdateDestinationAerodrome operation allows updating the destination aerodrome information within a filed flight plan.
MEP	In-Out
Operation Type	Synchronous
Idempotency	Idempotent

Input	Message UpdateDestinationAerodromeRequest containing FlightPlanId and the new destination aerodrome.
Output	Message UpdateDestinationAerodromeResponse containing Flight Plan ID of the updated flight plan (FlightPlanId) and Aerodrome data for the destination aerodrome as it is recognized by the service.
Faults	Fault InvalidAerodrome is returned when submitted flight plan ID or aerodrome ID is not valid.

7.1.3 Operation CancelFlightPlan

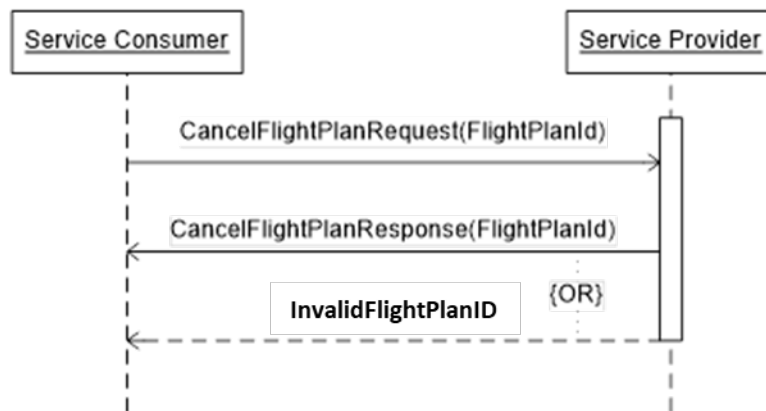


Figure 7-3 Operation CancelFlightPlan Sequence Diagram

Table 7-4 Operation CancelFlightPlan Specification

Name	CancelFlightPlan
Description	The CancelFlightPlan operation allows canceling a previously filed flight plan.
MEP	In-Out
Operation Type	Synchronous
Idempotency	Idempotent
Input	Message CancelFlightPlanRequest containing FlightPlanId of a FlightPlan to be canceled.
Output	Message CancelFlightPlanResponse containing confirmation of canceling the flight plan.
Faults	Fault InvalidFlightPlanID is returned when submitted flight plan ID is not valid.

7.2 Messages Requirements

1. The FPS SHALL exchange with [service consumers](#) the [messages](#) listed and specified in Table 7-5.

Table 7-5 Messages Specification

Name	Description	Direction	Body Type
FileFlightPlanRequest	Used by a service consumer to submit (file) a flight plan.	In	Text
FileFlightPlanResponse	Used to inform a service consumer that flight plan information has been accepted by returning the ID that has been assigned to the flight plan.	Out	Text
UpdateDestinationAerodromeRequest	Used by a service consumer to change the destination aerodrome within a filed flight plan identified by its flight plan ID.	In	Text
UpdateDestinationAerodromeResponse	Used to inform a service consumer that the original destination aerodrome has been changed by returning the new destination aerodrome together with the flight plan ID.	Out	Text
CancelFlightPlanRequest	Used by a service consumer to cancel a previously filed flight plan identified by its flight plan ID.	In	Text
CancelFlightPlanResponse	Used to inform a service consumer that the flight plan has been canceled by returning the ID of the canceled flight plan.	Out	Text

7.3 Faults Requirements

1. If the value of a flight plan element is invalid or missing from the [service consumer](#) request and no default value was established, the FPS SHALL respond with a [fault](#) message as specified in Table 7-6.

Table 7-6 Faults Specification

Name	Description	Fault Text
InvalidAerodrome	Used to inform a service consumer that submitted aerodrome ID or flight plan ID is not valid or cannot be found and FPS is unable to process the request.	"Flight Plan or Aerodrome not found"

InvalidFlightPlanID	Used to inform a service consumer that submitted flight plan ID is invalid or cannot be found and FPS is unable to process the request.	"Flight Plan not found"
InvalidDataFault	Used to inform a service consumer that submitted flight plan data is not valid and FPS is unable to process the request.	A field that contains one or more (separated by a comma and a space) of the following values: "Flight Rule", "Number Of Aircraft", "Filing Time", "Flight Plan Id", "Airman Id", "Originator Name", "Aircraft Type", "Aircraft Id", "Equipage Communication", "Equipage Navigation", "Equipage Surveillance", "Wake Turbulence Category", "Altitude Reference Datum", "Altitude Unit of Measure", "Estimated Departure Time", "Estimated Enroute Time", "True Speed Unit of Measure", "True Speed", "Mach Number", "Departure Aerodrome Id", "Destination Aerodrome Id", "Alternate Aerodrome Id"

