European ATM Service Description for the ReportAircraftTrajectory Service

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Abstract

This service reflects the standardisation done by EUROCAE WG78 in the production of the ADS-C standard and are justified by Operational Requirements taken from the OSED developed by Project 05.06.01 and the Technical Note developed by Project 04.05.
The service identified covers the operations dealing with the request and publication of

the Extended Projected Profile (EPP).
The service is called the ReportAircraftTrajectory service, the service provides a report on the EPP (4D trajectory).
This service enables ground based users to ensure consistency between the aircraft system based trajectory and the ground based trajectory being used for deconfliction purposes

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This deliverable consists of SJU foreground.

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Executive summary

The service identified covers the operations dealing with the request and publication of the Extended Projected Profile (EPP).

The proposed service is called the ReportAircraftTrajectory service, the service provides a report on the EPP (4D trajectory).

This service enables ground based users to ensure consistency between the aircraft system based trajectory and the ground based trajectory being used for deconfliction purposes.

1 Introduction

The services described in this document arise from the OSED developed by project 05.06.01 (see ref [10] as agreed at a F2F meeting between 08.03.07 and 05.06.01 early in Q2 2012.

They arise from requirements listed in the OSED and relate to ADS-C type datalink messages described by EUROCAE WG 78.

1.1 Purpose of the document

The service identified in this document will be a part of the Service Portfolio. The Service portfolio presents all services that are available or planned to become available at a high level.

The purpose of this Service description document is to provide a holistic overview of a particular service and its building blocks. It serves as a complement to a model based description and supports the configuration management process by providing well-defined baselines.

1.2 Intended readership

This service description is intended to be read by Enterprise Architects, Service Architects, Information Architects, System Engineers and Developers in pursuing architecting, design and development activities.

It must be read by members of P08.03.10 and P05.06.01.

1.3 Inputs from other projects

OSED developed by project 05.06.01 (see ref [10])

ADS-C type datalink messages described by EUROCAE WG 78

1.4 Glossary of terms

N/A

1.5 Acronyms and Terminology

1.5.1 Acronyms

Term	Definition
ADS-C	Automatic Dependent Surveillance-Contract
AMAN	Arrival Manager
ATM	Air Traffic Management
CPDLC	Controller Pilot Datalink Communication
DOD	Detailed Operational Description
EATMA	European Air Traffic Management Architecture
EPP	Extended Projected Profile
FAA	Federal Aviation Administration
IER	Information Exchange Requirement
ISRM	Information Service Reference Model

Term	Definition
NOV	NATO Operational View
NSOV	NATO Service Oriented View
NSV	NATO System View
OSED	Operational Service and Environment Definition
PDR	Problem Defect Report
SDD	Service Description Document
SESAR	Single European Sky ATM Research Programme
SESAR Programme	The programme which defines the Research and Development activities and Projects for the SJU.
SID	Service Identification Document
SJU	SESAR Joint Undertaking (Agency of the European Commission)
SWIM	System Wide Information Management
UML	Unified Modelling Language
V&V	Validation and Verification

1.5.2 Terminology

Term	Definition	Source
Capability	Capability is the ability of one or more of the enterprise's resources to deliver a specified type of effect or a specified course of action to the enterprise stakeholders.	EATMA Guidance Material [8]
Capability Configuration	A Capability Configuration is a combination of Roles and Systems configured to provide a Capability derived from operational and/or business need(s) of a stakeholder type.	EATMA Guidance Material [8]
Node	A logical entity that performs Activities. Note: nodes are specified independently of any physical realisation.	EATMA Guidance Material [8]
Service	The contractual provision of something (a non-physical object), by one, for the use of one or more others. Services involve interactions between providers and consumers, which may be performed in a digital form (data exchanges) or through voice communication or written processes and procedures.	EATMA Guidance Material [8]
Service function	A type of activity describing the functionality of a Service.	EATMA Guidance

Term	Definition	Source
		Material [8]
Service interface	The mechanism by which a service communicates	EATMA Guidance Material [8]

2 Service identification

Name	ReportAircraftTrajectory
ID	{5D32718A-9087-42e1-BB2A-5018ECDF53F4}
Version	3.0
Keywords	Aircraft, Datalink, ADS-C, ETA,
Architect(s)	[redacted] DFS

Lifecycle status	Date	Reference
Identified	29/06/2012	See reference [18]
Allocated	29/06/2012	See reference [18]
Designed	03/09/2013	This document
Validated	*Date when validated. Filled by WP3*	*Name of protocol documenting the decision*
IOC	*Date for Initial Operational Capability*	*Reference to technical enabler hosting the service in the ATM master plan*
FOC	*Date for Full Operational Capability*	*Reference to technical enabler hosting the service in the ATM master plan*

3 Operational and Business context

At the time of writing there are no business level capabilities provided from the Business Architect (WPB4.1). The description of what business level capabilities the service aims to achieve will be added once these are available.

3.1 Information Exchange Requirements

A common set of IER have been developed by P08.03 for inclusion in both P05.06.01 and P04.05 to cover the same functional area.

In the meantime the capabilities of the service have been linked to the Operational requirements taken from the latest OSED [10] and OSED [13].

Because of the number of Operational requirements and IER it has been decided to show the ones relating to uplink and downlink on two separate diagrams.

Figure 1 shows high level requirement traceability.

Figure 2 shows the identified operational and IER requirements used to define capability relating to uplink and Figure 3 shows those related to downlink.