7.4 Data Requirements

In this SRD example, we have simulated a scenario in which a "Flight Plan Exchange Model" has been developed as a separate effort and the FPS is being required by the SRD to conform to this model. Because the example is unable to supply a real network address (URL) for the model, a conceptual model of the data elements that appear in the Flight Plan XML schema is provided in Figure 7-4, and the XML schema itself is provided in [Appendix A](#) (a diagram of the schema is in [Appendix B](#)). An example of an instantiation of this schema is shown in [Appendix C](#).

1. All [data](#) exchanged by the FPS SHALL conform to the FPXM 1.0, Flight Plan Exchange Model [\[FPXM\]](#). This data is depicted in Figure 7-4 and defined in Table 7-7.

- All [data elements](#) provided by the FPS SHALL be valid, that is, conform to definitions, syntax, and constraints as defined in the XML schema found at <http://faa.gov/fpxm/2006/fpxm10.xsd> *. (See [Appendix A](#) for a copy of the schema.)

* NOTE: The [URL](#) in section 7.4 is provided as an example only and does not resolve to any resource.

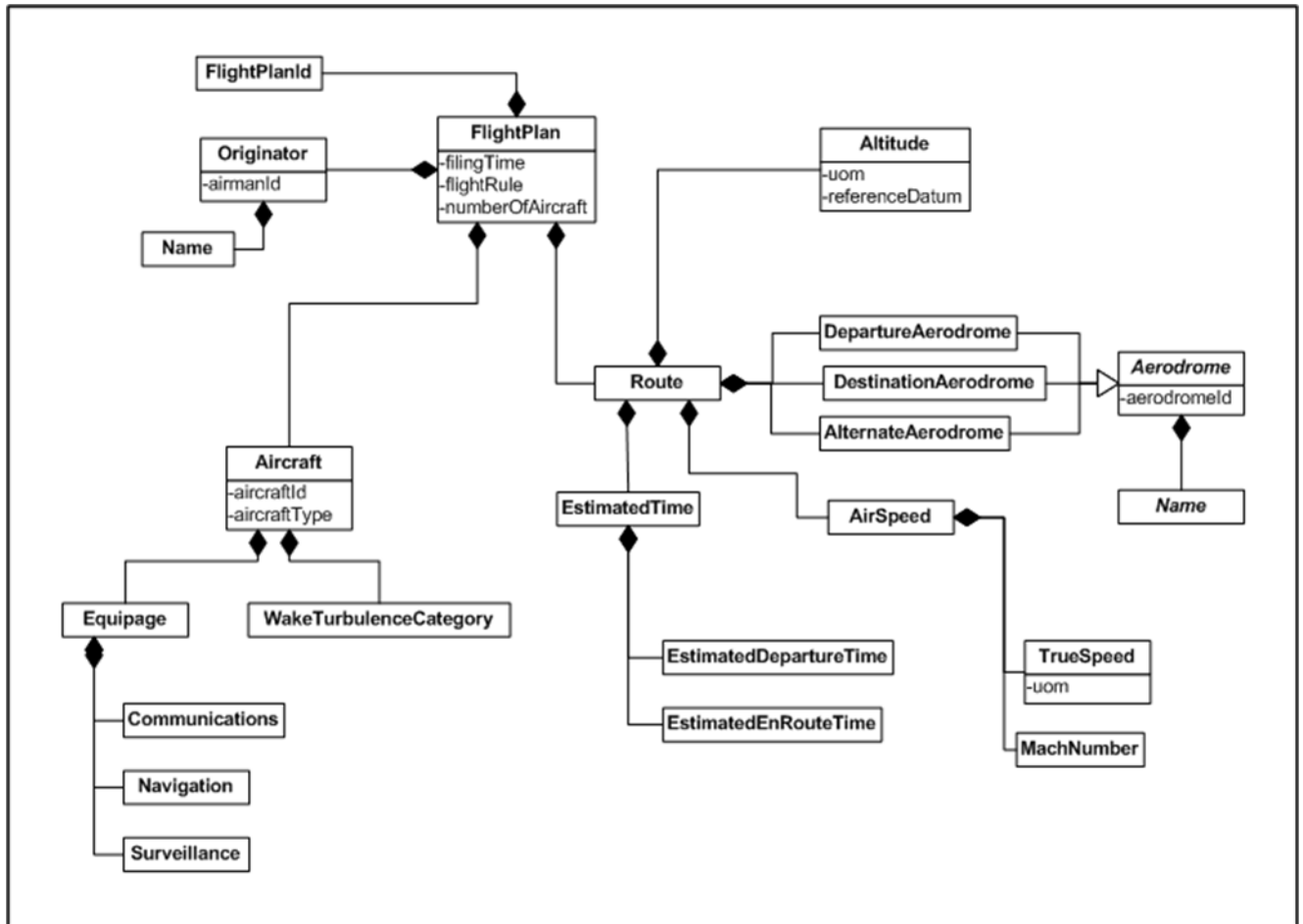


Figure 7-4 Flight Plan Exchange Conceptual Model

Table 7-7 Flight Plan Data Element Definitions

Name	Definition	Permissible Values
FlightPlan	The outmost container (root) element for all data provided by the pilot or his/her designated representative to air traffic services units, relative to the intended flight or portion of the flight of the aircraft.	N/A
FlightPlanId	An element that uniquely identifies the flight plan.	N/A

Name	Definition	Permissible Values
FlightPlan.flightRule	A code representing regulations (i.e., instrument or visual flight rules) under which the pilot is flying or intends to fly the aircraft.	"I" – IFR only "V" – VFR only "Y" – IFR first "Z" – VFR first
FlightPlan.filingTime	The point in time (UTC) at which the flight plan is filed.	N/A
Altitude	An element that indicates the pressure altitude above mean sea level (MSL) at which the aircraft is flying or is intended to be flown.	N/A
Altitude.uom	A code representing the units of measure of the aircraft's altitude.	"m", "meter" – altitude in meters "foot" – altitude in feet
Altitude.referenceDatum	A code representing the atmospheric pressure reference used to adjust a pressure altimeter.	"Local" – local pressure extrapolated to zero MSL. "Standard" – pressure with respect to the pressure datum 1013.2 hectopascals (hPa).