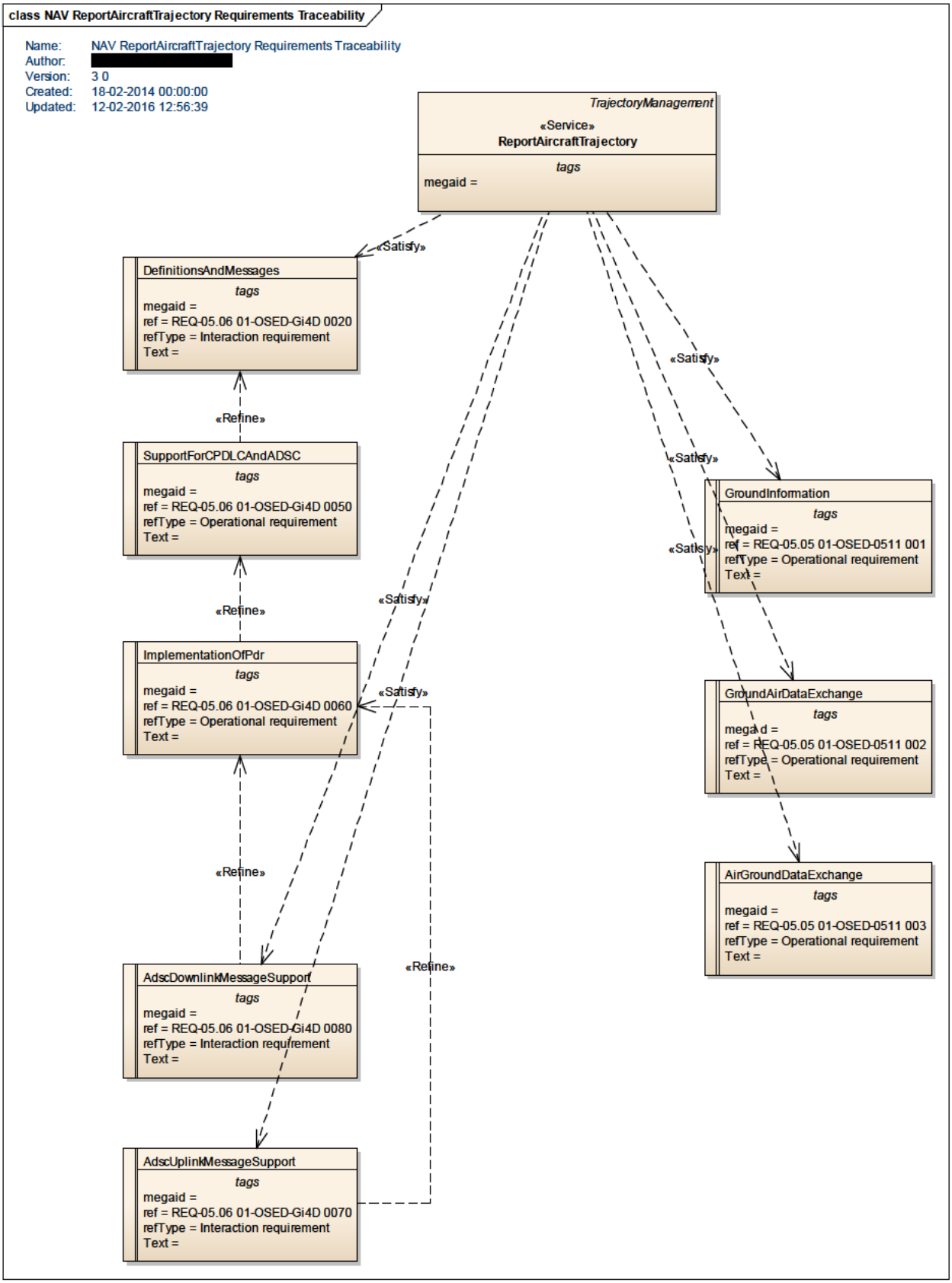

Figure 1 Service to Requirements Mapping General

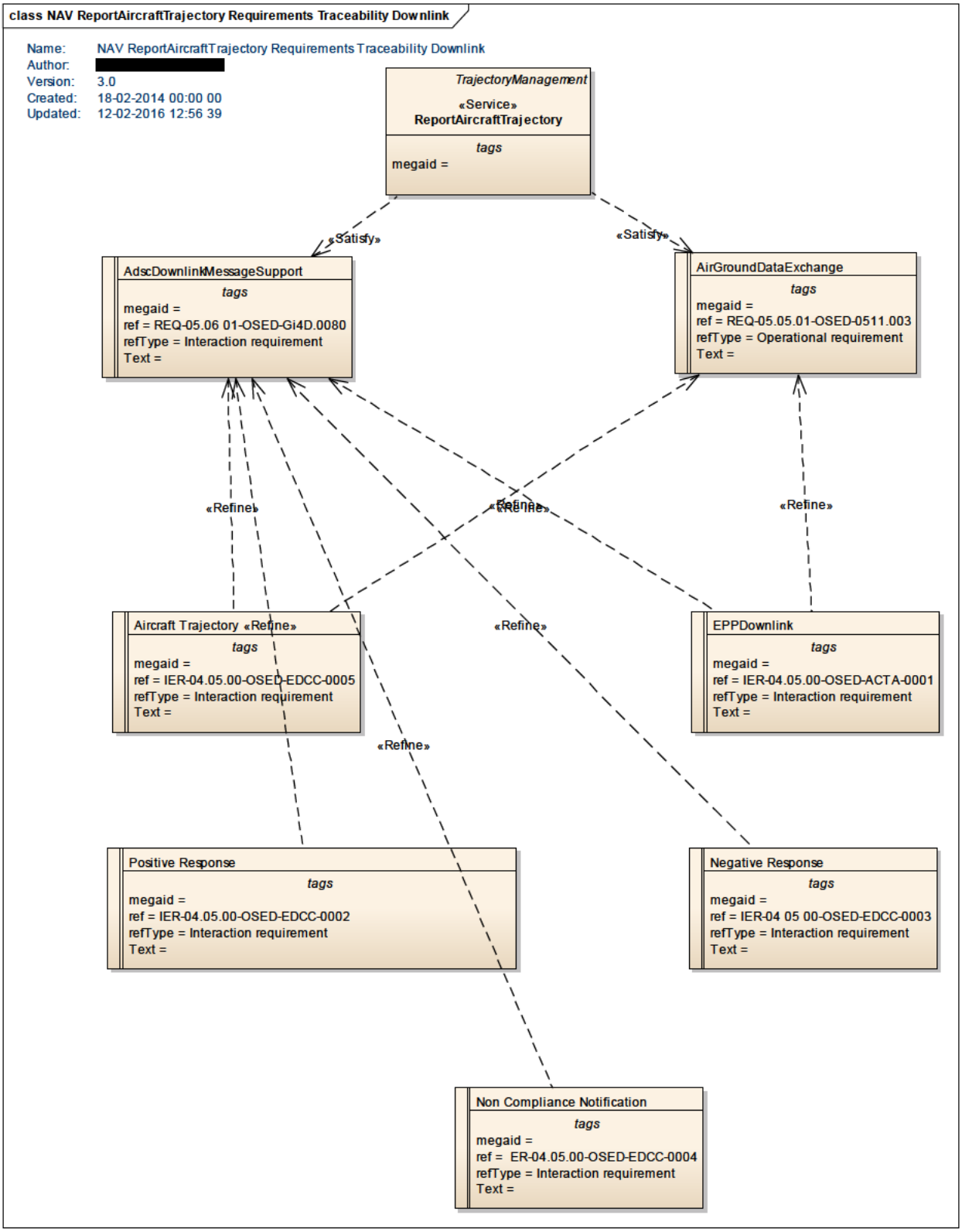

Figure 2 Service to Requirements Mapping Uplink

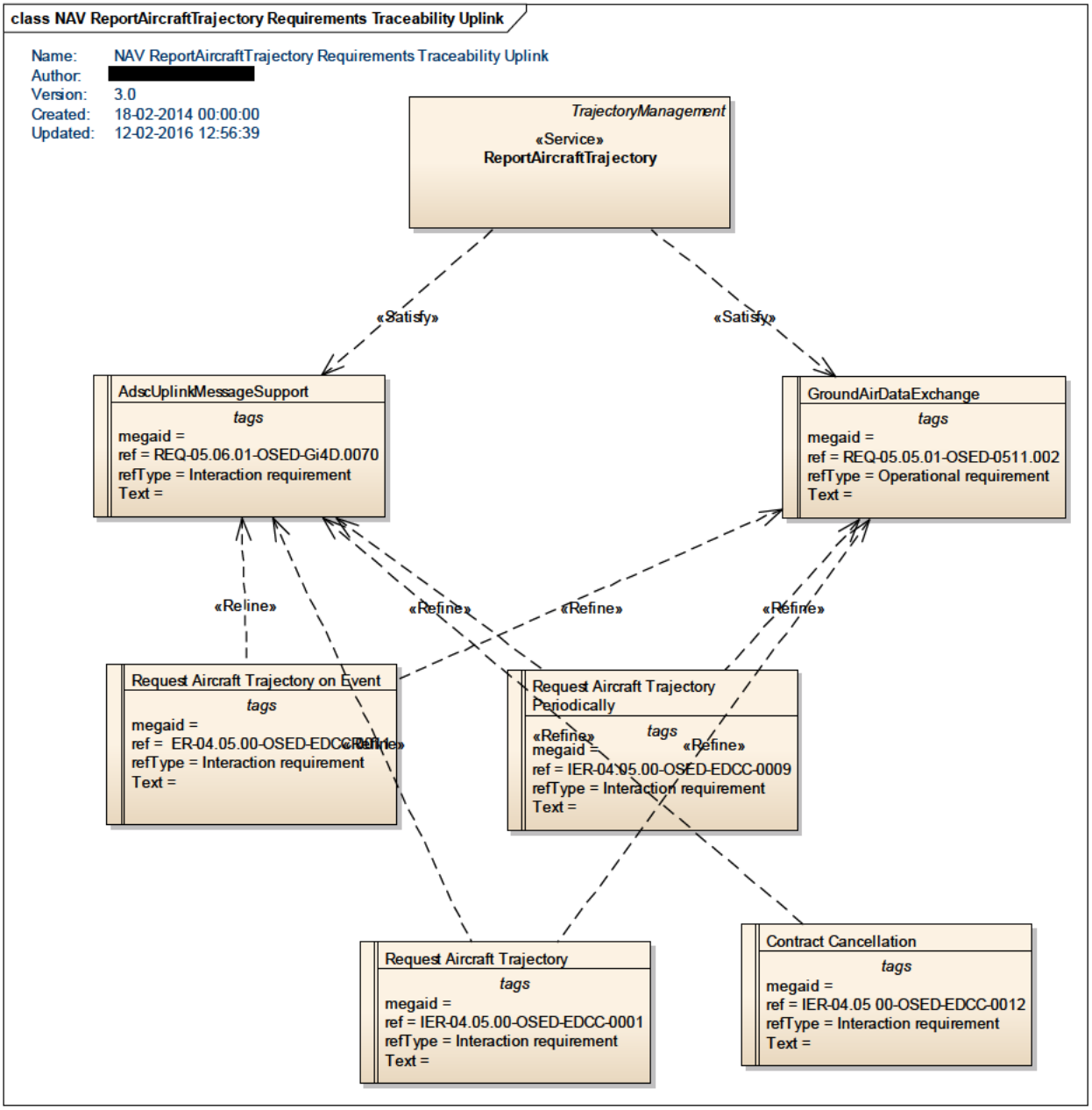

Figure 3 Service to Requirements Mapping Downlink

The requirements take from OSED 05.05.01 are given below:

Element Name	Author	Notes
AdscDownlinkMessageSupport	[redacted]	The SESAR i4D shall support all the ADS-C downlink messages defined in: • ADS-C demand report; • ADS-C periodic report; • ADS-C event report; • ADS-C positive acknowledgement; • ADS-C non compliance notification; ADS-C reject notification.

	Element Tagged Value Name	Value
	megaid	

	ref	REQ-05.06.01-OSED-Gi4D.0080
	refType	Interaction requirement
	Text	

Element Name	Author	Notes
AdscUplinkMessageSupport	[redacted]	The SESAR i4D **shall** support all the ADS-C uplink messages defined in: • ADS-C Demand Contract; • ADS-C Event Contract; • ADS-C Periodic Contract; • ADS-C Cancel Contract; ADS-C Cancel All Contract

	Element Tagged Value Name	Value
	megaid	
	ref	REQ-05.06.01-OSED-Gi4D.0070
	refType	Interaction requirement
	Text	

Element Name	Author	Notes
AirGroundDataExchange	[redacted]	The AC shall be able to down-link a reliable ADS-C EPP to GD on GD request.

	Element Tagged Value Name	Value
	megaid	
	ref	REQ-05.05.01-OSED-0511.003
	refType	Operational requirement
	Text	

Element Name	Author	Notes
Aircraft Trajectory	[redacted]	The aircraft responds to the request by publishing its trajectory for a specified duration or number of points. Each point contains enough information to describe the 4D location and maneuver. The speed schedule is also included if available along with the significant masses of the aircraft.

	Element Tagged Value Name	Value
	megaid	
	ref	IER-04.05-OSED-EDCC-0005
	refType	Interaction requirement
	Text	

Element Name	Author	Notes
DefinitionsAndMessages	[redacted]	The SESAR i4D **shall** support the new definitions and messages as defined in EUROCAE WG78 / RTCA SC214 Version H plus the agreed PDRs; defining the worldwide standard for Advanced ATS Data Communication. • Interop - Interoperability Requirements Standard • SPR - Safety and Performance Requirements

	Element Tagged Value Name	Value
	megaid	
	ref	REQ-05.06.01-OSED-Gi4D.0020
	refType	Interaction requirement
	Text	

Element Name	Author	Notes
EPPDownlink	[redacted]	On request of the current downstream or arrival ATSU or on trigger from event or periodic contract the aircraft downlinks its 4D trajectory.

	Element Tagged Value Name	Value
	megaid	
	ref	IER-04.05- OSED-ACTA-0001
	refType	Interaction requirement
	Text	

Element Name	Author	Notes
GroundAirDataExchange	[redacted]	*The GD shall be able to log-on to the AC via ATN ADS-C to request ON EVENT, ON DEMAND and PERIODIC "EPP change" downlink of EPP report.*

	Element Tagged Value Name	Value
	megaid	
	ref	REQ-05.05.01-OSED-0511.002
	refType	Operational requirement
	Text	

Element Name	Author	Notes
GroundInformation	[redacted]	*The GD shall have the aircraft 4D capability information available (e.g. FPL information, ADS-C application active, RTA capability)*

	Element Tagged Value Name	Value
	megaid	
	ref	REQ-05.05.01-OSED-0511.001
	refType	Operational requirement
	Text	

Element Name	Author	Notes
ImplementationOfPdr	[redacted]	On top of the Version H baseline the following Problem Defect Reports (PDRs) **shall** be implemented: • 38 • 50 (equals 79) • 55 • 71 • 124 • 158 • 157 • 194 • 206 • 208 • 209 • 240

	Element Tagged Value Name	Value
	megaid	
	ref	REQ-05.06.01-OSED-Gi4D.0060
	refType	Operational requirement
	Text	

Element Name	Author	Notes
Request Aircraft Trajectory	[redacted]	The ground based user requests the 4D trajectory from the aircraft from the current location for a flying duration or a maximum number of points.

	Element Tagged Value Name	Value
	megaid	
	ref	IER-04.05-OSED-EDCC-0001
	refType	Interaction requirement
	Text	

Element Name	Author	Notes
Request Aircraft Trajectory Periodically	[redacted]	The ground based user requests the 4D trajectory from the aircraft from the current location for a flying duration or a maximum number of points, periodically; where the period between publications is supplied in the request.

	Element Tagged Value Name	Value
	megaid	
	ref	IER-04.05-OSED-EDCC-0009
	refType	Interaction requirement
	Text	

Element Name	Author	Notes
Request Aircraft Trajectory on Event	[redacted]	The ground based user requests the 4D trajectory from the aircraft from the current location for a flying duration or a maximum number of points, when the specified event occurs. The requestor specifies the number of points to be published when the event occurs. The requestor also indicates the type of event which may be, a set of tolerances for a set of waypoints using either the same tolerance for the whole trajectory or specific tolerances fo each specified waypoint.

	Element Tagged Value Name	Value
	megaid	
	ref	IER-04.05-OSED-EDCC-0011
	refType	Interaction requirement
	Text	

Element Name	Author	Notes
SupportForCPDLCAndADSC	[redacted]	The SESAR i4D **shall** support the new CPDLC and ADS-C ATN applications as defined by "EUROCAE WG78 Version H".

	Element Tagged Value Name	Value
	megaid	
	ref	REQ-05.06.01-OSED-Gi4D.0050
	refType	Operational requirement
	Text	

Element Name	Author	Notes
Positive Response	[redacted]	The aircraft is able to process the request and issues a positive response.

	Element Tagged Value Name	Value
	megaid	
	ref	IER-04.05.00-OSED-EDCC-0002
	refType	Interaction requirement
	Text	

Element Name	Author	Notes
Negative Response	[redacted]	The aircraft is unable to process the invalid request and issues a negative response.

	Element Tagged Value Name	Value
	megaid	
	ref	IER-04.05.00-OSED-EDCC-0003
	refType	Interaction requirement
	Text	

Element Name	Author	Notes
Non Compliance Notification	[redacted]	The aircraft is unable to process the valid request and issues a NCN response.

	Element Tagged Value Name	Value
	megaid	
	ref	IER-04.05.00-OSED-EDCC-0004
	refType	Interaction requirement
	Text	

Element Name	Author	Notes
Contract Cancellation	[redacted]	The ground based user requests the previous contract established with the aircraft be canceled. The request may cancel periodic, event or all contracts.

	Element Tagged Value Name	Value
	megaid	
	ref	IER-04.05.00-OSED-EDCC-0012
	refType	Interaction requirement
	Text	

Table 1 IER requirements

3.2 Other Requirements

3.2.1 Non-Functional Requirements

N/A

3.2.2 Relevant Industrial Standards

The content of the service payload is defined by the ADS-C standard defined by RTCA/EUROCAE in ref [12].

3.2.3 Nodes

The diagram showing the nodes providing and consuming the service, is shown below:

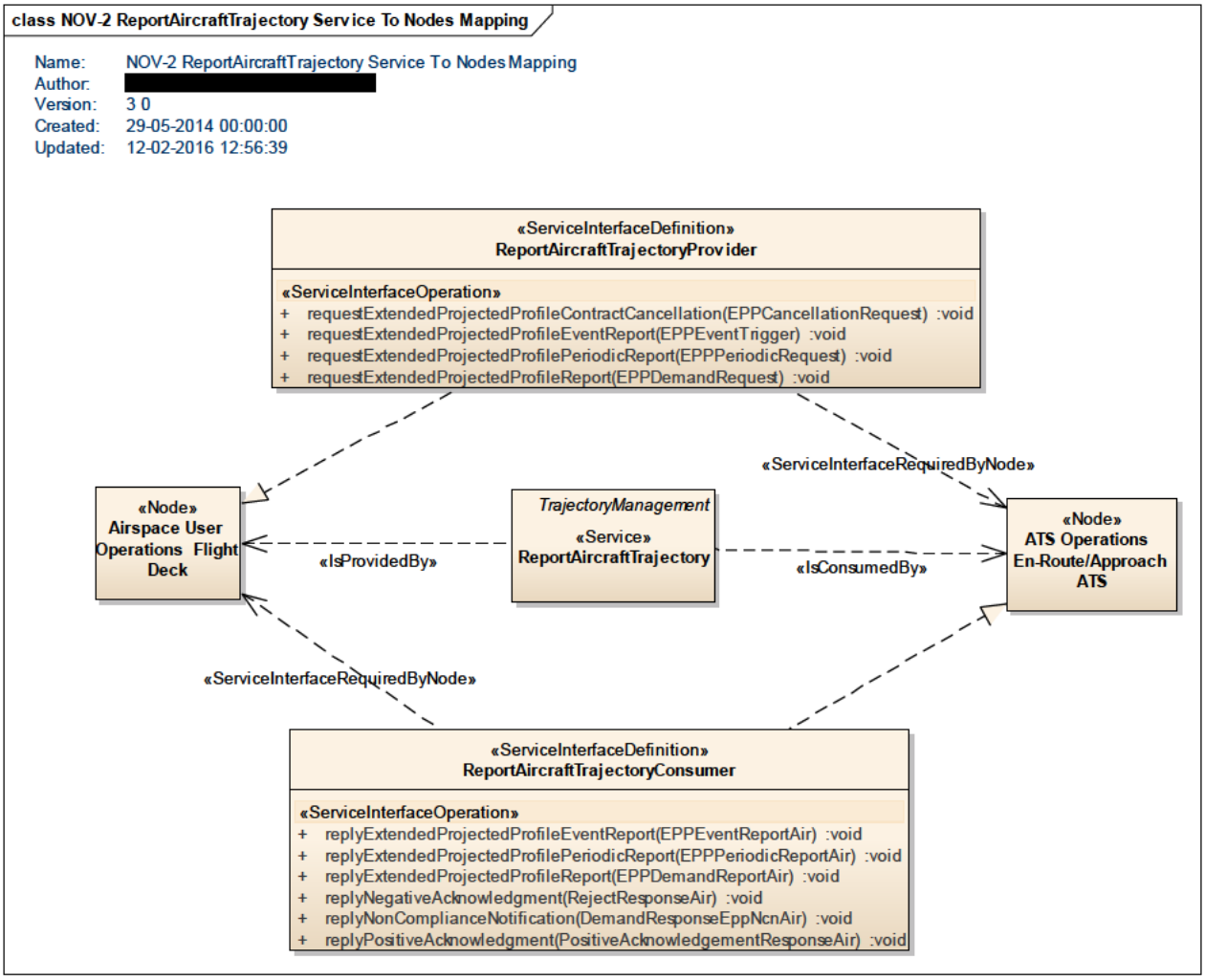

Figure 4: NOV-2 ReportAircraftTrajectory Service to Nodes Mapping diagram

4 Service overview

4.1 Service Taxonomy

The service taxonomy is described in the ISRM Service Portfolio document [9].

4.2 Service Levels (NfRs)

Non Functional Requirements are described in section 3.2.1.

4.3 Service Functions and Capabilities

The functions and capabilities of the service can be shown through the following diagrams:

The service interface is shown in Figure 5. The service supports a number of operations which are described in more detail later in this document.

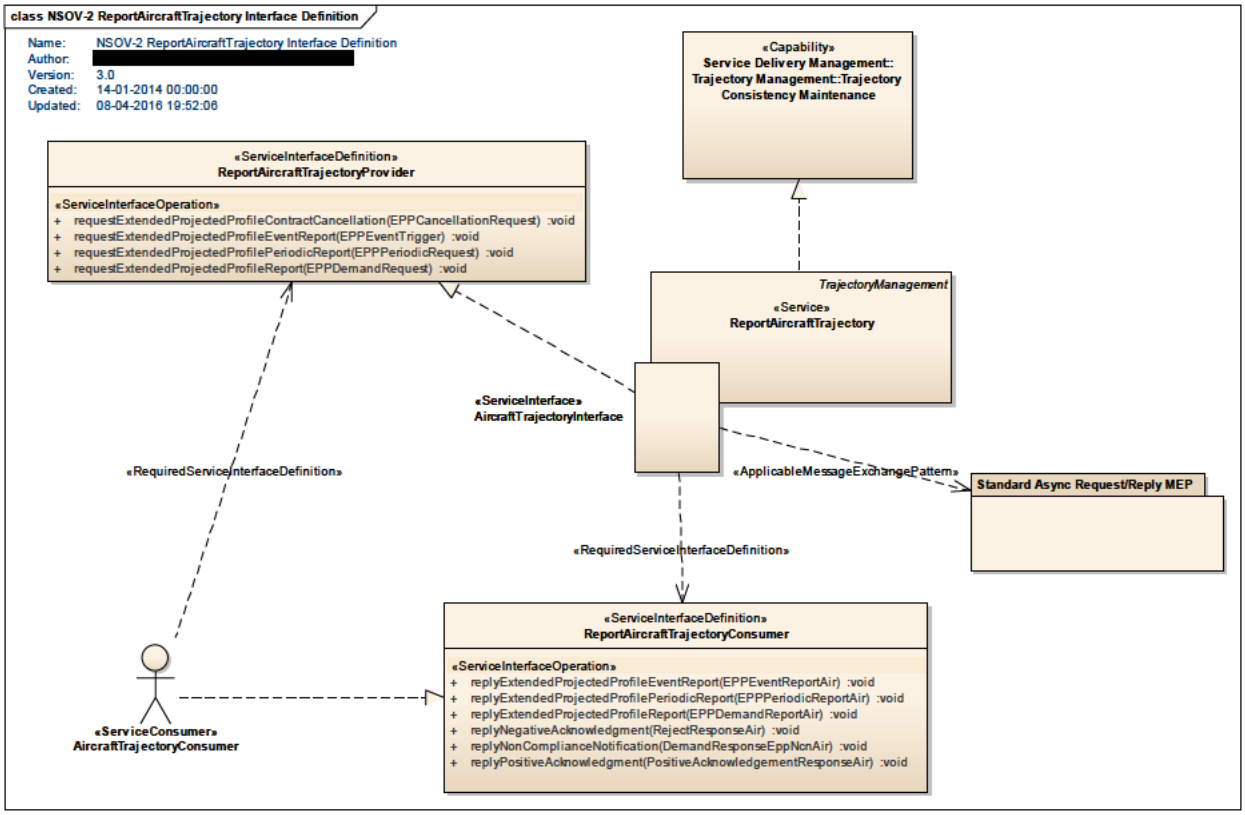

Figure 5 NSOV-2 Service Interface Overview

The Business Process overview showing the interaction between Approach unit and aircraft in relation to the request and publication of an aircraft trajectory is shown in Figure 6