Aircraft	A container element for all data related to the aircraft.	N/A
Aircraft.aircraftType	An aircraft type designator that informs an air traffic controller of the performance characteristics of the aircraft.	Values are listed in ICAO 8643, Aircraft Type Designators, http://legacy.icao.int/anb/ais/8643/ .
WakeTurbulenceCategory	A code that classifies the aircraft for the purpose of wake turbulence separation minima, based on the maximum certified takeoff mass of the aircraft.	"H", "HEAVY" – aircraft having a maximum certificated take-off mass of 136,000 kg (300,000 lb) or more. "M", "MEDIUM" – aircraft having a maximum certificated take-off mass of less than 136,000 kg (300,000 lb) and more than 7,000 kg (15,500 lb). "L", "LIGHT" – aircraft having a maximum certificated take-off mass of 7,000 kg (15,500 lb) or less.
DestinationAerodrome	A container element for all data related to the primary aerodrome to which the flight is destined.	N/A

Name	Definition	Permissible Values
DestinationAerodrome.aerodromeld	An element that uniquely identifies the destination aerodrome.	Values are listed in ICAO Document 7910, Location Indicators, http://store1.icao.int/mainpage.ch2 .
DestinationAerodrome.Name	An element that contains the name or location (nearest city) of the destination aerodrome.	N/A

8 Interoperability Requirements

8.1 Data Protocol Requirements

1. For [data](#) serialization, the FPS SHALL use Extensible Markup Language (XML) 1.0 (Fifth Edition) [\[XML-1.0\]](#).

8.2 Message Protocol Requirements

1. All [messages](#) exchanged by the FPS SHALL be constructed in accordance with SOAP Version 1.2 Part 1: Messaging Framework (Second Edition) [\[SOAP\]](#).

8.3 Transport Protocol Requirements

1. The FPS SHALL use Hypertext Transport Protocol – HTTP/1.1, RFC 2616 [\[RFC-2616\]](#) as a transport-level protocol.

8.4 Other Protocols Requirements

This SRD does not impose any other [protocol](#) requirements.

9 Quality Assurance Provisions

9.1 Responsibility for Verification

The FAA is responsible for developing and implementing the verification of requirements for each project. The FAA may delegate verification activities to other [organizations](#), independent contractors, and/or the prime contractor.