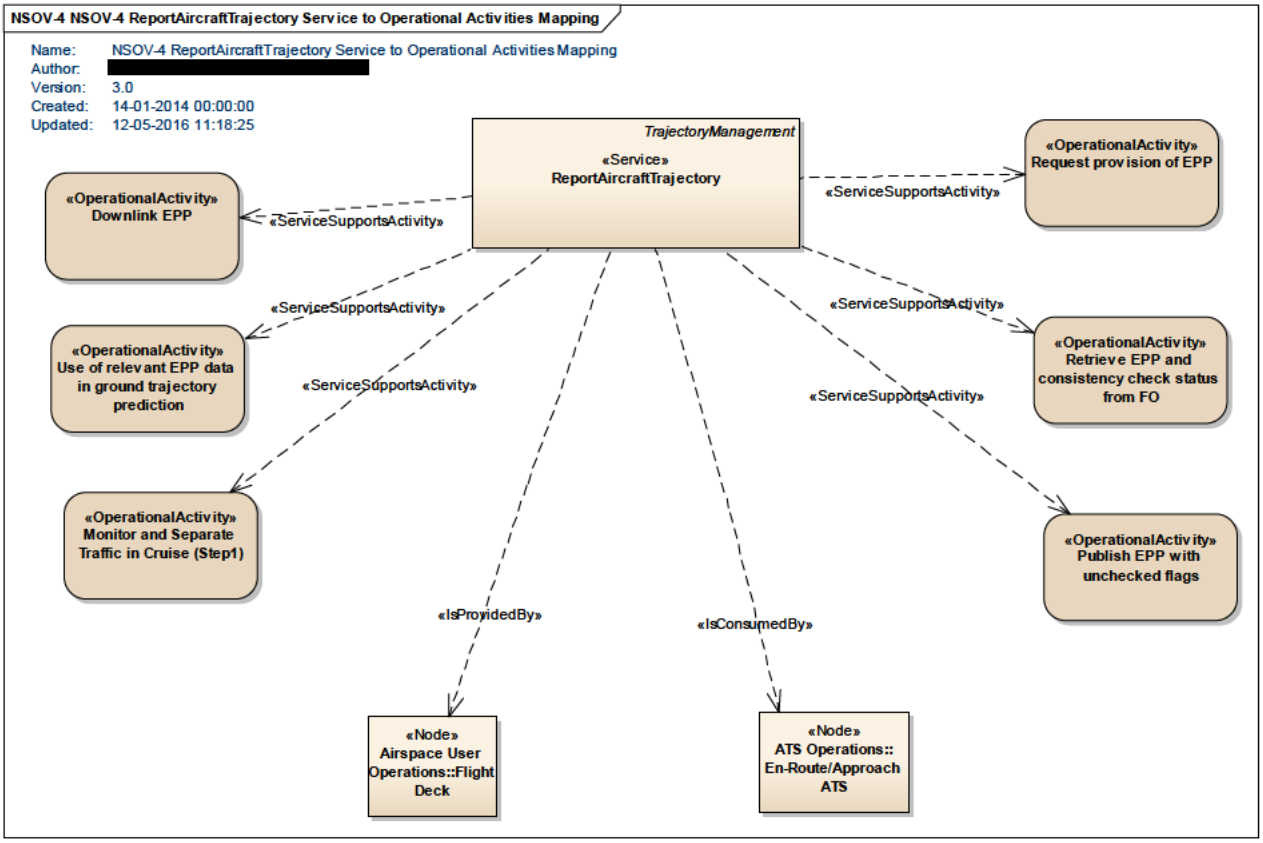

Figure 6 NSOV-4 Aircraft Trajectory Service to Operational Activities Mapping

4.4 Service Interfaces

The service is based on two interfaces, providing (a) a simple publish/subscribe mechanism and (b) a request/response style interaction. The first interface allows the consumer to subscribe or unsubscribe to the data (supporting (a)) as well as to request the current data (supporting (b)); the second interface allows the service provider to publish the message containing the data.
The service interfaces are shown in Figure 5.

ServiceInterface	ServiceInterfaceDefinition	ServiceInterfaceOperation	Role
AircraftTrajectoryInterface	ReportAircraftTrajectoryProvider	requestExtendedProjectedProfileContractCancellation	provided
AircraftTrajectoryInterface	ReportAircraftTrajectoryProvider	requestExtendedProjectedProfileEventReport	provided
AircraftTrajectoryInterface	ReportAircraftTrajectoryProvider	requestExtendedProjectedProfilePeriodicReport	provided
AircraftTrajectoryInterface	ReportAircraftTrajectoryProvider	requestExtendedProjectedProfileReport	provided
AircraftTrajectoryInterface	ReportAircraftTrajectoryConsumer	replyExtendedProjectedProfileReport	required
AircraftTrajectoryInterface	ReportAircraftTrajectoryConsumer	replyExtendedProjectedProfileEventReport	required
AircraftTrajectoryInterface	ReportAircraftTrajectoryConsumer	replyExtendedProjectedProfilePeriodicReport	required
AircraftTrajectoryInterface	ReportAircraftTrajectoryConsumer	replyPositiveAcknowledgment	required
AircraftTrajectoryInterface	ReportAircraftTrajectoryConsumer	replyNegativeAcknowledgment	required
AircraftTrajectoryInterface	ReportAircraftTrajectoryConsumer	replyNonComplianceNotification	required

Table 2: Service Interfaces

5 Service interface specifications

The interfaces of the ReportAircraftTrajectory service are shown in Figure 5. They are described in more detail in the sections below.

5.1 Service Interface AircraftTrajectoryInterface

5.1.1 Service Interface Definition ReportAircraftTrajectoryProvider

The interface offers a few operations, to receive from the publication service the EPP report and other related responses.

5.1.1.1 Operation requestExtendedProjectedProfileReport

5.1.1.1.1 Operation Functionality

This operation enables the consumer to request the publication of an Extended Projected Profile (EPP) report from the aircraft onboard systems. The user of the service supplies a unique identifier for the flight and number of fixes on the route of flight or a time along the route of flight for which a report is requested. The data related to the ADS-C contract session has been ignored at this logical level.

5.1.1.1.2 Operation Parameters

The input parameter message structure EPPDemandRequest is shown below. The demand request is a specialisation of the ContractRequestAir which includes other types of request for ADS-C services.

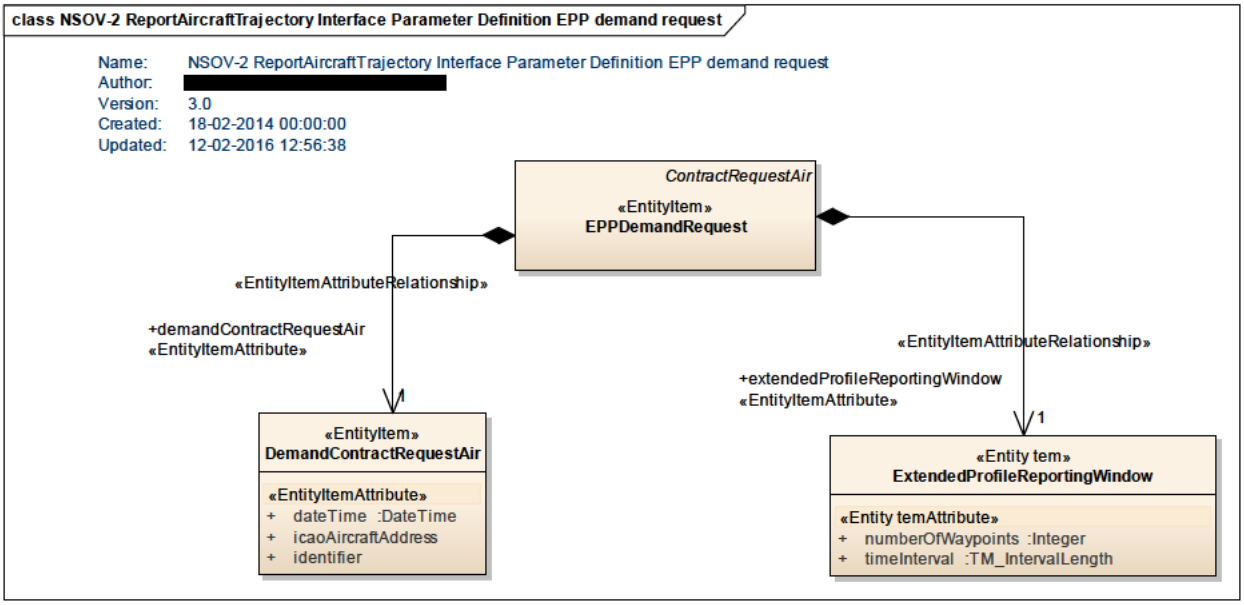

Figure 7 NSOV-2 ReportAircraftTrajectory Interface Parameter Definition EPPDemandRequest

Element Name	Author	Notes
EPPDemandRequest	[redacted]	A class representing an Extended Projected Profle (EPP) demand request. It is the class that contains the data defined in the standard for the request of an EPP defined as the points inside a time interval into the future or a number of points in the future.

Element Name			Author	Notes
ExtendedProfileReportingWindow			[redacted]	The parameters for a requested Extended Projected Profile (EPP). To include the time into the future and or the number of requested waypoints.
	Attribute Name	**Type**		**Notes**
	numberOfWaypoints	Integer		The number of requested waypoints for the requested EPP.
	Tagged Value Name	**Value**		
	CLDMSemanticTrace	CLDM_out_of_scope		
	Attribute Name	**Type**		**Notes**
	timeInterval	TM_IntervalLength		The time interval for the flight to give a number of 4D points.
	Tagged Value Name	**Value**		
	CLDMSemanticTrace	CLDM_out_of_scope		

Element Name			Author	Notes
DemandContractRequestAir			[redacted]	A class representing a demand data contract supplied by a ground system. This is a request for the immediate return of the requested data from the aircraft FMS if it is possible for the aircraft to do so.
	Attribute Name	**Type**		**Notes**
	dateTime	DateTime		The mandatory date and time at the time of report generation.
	Tagged Value Name	**Value**		
	CLDMSemanticTrace	CLDM_out_of_scope		
	Attribute Name	**Type**		**Notes**
	icaoAircraftAddress			The optional 24bit Mode S address of the aircraft.
	Tagged Value Name	**Value**		
	CLDMSemanticTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Aircraft:AircraftIdentifier:ICAOAircraftAddress		
	Attribute Name	**Type**		**Notes**
	identifier			The optional 2-8 characters representing the flight identifier as known by the aircraft (i.e. as broadcast in the Mode S). Not necessarily the flight identification as filed.
	Tagged Value Name	**Value**		
	CLDMSemanticTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Flight:FlightIdentifier:AircraftIdentification@flightNumber		

Table 3: Demand Request Mapping

5.1.1.2 Operation requestExtendedProjectedProfilePeriodicReport

5.1.1.2.1 Operation Functionality

This operation enables the consumer to request the regular publication of an Extended Projected Profile (EPP) report from the aircraft onboard systems. The user of the service supplies a unique identifier for the flight and number of fixes on the route of flight or a time along the route of flight for which a report is requested. The user also supplies the period between subsequent report publications.

5.1.1.2.2 Operation Parameters

The input parameter message structure EPPPeriodicRequest is shown below. As can be seen the demand request is a specialisation of the ContractRequestAir which includes other types of request for ADS-C services.

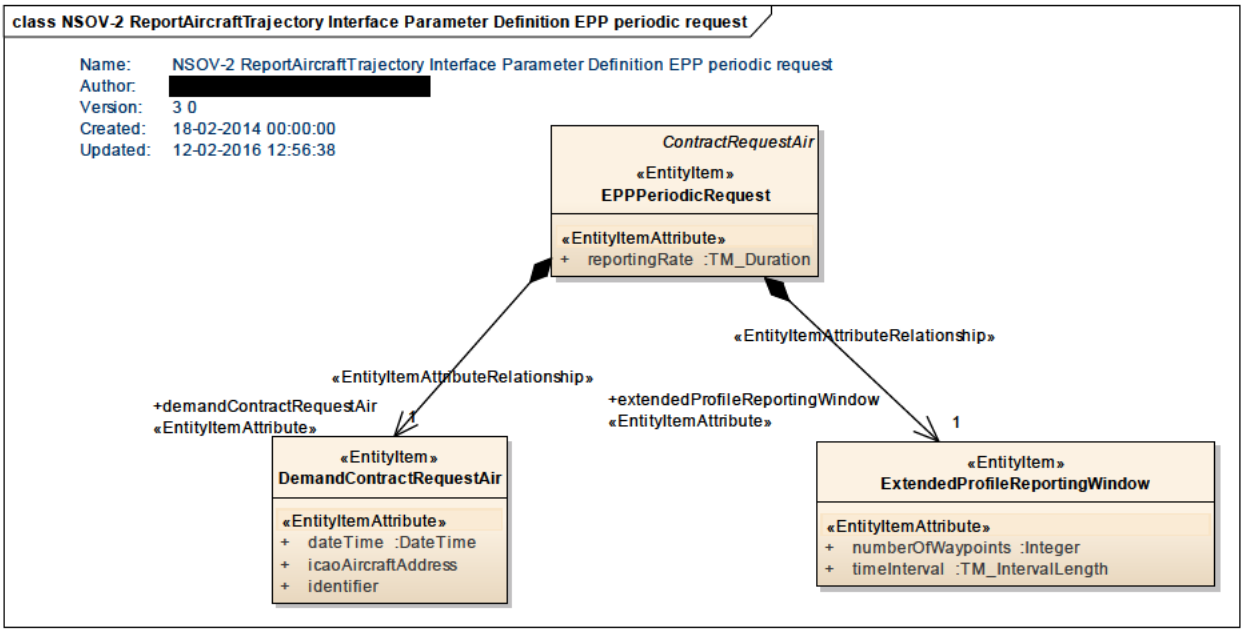

Figure 8 NSOV-2 ReportAircraftTrajectory Interface Parameter Definition EPPPeriodicRequest

Element Name	Author	Notes
EPPPeriodicRequest	[redacted]	A class representing an Extended Projected Profile (EPP) periodic request. It is the class that contains the data defined in the standard for the request of a EPP defined as the points inside a time interval into the future or a number of points in the future. It also supplies an interval for which the publication is required.

	Attribute Name	Type	Notes
	reportingRate	TM_Duration	A duration or period for which the periodic report is required to be repeatedly published.

	Tagged Value Name	Value
	CLDMSemanticTrace	CLDM_out_of_scope

Table 4: EPP Periodic Request Mapping

5.1.1.3 Operation requestExtendedProjectedProfileEventReport

5.1.1.3.1 Operation Functionality

This operation enables the consumer to request the publication of an Extended Projected Profile (EPP) report from the aircraft onboard systems, whenever the specified conditions occur. The user of the service supplies a unique identifier for the flight and number of fixes on the route of flight or a time along the route of flight for which a report is requested. The user also supplies the conditions necessary to determine when the "event" occurs.

The available event types are deviations from the trajectory in any of the 4 dimensions, deviation from the RTA and a change in route and or trajectory.

5.1.1.3.2 Operation Parameters

The input parameter message structure EPPEventRequest is shown below. As can be seen the demand request is a specialisation of the ContractRequestAir which includes other types of request for ADS-C services.

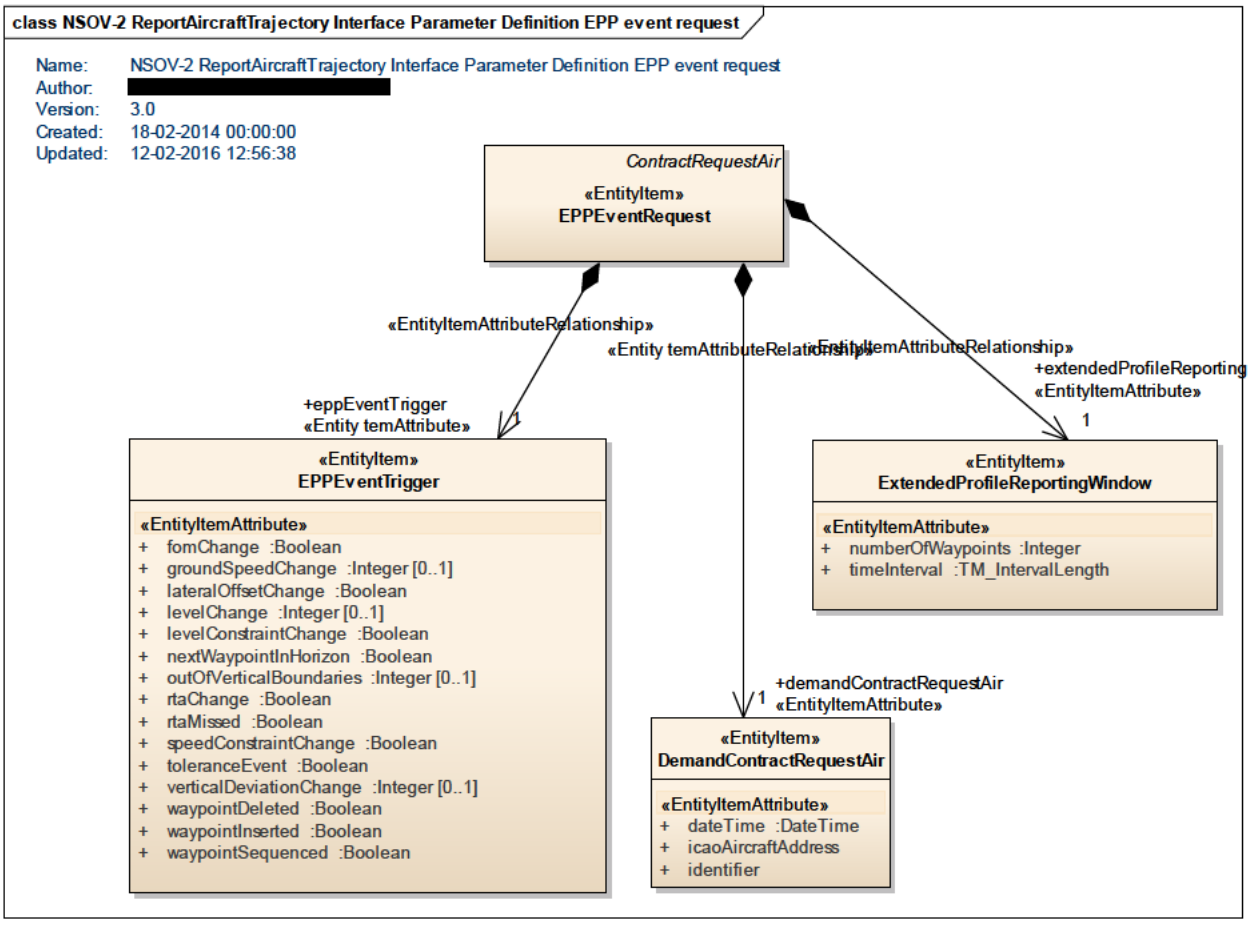

Figure 9 NSOV-2 ReportAircraftTrajectory Interface Parameter Definition EPPEventRequest

Element Name	Author	Notes
EPPEventRequest	[redacted]	A class representing an Extended Projected Profile (EPP) event request. It is the class that contains the data defined in the standard for the request of a EPP defined as the points inside a time interval into the future or a number of points in the future. It also supplies the event criteria for which the publication is required when the criteria are met.