9.2 Special Verification Requirements

1. The FPS SHALL be tested in accordance with the FAA Acquisition Management System Test and Evaluation Process Guidelines [\[FAA-TEP\]](#).
2. The FPS SHALL be tested in its normal operating mode at the William J. Hughes Technical Center (WJHTC) System Support Computer Complex, or other appropriate demonstration site.
3. The FPS test environment SHALL include a separate testing database.
4. The FPS test environment SHALL provide a separate network address (URL) for [consumer](#) testing.
5. Problems encountered with the FPS [software agent](#) during consumer software agent testing SHOULD be reported to John D. Doe, 609-555-4444, john.d.doe@faa.gov.

9.3 Verification Requirements Traceability Matrix

1. Verification shall be in accordance with Table 9-1, Verification Requirements Traceability Matrix (VRTM).

Table 9-1 Verification Requirements Traceability Matrix

A = Analysis; D = Demonstration; I = Inspection; T = Test; X = Not Applicable

Section Number	Requirement Title	Req't. ID	Verification Level	
			Service Level	Integration Level
5	Functional Requirements			
	<i>File flight plan</i>	1	D	D
	<i>Change destination aerodrome</i>	2	D	D
	<i>Cancel flight plan</i>	3	D	D
6	Non-Functional Requirements			
6.1	Security Requirements			
6.1.1	Authentication			
	<i>Deploy Username/Token credential per OASIS Standard 200401</i>	1	A,D	A,D
	<i>Comply with Identification and Authentication requirements in NIST FIPS publication 200</i>	2	A,D	A,D
	<i>Comply with FAA Order 1370.121</i>	3	A,D	A,D
6.1.2	Authorization			
	<i>Utilize authentication credential to authorize service operations</i>	1	A,D	A,D

Section	Requirement Title	Req't. ID	Verification Level	
	<i>Deploy role-based access control (RBAC)</i>	2	D	D
	<i>Comply with ANSI/INCITS 359-2004</i>	3	A,D	A,D
	<i>Define 2 roles, "Reader" and "Originator"</i>	4	D	X
6.1.3	Integrity			
	<i>Comply with RFC 5246</i>	1	A,D	A,D
6.1.4	Confidentiality			
6.1.5	Non-Repudiation			
	<i>Require digital signatures per W3C Recommendation 10 June 2008</i>	1	D	D
6.1.6	Audit Capability			
	<i>Include timestamp on each request</i>	1	D	X
	<i>Provide an audit trail</i>	2	D	X
	<i>Provide specified audit trail data elements</i>	3	D	X
	<i>Audit trail access is internal</i>	4	D	X
	<i>Limit access to system administrator</i>	5	D	X
6.1.7	Other Security Requirements			
6.2	Quality of Service Requirements			
	<i>Meet required QoS values</i>	1	D	X
6.3	Service Policies Requirements			
	<i>Comply with FAA Order 1370.121A</i>	1a	A,D	X
	<i>Comply with FPS Policy Document V1</i>	1b	I	X
	<i>Comply with Runtime Policy Reference</i>	1c	I	X
6.4	Processing Requirements			
6.5	Operational Environment Requirements			
	<i>Utilize FTI</i>	1	D	D
	<i>Utilize NEMS</i>	2	D	D
7	Interface Requirements			
	<i>Employ method-oriented interface</i>	1	D	D
	<i>Implement FlightPlanInterface</i>	2	D	D
7.1	Operations Requirements			
	<i>Perform operation FileFlightPlan</i>	1	D	D
	<i>Perform operation UpdateDestinationAerodrome</i>	2	D	D
	<i>Perform operation CancelFlightPlan</i>	3	D	D
7.2	Messages Requirements			
	<i>Exchange messages as specified</i>	1	D	D
7.3	Faults Requirements			
	<i>Generate fault messages as specified</i>	1	D	D
7.4	Data Requirements			
	<i>Conform to FPXM 1.0</i>	1	A,D	A,D
	<i>Conform to specified definitions, syntax, and constraints</i>	2	A,D	A,D
8	Interoperability Requirements			
8.1	Data Protocol Requirements			
	<i>Utilize XML 1.0 for data serialization</i>	1	A,D	A,D

Section	Requirement Title	Req't. ID	Verification Level	
8.2	Message Protocol Requirements			
	<i>Construct messages per W3C SOAP V1.2 Part 1</i>	1	A,D	A,D
8.3	Transport Protocol Requirements			
	<i>Utilize HTTP 1.1 (RFC 2616)</i>	1	A,D	A,D
8.4	Other Protocol Requirements			
9	Quality Assurance Provisions			
9.1	Responsibility for Verification			
9.2	Special Verification Requirements			
	<i>Conduct testing in accordance with FAA Acquisition Management System Test and Evaluation Process Guidelines</i>	1	A,D	A,D
	<i>Conduct testing at WJHTC</i>	2	X	X
	<i>Include separate testing database</i>	3	I,D	X
	<i>Provide separate URL for consumer testing</i>	4	D	X
	<i>Provide FPS problem reporting point of contact</i>	5	X	X