Table 5: EPPEventRequest Mapping

Element Name			Author	Notes
EPPEventTrigger			[redacted]	The parameters that determine the conditions for the generation of the event report.
	Attribute Name	**Type**		**Notes**
	fomChange	Boolean		An indication that the publication is required if there is a (FOM) change.
	Tagged Value Name	**Value**		
	CLDMSemanticTrace	CLDM_out_of_scope		
	Attribute Name	**Type**		**Notes**
	groundSpeedChange	Integer		Level change that would trigger an event. 100 - 5000ft in units of 10 ft
	Tagged Value Name	**Value**		
	CLDMSemanticTrace	CLDM_out_of_scope		
	Attribute Name	**Type**		**Notes**
	lateralOffsetChange	Boolean		An indication that the publication is required if there is a lateral offset change.
	Tagged Value Name	**Value**		
	CLDMSemanticTrace	CLDM_out_of_scope		
	Attribute Name	**Type**		**Notes**
	levelChange	Integer		Level change that would trigger an event. 100 - 5000ft in units of 10 ft
	Tagged Value Name	**Value**		
	CLDMSemanticTrace	CLDM_out_of_scope		
	Attribute Name	**Type**		**Notes**
	levelConstraintChange	Boolean		An indication that the publication is required if there is a level constraint change.
	Tagged Value Name	**Value**		
	CLDMSemanticTrace	CLDM_out_of_scope		
	Attribute Name	**Type**		**Notes**
	nextWaypointInHorizon	Boolean		An indication that the publication is required if the next waypoint is now in horizon.
	Tagged Value Name	**Value**		
	CLDMSemanticTrace	CLDM_out_of_scope		
	Attribute Name	**Type**		**Notes**
	outOfVerticalBoundaries	Integer		Out of Vertical Boundaries change that would trigger an event. 100 - 5000ft in units of 10 ft
	Tagged Value Name	**Value**		
	CLDMSemanticTrace	CLDM_out_of_scope		
	Attribute Name	**Type**		**Notes**
	rtaChange	Boolean		An indication that the publication is required if there is a Required Time of Arrival (RTA)

			change.
	Tagged Value Name	**Value**	
	CLDMSemanticTrace	CLDM_out_of_scope	
	Attribute Name	**Type**	**Notes**
	rtaMissed	Boolean	An indication that the publication is required if the Required Time of Arrival (RTA) has been missed.
	Tagged Value Name	**Value**	
	CLDMSemanticTrace	CLDM_out_of_scope	
	Attribute Name	**Type**	**Notes**
	speedConstraintChange	Boolean	An indication that the publication is required if there is a speed constraint change.
	Tagged Value Name	**Value**	
	CLDMSemanticTrace	CLDM_out_of_scope	
	Attribute Name	**Type**	**Notes**
	toleranceEvent	Boolean	An indication that the publication is required if the required tolerance for a trajectory point has been missed.
	Tagged Value Name	**Value**	
	CLDMSemanticTrace	CLDM_out_of_scope	
	Attribute Name	**Type**	**Notes**
	verticalDeviationChange	Integer	vertical deviation change that would trigger an event. 100 - 5000ft in units of 10 ft
	Tagged Value Name	**Value**	
	CLDMSemanticTrace	CLDM_out_of_scope	
	Attribute Name	**Type**	**Notes**
	waypointDeleted	Boolean	An indication that the publication is required if a waypoint is deleted.
	Tagged Value Name	**Value**	
	CLDMSemanticTrace	CLDM_out_of_scope	
	Attribute Name	**Type**	**Notes**
	waypointInserted	Boolean	An indication that the publication is required if a waypoint is inserted.
	Tagged Value Name	**Value**	
	CLDMSemanticTrace	CLDM_out_of_scope	
	Attribute Name	**Type**	**Notes**
	waypointSequenced	Boolean	An indication that the publication is required if a waypoint is sequenced.
	Tagged Value Name	**Value**	
	CLDMSemanticTrace	CLDM_out_of_scope	

Table 6: EPPEventTrigger Mapping

5.1.1.4 Operation requestExtendedProjectedProfileContractCancellation

5.1.1.4.1 Operation Functionality

This operation enables the consumer to request the cancellation of an earlier event or periodic contract for the publication of an Extended Projected Profile (EPP) report.

The cancellation may request either the periodic or event or both types of contract be cancelled.

5.1.1.4.2 Operation Parameters

The input parameter message structure EPPCancellationRequest is shown below. As can be seen the cancellation request is a specialisation of the ContractRequestAir which includes other types of request for ADS-C services.

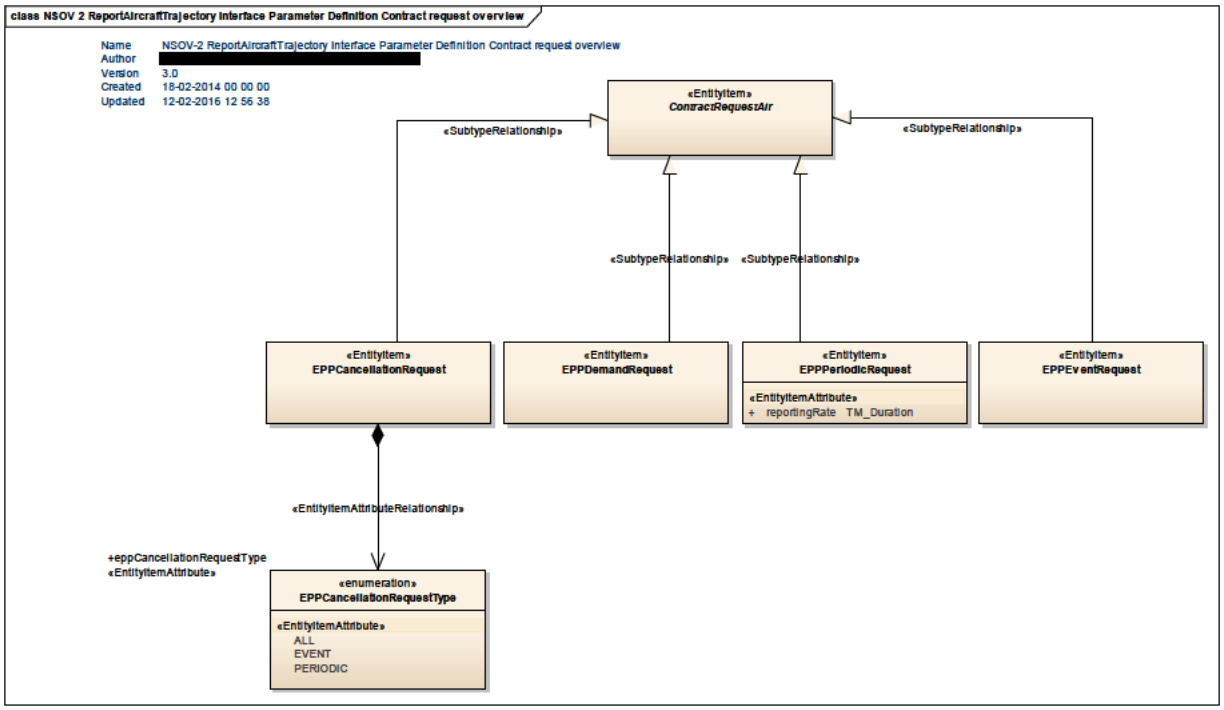

Figure 10 NSOV-2 ReportAircraftTrajectory Interface Parameter Definition EPPCancellationRequest

Element Name	Author	Notes
EPPCancellationRequest	[redacted]	A class representing the user request to cancel an existing periodic or event Extended Projected Profile (EPP) contract. It is the class that contains the data defined in the standard for the request of a EPP contract cancellation.

Table 7: EPPCancellationRequest Mapping

Element Name			Author	Notes
EPPCancellationRequestType			[redacted]	type of EPP Contract being cancelled: period, event or all.
	Attribute Name	**Type**		**Notes**
	ALL			
	Tagged Value Name	**Value**		
	CLDMSemanticTrace	CLDM_Out_of_scope		
	IMDefinitionTrace	N/A		
	Attribute Name	**Type**		**Notes**
	EVENT			
	Tagged Value Name	**Value**		
	CLDMSemanticTrace	CLDM_Out_of_scope		
	IMDefinitionTrace	N/A		
	Attribute Name	**Type**		**Notes**
	PERIODIC			
	Tagged Value Name	**Value**		
	CLDMSemanticTrace	CLDM_Out_of_scope		

Element Name		Author		Notes
EPPCancellationRequestType		[redacted]		type of EPP Contract being cancelled: period, event or all.
	Attribute Name	**Type**		**Notes**
	IMDefinitionTrace	N/A		

Table 8: EPPCancellationRequestType Mapping

5.1.2 Service Interface Definition ReportAircraftTrajectoryConsumer

The interface offers a few operations, to receive from the publication service the EPP report and other related responses. An overview of the high level report structure and common parts is shown in Figure 11.

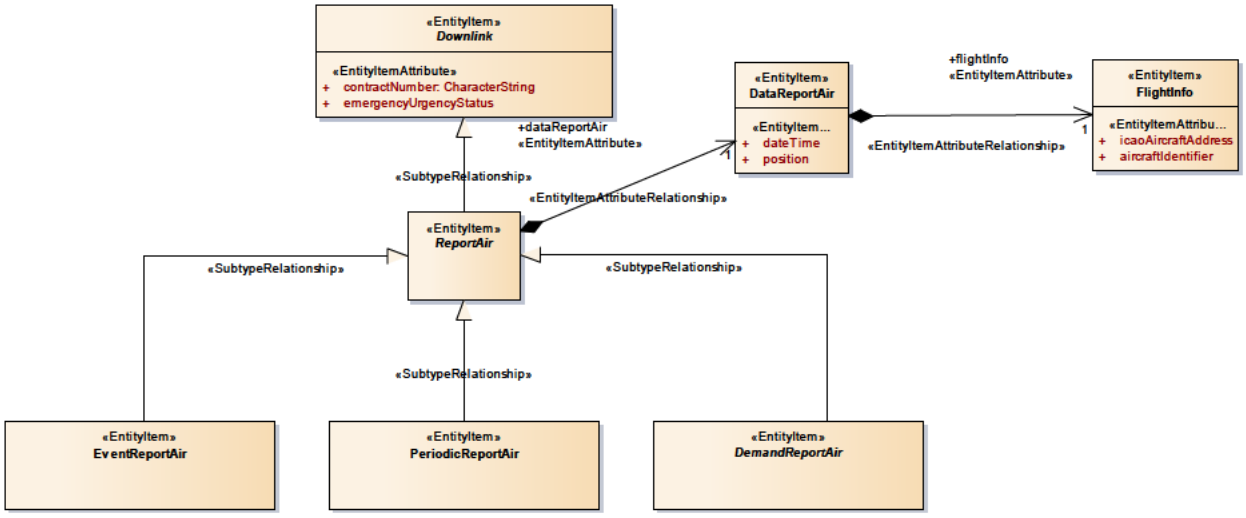

Figure 11 NSOV-2 ReportAircraftTrajectory Interface Parameter Definition EPP Report Overview

Element Name		Author		Notes
Downlink		[redacted]		The generic class to represent the set of messages that may be downlinked from the aircraft FMS as part of the standard. *rework definition
	Attribute Name	**Type**		**Notes**
	contractNumber	CharacterString		The identifier of the ADS-C Contract
	Tagged Value Name		**Value**	
	CLDMSemanticTrace		CLDM_out_of_scope	
	Attribute Name	**Type**		**Notes**
	emergencyUrgencyStatus			This attribute indicates whether emergency is not declared (none), declared or cancelled.
	Tagged Value Name		**Value**	
	CLDMSemanticTrace		urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Surveillance:StatusReportedByADSB@flightStatus	

Element Name	Author	Notes
DataReportAir	[redacted]	A component of a report supplied by an airborne system. It gives the position of the

			aircraft and the associated time when the report was generated.
	Attribute Name	**Type**	**Notes**
	dateTime		The mandatory date and time at the time of report generation.
	Tagged Value Name	**Value**	
	CLDMSemanticTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:Abstract:TemporalEnabledEntity@startEntityLifetime	
	Attribute Name	**Type**	**Notes**
	position		The mandatory 3D position of the aircraft at the time of report generation.
	Tagged Value Name	**Value**	
	CLDMSemanticTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Surveillance:AircraftDerivedData@position	

Table 9: EPPReportOverview Mapping

5.1.2.1 Operation replyExtendedProjectedProfileReport

5.1.2.1.1 Operation Functionality

This operation is provided by the consumer of the requested report to enable it to receive the EPP Demand report publication. Its payload is the EPPDemandReportAir which consists of the report containing the 4D trajectory the aircraft systems know about within the requested limits. The report also contains the optional speed schedule and Meteo information.

5.1.2.1.2 Operation Parameters

The input parameter message structure EPPDemandReportAir is shown below. As can be seen the report is a specialisation of a demand report air which in turn is a specialisation of a Report Air.

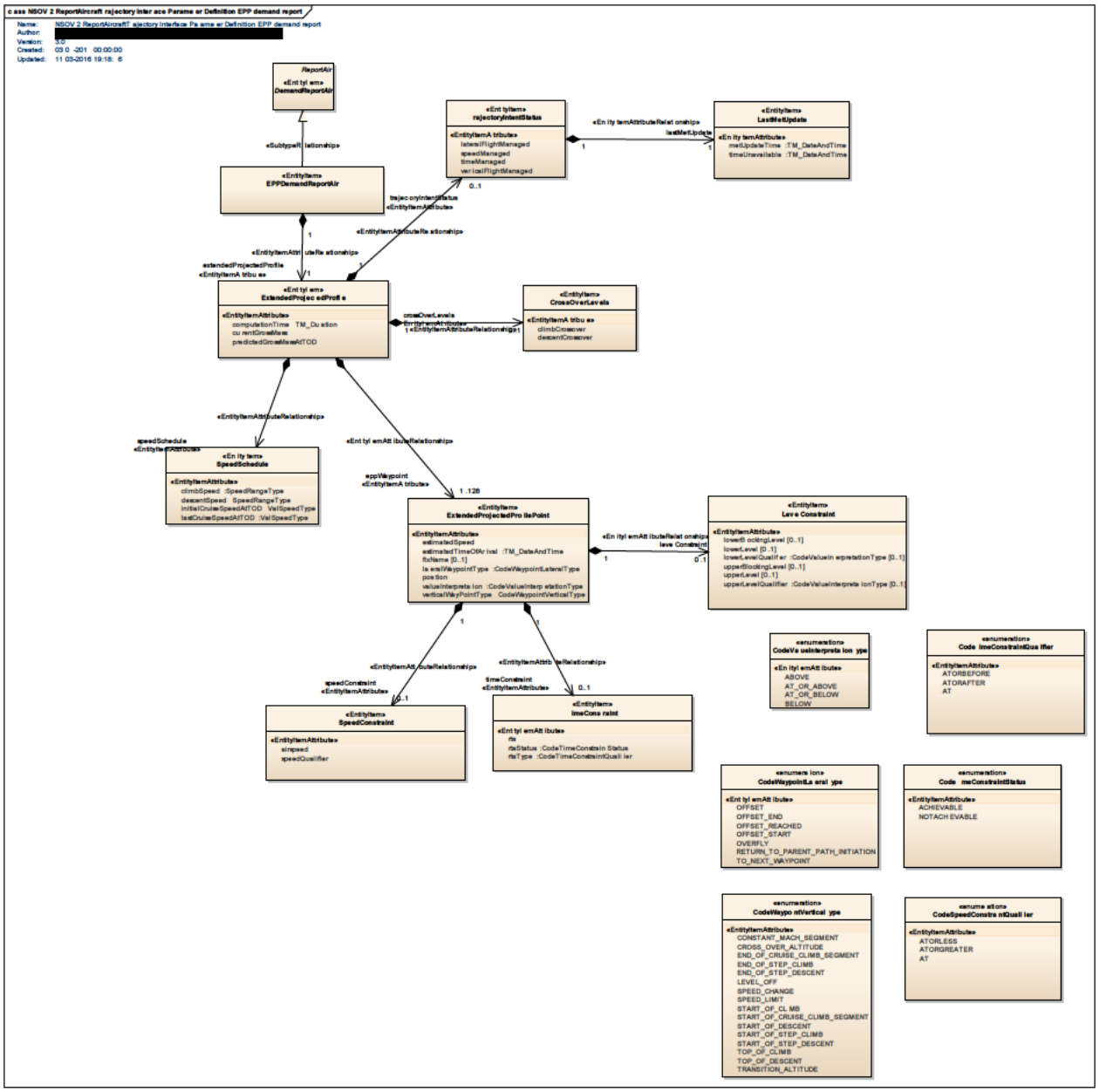

Figure 12 NSOV-2 ReportAircraftTrajectory Interface Parameter Definition EPP Demand Report

Element Name	Author	Notes
DemandReportAir	[redacted]	A class representing a demand data report supplied by an airborne system. This is the response to a data demand and is effectively the publication of the requested data as known by the aircraft flight management system.

Element Name	Author	Notes
EPPDemandReportAir	[redacted]	A class representing an Extended Projected Profile (EPP) demand data report supplied by an airborne system. This is the response to a data EPP demand and is effectively the publication of the requested data as known by the aircraft flight management system.

Element Name	Author	Notes
EPPDemandReportAir	[redacted]	A class representing an Extended Projected Profile (EPP) demand data report supplied by an airborne system. This is the response to a data EPP demand and is effectively the publication of the requested data as known by the aircraft flight management system.

Element Name			Author	Notes
ExtendedProjectedProfile			[redacted]	The optional extended projected profile is a series of 4D positions that contain extended data beyond the actual 4D details. These might be the aircraft mass or speed profile..
	Attribute Name	**Type**		**Notes**
	computationTime	TM_Duration		The time taken to produce the computation.
	Tagged Value Name		**Value**	
	CLDMSemanticTrace		CLDM_out_of_scope	
	Attribute Name	**Type**		**Notes**
	currentGrossMass			The gross mass of the flight at the current position and time indicated.
	Tagged Value Name		**Value**	
	CLDMSemanticTrace		urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Aircraft:FlightConfiguration@aircraftMass	
	Attribute Name	**Type**		**Notes**
	predictedGrossMassAtTOD			The current predicted gross mass of the aircraft at the Top Of Descent.
	Tagged Value Name		**Value**	
	CLDMSemanticTrace		urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Aircraft:FlightConfiguration@aircraftMass	

Element Name			Author	Notes
SpeedSchedule			[redacted]	The optional speed schedule for the flight, giving the option to give the set of air speeds for a set of decision points and for each point optionally giving expected, max and min values.
	Attribute Name	**Type**		**Notes**
	climbSpeed	SpeedRangeType		The airspeed range in the climb.
	Tagged Value Name		**Value**	
	CLDMSemanticTrace		CLDM_out_of_scope	
	Attribute Name	**Type**		**Notes**
	descentSpeed	SpeedRangeType		The airspeed range in the descent.
	Tagged Value Name		**Value**	

	CLDMSemanticTrace	CLDM_out_of_scope	
	Attribute Name	**Type**	**Notes**
	initialCruiseSpeedAtTOD	ValSpeedType	The initial cruise airspeed range at the Top Of Descent (TOD).
	Tagged Value Name	**Value**	
	CLDMSemanticTrace	CLDM_out_of_scope	
	Attribute Name	**Type**	**Notes**
	lastCruiseSpeedAtTOD	ValSpeedType	The last cruise airspeed range at the Top Of Descent (TOD).
	Tagged Value Name	**Value**	
	CLDMSemanticTrace	CLDM_out_of_scope	

Element Name	**Author**	**Notes**
TrajectoryIntentStatus	[redacted]	The optional status of the trajectory intent. Indicates whether the flight is constrained in some way.