Appendixes

Appendix A. FlightPlan.XSD

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
  xmlns="urn:us:gov:dot:faa:example:atm:enroute:fps:entities"
  targetNamespace="urn:us:gov:dot:faa:example:atm:enroute:fps:entities"
  elementFormDefault="qualified" attributeFormDefault="unqualified">
  <xs:annotation>
    <xs:documentation xml:lang="en">
      Title: FlightPlan schema for SRD Example.
      Description: This schema declares XML elements for defining
        a Flight Plan transmitted by FlightPlanService
      Creator: Mark Kaplun (mark.kaplun@faa.gov)
      Date: 2010-01-21
      See also: SRD Flight Plan Service.doc
    </xs:documentation>
  </xs:annotation>
  <!-- ////////////////////////////////////////////////////
        Global types
        //////////////////////////////////////////////////// -->
  >
  <xs:element name="FlightPlan">
    <xs:complexType>
      <xs:sequence>
        <!-- "FlightPlanId" is always required.
          When flight plan is filed and the "FlightPlanId" element has no
content
          - the content is nil. -->
        <xs:element name="FlightPlanId" type="FlightPlanIdType"
nillable="true"/>
        <xs:element name="Originator" type="OriginatorType"/>
        <xs:element ref="Aircraft"/>
        <xs:element ref="Route"/>
      </xs:sequence>
      <xs:attribute name="filingTime" type="xs:dateTime" use="required"/>
      <xs:attribute name="flightRule" type="FlightRuleType" use="required"/>
      <xs:attribute name="numberOfAircraft" type="xs:positiveInteger"
default="1"/>
    </xs:complexType>
  </xs:element>
  <xs:element name="Aircraft" type="AircraftType"/>
  <xs:element name="Route" type="RouteType"/>
  <!-- ////////////////////////////////////////////////////
        Types definitions
        //////////////////////////////////////////////////// -->
  <xs:simpleType name="FlightPlanIdType">
    <xs:restriction base="xs:string">
      <xs:pattern value="[A-Za-z0-9]*"/>
    </xs:restriction>
  </xs:simpleType>
  <xs:complexType name="AircraftType">
    <xs:sequence>

```



```

<xs:element name="Equipage">
  <xs:complexType>
    <xs:sequence>
      <xs:element name="Communication" type="xs:string"/>
      <xs:element name="Navigation" type="xs:string"/>
      <xs:element name="Surveillance" type="xs:string"/>
    </xs:sequence>
  </xs:complexType>
</xs:element>
<xs:element name="WakeTurbulenceCategory"
type="WakeTurbulenceCategoryType"/>
</xs:sequence>
<xs:attribute name="aircraftId" type="xs:string"/>
<xs:attribute name="aircraftType" type="xs:string"/>
<!-- Values are listed in ICAO 8643, Aircraft Type Designators,
      http://www.icao.int/anb/ais/8643/index.cfm.-->
</xs:complexType>
<xs:complexType name="OriginatorType">
  <xs:sequence>
    <xs:element name="Name" type="xs:string"/>
  </xs:sequence>
  <xs:attribute name="airmanId" type="xs:string" use="required"/>
</xs:complexType>
<xs:complexType name="RouteType">
  <xs:sequence>
    <xs:element name="Altitude" type="AltitudeType"/>
    <xs:element name="EstimatedTime ">
      <xs:complexType>
        <xs:sequence>
          <xs:element name="EstimatedDepartureTime" type="xs:time"/>
          <xs:element name="EstimatedEnRouteTime" type="xs:duration"/>
        </xs:sequence>
      </xs:complexType>
    </xs:element>
    <xs:element name="AirSpeed" type="AirSpeedType"/>
    <xs:element name="DepartureAerodrome" type="AerodromeType"/>
    <xs:element name="DestinationAerodrome" type="AerodromeType"/>
    <xs:element name="AlternateAerodrome" type="AerodromeType"/>
    <xs:any minOccurs="0" maxOccurs="unbounded">
      <!--This element is declared as "any" to indicate that Route element
            can be extended with elements such as: fixes (significant points),
            route names, route segments and etc. -->
    </xs:any>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="AerodromeType">
  <xs:annotation>
    <xs:documentation>
      Values for aerodrome Ids are listed in ICAO Document 7910,
      Location Indicators, http://www.icao.int/eshop/index.html.
    </xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="Name" type="xs:string"/>
  </xs:sequence>

```

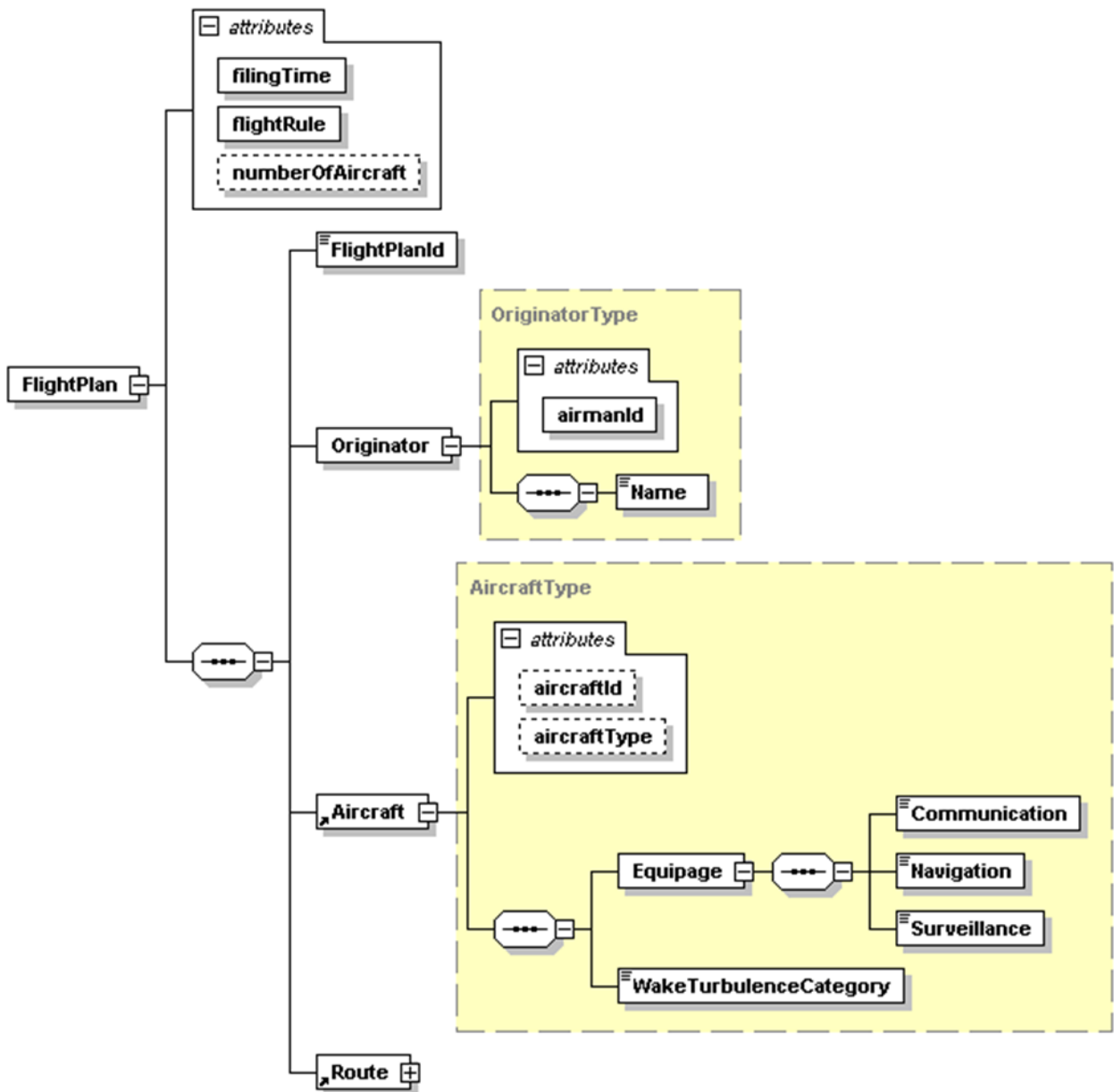
```

    <xs:attribute name="aerodromeId" type="AerodromeIdType" use="required"/>
</xs:complexType>
<xs:simpleType name="SpeedBase">
  <xs:restriction base="xs:decimal"/>
</xs:simpleType>
<xs:complexType name="TrueSpeedType">
  <xs:simpleContent>
    <xs:extension base="SpeedBase">
      <xs:attribute name="uom" type="UnitOfSpeedType" default="knots"/>
    </xs:extension>
  </xs:simpleContent>
</xs:complexType>
<xs:complexType name="AirSpeedType">
  <xs:sequence>
    <xs:element name="TrueSpeed" type="TrueSpeedType"/>
    <xs:element name="MachNumber" type="xs:decimal"/>
  </xs:sequence>
</xs:complexType>
<xs:simpleType name="AltitudeBase">
  <xs:restriction base="xs:nonNegativeInteger"/>
</xs:simpleType>
<xs:complexType name="AltitudeType">
  <xs:simpleContent>
    <xs:extension base="AltitudeBase">
      <xs:attribute name="uom" type="UnitOfAltitudeType" default="foot"/>
      <xs:attribute name="referenceDatum" type="ReferenceDatumType"
use="required"/>
    </xs:extension>
  </xs:simpleContent>
</xs:complexType>
<!-- ////////////////////////////////////////
          Code types
////////////////////////////////////// -->
<xs:simpleType name="AerodromeIdType">
  <xs:restriction base="xs:string">
    <xs:maxLength value="4"/>
    <xs:pattern value="[A-Z][A-Z][A-Z][A-Z]"/>
  </xs:restriction>
</xs:simpleType>
<!-- ////////////////////////////////////////
          Enumerations types
////////////////////////////////////// -->
<xs:simpleType name="FlightRuleType">
  <xs:restriction base="xs:string">
    <xs:enumeration value="I"/>
    <xs:enumeration value="V"/>
    <xs:enumeration value="Y"/>
    <xs:enumeration value="Z"/>
  </xs:restriction>
</xs:simpleType>
<xs:simpleType name="WakeTurbulenceCategoryType">
  <xs:restriction base="xs:string">
    <xs:enumeration value="H"/>
    <xs:enumeration value="HEAVY"/>
    <xs:enumeration value="M"/>
  </xs:restriction>

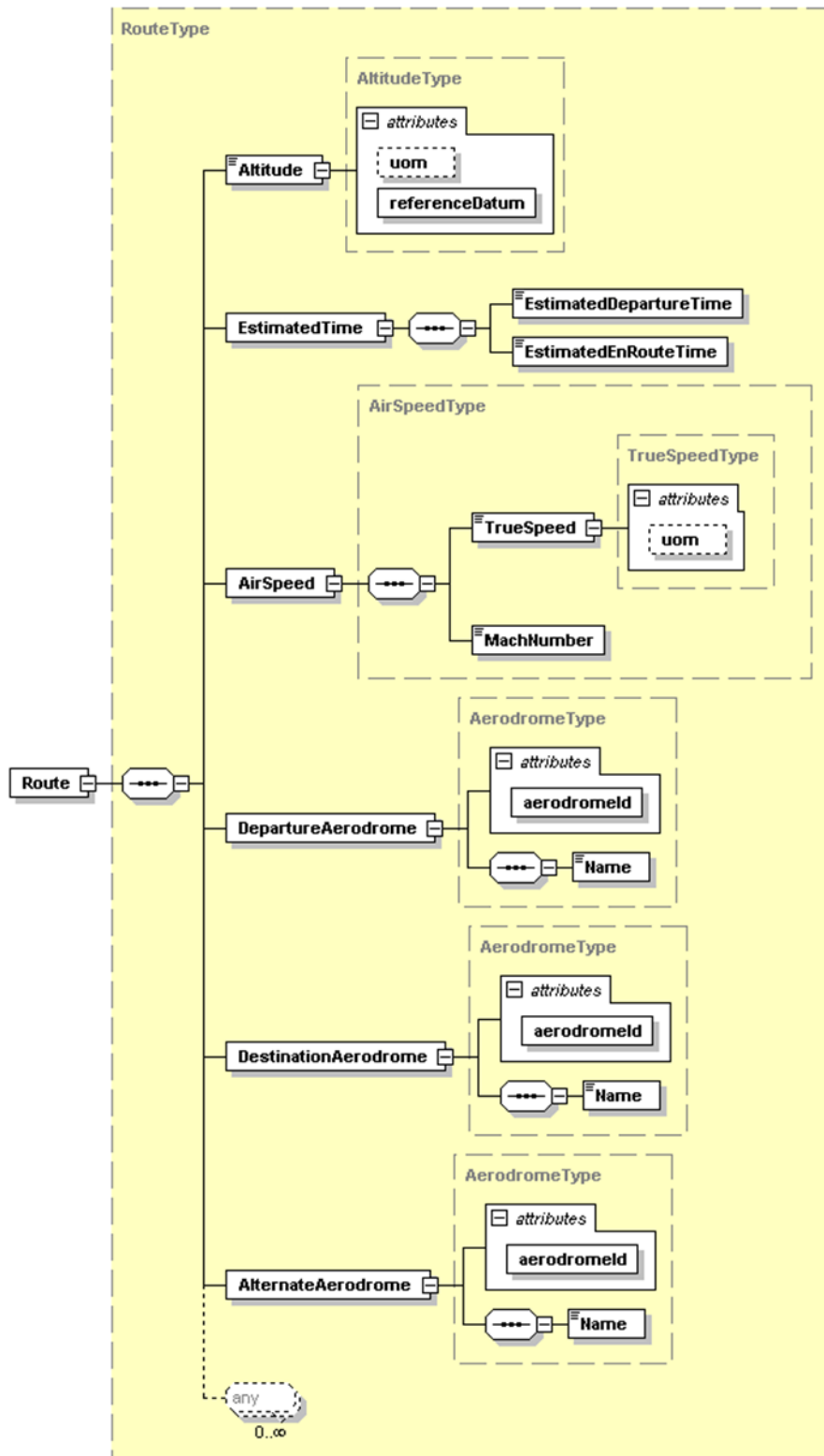
```

```
        <xs:enumeration value="MEDIUM"/>
        <xs:enumeration value="L"/>
        <xs:enumeration value="LIGHT"/>
    </xs:restriction>
</xs:simpleType>
<xs:simpleType name="ReferenceDatumType">
    <xs:restriction base="xs:string">
        <xs:enumeration value="local"/>
        <xs:enumeration value="standard"/>
    </xs:restriction>
</xs:simpleType>
<!-- ////////////////////////////////////////
                Units of Measurement enumerations
////////////////////////////////////// -->
<xs:simpleType name="UnitOfSpeedType">
    <xs:restriction base="xs:string">
        <xs:enumeration value="km/h"/>
        <xs:enumeration value="knots"/>
    </xs:restriction>
</xs:simpleType>
<xs:simpleType name="UnitOfAltitudeType">
    <xs:restriction base="xs:string">
        <xs:enumeration value="m"/>
        <xs:enumeration value="meter"/>
        <xs:enumeration value="foot"/>
    </xs:restriction>
</xs:simpleType>
</xs:schema>
```

Appendix B. FlightPlan.xsd - diagram



Fragment - Route element



Appendix C. FlightPlan.xml

```

<?xml version="1.0" encoding="UTF-8"?>
<FlightPlan xmlns="urn:us:gov:dot:faa:example:atm:enroute:fps:entities"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="./FlightPlan.xsd"
  flightRule="I"
  numberOfAircraft="1"
  filingTime="2001-12-17T09:30:47Z" >
  <FlightPlanId xsi:nil="true" />
  <Originator airmanId="215336745">
    <Name>John Doe</Name>
  </Originator>
  <Aircraft aircraftType="PA-32R" aircraftId="JHB426E">
    <Equipage>
      <Communication>V</Communication>
      <Navigation>C</Navigation>
      <Surveillance>OL</Surveillance>
    </Equipage>
    <WakeTurbulenceCategory>LIGHT</WakeTurbulenceCategory>
  </Aircraft>
  <Route>
    <Altitude referenceDatum="local" uom="foot">7000</Altitude>
    <EstimatedTime>
      <EstimatedDepartureTime>14:20:00.0Z</EstimatedDepartureTime>
      <EstimatedEnRouteTime>PT3H30M</EstimatedEnRouteTime>
    </EstimatedTime>
    <AirSpeed>
      <TrueSpeed uom="knots">170</TrueSpeed>
      <MachNumber>0.12</MachNumber>
    </AirSpeed>
    <DepartureAerodrome aerodromeId="KBWI">
      <Name>Baltimore-Washington International, MD</Name>
    </DepartureAerodrome>
    <DestinationAerodrome aerodromeId="KBOS">
      <Name>Logan International Airport, Boston, MA</Name>
    </DestinationAerodrome>
    <AlternateAerodrome aerodromeId="KJFK">
      <Name>John F. Kennedy International Airport, NY, NY</Name>
    </AlternateAerodrome>
  </Route>
</FlightPlan>

```