	Attribute Name	**Type**	**Notes**
	lateralFlightManaged		The flight is laterally constrained or managed. boolean
	Tagged Value Name	**Value**	
	CLDMContextTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Flight:Trajectory:LateralConstraint	
	CLDMSemanticTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Flight:Trajectory:TrajectoryConstraint@status	
	Attribute Name	**Type**	**Notes**
	speedManaged		The flight is speed constrained or managed. boolean
	Tagged Value Name	**Value**	
	CLDMContextTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Flight:Trajectory:SpeedConstraint	
	CLDMSemanticTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Flight:Trajectory:TrajectoryConstraint@status	
	Attribute Name	**Type**	**Notes**
	timeManaged		The flight is time constrained or managed. boolean
	Tagged Value Name	**Value**	
	CLDMContextTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Flight:Trajectory:TimeConstraint	
	CLDMSemanticTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Flight:Trajectory:TrajectoryConstraint@status	
	Attribute Name	**Type**	**Notes**
	verticalFlightManaged		The flight is vertically constrained or managed. boolean
	Tagged Value Name	**Value**	
	CLDMContextTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Flight:Trajectory:VerticalConstraint	
	CLDMSemanticTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Flight:Trajectory:TrajectoryConstraint@status	

Element Name			Author	Notes
LastMetUpdate			[redacted]	The date and time of last Meteorological update.
	Attribute Name	**Type**		**Notes**
	metUpdateTime	TM_DateAndTime		Met Update time and date
	Tagged Value Name	**Value**		
	CLDMSemanticTrace	CLDM_out_of_scope		
	Attribute Name	**Type**		**Notes**
	timeUnavailable	TM_DateAndTime		The date and time is unavailable. boolean
	Tagged Value Name	**Value**		
	CLDMSemanticTrace	CLDM_out_of_scope		

Element Name			Author	Notes
CrossOverLevels			[redacted]	The optional cross over levels for the flight above level and below level.
	Attribute Name	**Type**		**Notes**
	climbCrossover			The optional level to be crossed during climb.
	Tagged Value Name	**Value**		
	CLDMSemanticTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Flight:AircraftAltitude@flightLevel		
	Attribute Name	**Type**		**Notes**
	descentCrossover			The optional level to be crossed during descent.
	Tagged Value Name	**Value**		
	CLDMSemanticTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Flight:AircraftAltitude@flightLevel		

Element Name			Author	Notes
SpeedConstraint			[redacted]	Entity holding information about a speed constraint at a trajectory point.
	Attribute Name	**Type**		**Notes**
	airspeed			The value of the required speed constraint.
	Tagged Value Name	**Value**		
	CLDMSemanticTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Flight:AircraftSpeed@indicatedAirSpeed		
	Attribute Name	**Type**		**Notes**
	speedQualifier			Type of speed qualifier to be applied as a constraint.
	Tagged Value Name	**Value**		
	CLDMSemanticTrace	CLDM_out_of_scope		

Element Name			Author	Notes
TimeConstraint			[redacted]	Entity holding information about a time constraint at a trajectory point.
	Attribute Name	**Type**		**Notes**
	rta			The value of the required time of arrival, time constraint.
	Tagged Value Name	**Value**		
	IMDefinitionTrace	urn:x-ses:sesarju:airm:v410:InformationModel:SubjectFields:Fligh		

		t:Trajectory:ControlledTimeOfArrival	
	Attribute Name	**Type**	**Notes**
	rtaStatus	CodeTimeConstraintStatus	Optional indication of whether time constraint can be met.
	Tagged Value Name	**Value**	
	CLDMSemanticTrace	CLDM_out_of_scope	
	Attribute Name	**Type**	**Notes**
	rtaType	CodeTimeConstraintQualifier	Type of RTA to be applied as a constraint.
	Tagged Value Name	**Value**	
	CLDMSemanticTrace	CLDM_out_of_scope	

Element Name	**Author**	**Notes**
LevelConstraint	[redacted]	Entity holding information about a level constraint at a trajectory point.

	Attribute Name	**Type**	**Notes**
	lowerBlockingLevel		Optional field giving the value of the lower blocking level.
	Tagged Value Name	**Value**	
	CLDMSemanticTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Flight:AircraftAltitude@flightLevel	
	Attribute Name	**Type**	**Notes**
	lowerLevel		Optional field giving the value of the lower level.
	Tagged Value Name	**Value**	
	CLDMSemanticTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Flight:AircraftAltitude@flightLevel	
	Attribute Name	**Type**	**Notes**
	lowerLevelQualifier	CodeValueInterpretationType	Optional field giving type of qualifier for the lower level.
	Tagged Value Name	**Value**	
	CLDMSemanticTrace	CLDM_out_of_scope	
	Attribute Name	**Type**	**Notes**
	upperBlockingLevel		Optional field giving the value of the upper blocking level.
	Tagged Value Name	**Value**	
	CLDMSemanticTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Flight:AircraftAltitude@flightLevel	
	Attribute Name	**Type**	**Notes**
	upperLevel		Optional field giving the value of the upper level.
	Tagged Value Name	**Value**	
	CLDMSemanticTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Flight:AircraftAltitude@flightLevel	
	Attribute Name	**Type**	**Notes**
	upperLevelQualifier	CodeValueInterpretationType	Optional field giving type of qualifier for the upper level.
	Tagged Value Name	**Value**	
	CLDMSemanticTrace	CLDM_out_of_scope	

Element Name			Author	Notes
ExtendedProjectedProfilePoint			[redacted]	class representing a single waypoint in the EPP.
	Attribute Name	**Type**		**Notes**
	estimatedSpeed			The estimated speed at the point.
	Tagged Value Name		**Value**	
	CLDMSemanticTrace		urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Aircraft:AircraftPerformance@airSpeed	
	Attribute Name	**Type**		**Notes**
	estimatedTimeOfArrival	TM_DateAndTime		The estimated time of arrival at the point.
	Tagged Value Name		**Value**	
	IMDefinitionTrace		urn:x-ses:sesarju:airm:v410:InformationModel:SubjectFields:Flight:FlightEvent:EstimatedTimeOfArrival	
	Attribute Name	**Type**		**Notes**
	fixName			Fix Name
	Tagged Value Name		**Value**	
	CLDMSemanticTrace		urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:AirspaceInfrastructure:AirspaceInfrastructurePoint:SignificantPoint@designator	
	Attribute Name	**Type**		**Notes**
	lateralWaypointType	CodeWaypointLateralType		Type of lateral constraint.
	Tagged Value Name		**Value**	
	CLDMContextTrace		CLDM_out_of_scope	
	Attribute Name	**Type**		**Notes**
	position			The location of the EPP point.
	Tagged Value Name		**Value**	
	CLDMContextTrace		urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Flight:Trajectory:TrajectoryPoint	
	CLDMSemanticTrace		urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Flight:Trajectory:TrajectoryPoint	
	Attribute Name	**Type**		**Notes**
	valueInterpretation	CodeValueInterpretationType		Value Interpretation
	Tagged Value Name		**Value**	
	CLDMSemanticTrace		CLDM_out_of_scope	
	Attribute Name	**Type**		**Notes**
	verticalWayPointType	CodeWaypointVerticalType		The type of vertical constraint
	Tagged Value Name		**Value**	
	CLDMSemanticTrace		CLDM_out_of_scope	

Table 10: Report Payload AIRM linkage

5.1.2.2 Operation replyExtendedProjectedProfilePeriodicReport

5.1.2.2.1 Operation Functionality

This operation is provided by the consumer of the requested report to enable it to receive the EPP Periodic Report publication. Its payload is the EPPPeriodicReportAir which consists of the report containing the 4D trajectory the aircraft systems know about within the requested limits. The report also contains the optional speed schedule and Meteo information.

5.1.2.2.2 Operation Parameters

The input parameter message structure EPPPeriodicReportAir is shown below. As can be seen the report is a specialisation of a periodic report air which in turn is a specialisation of a Report Air.

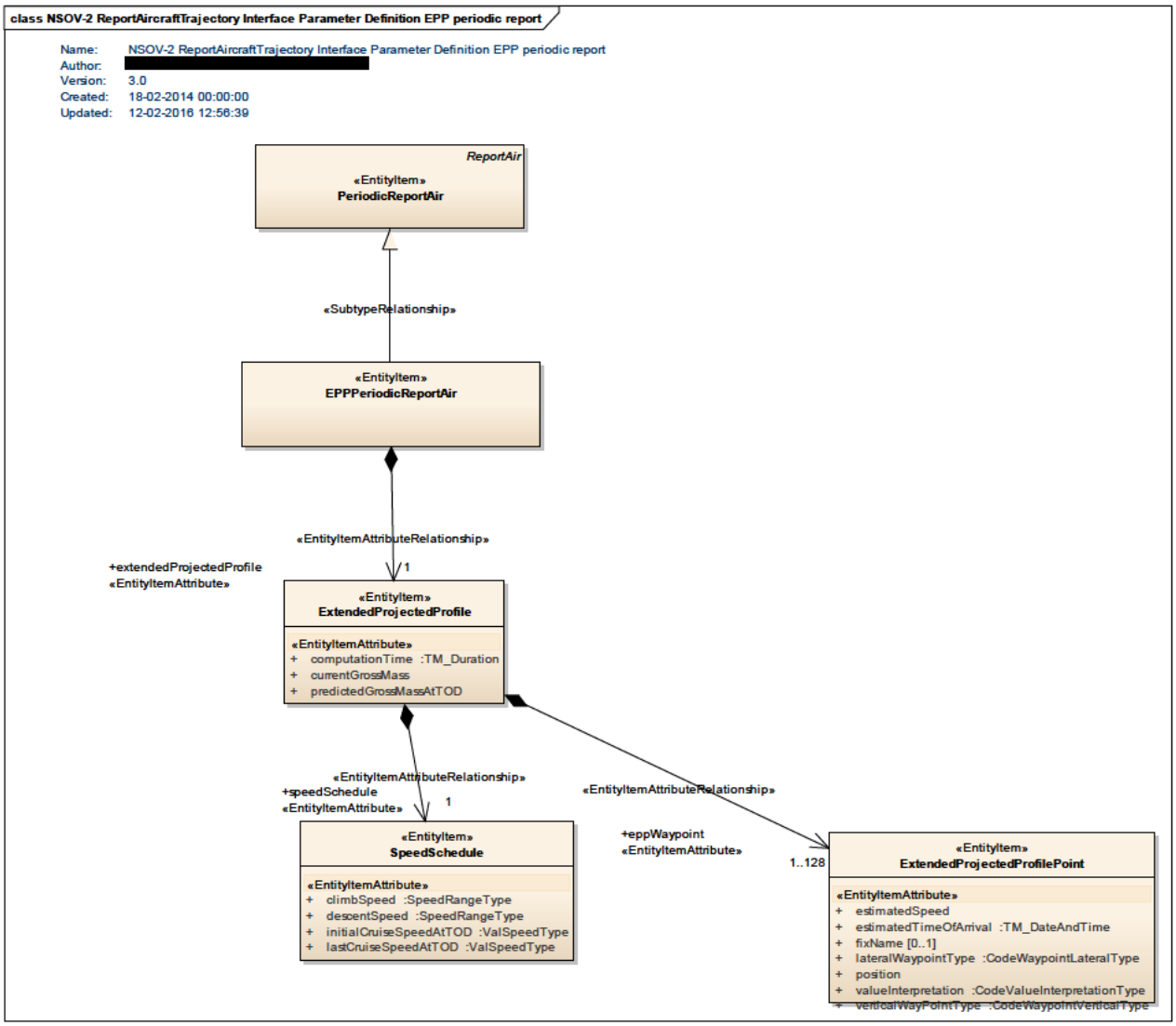

Figure 13 NSOV-2 ReportAircraftTrajectory Interface Parameter Definition EPP Periodic Report

Element Name	Author	Notes
EPPPeriodicReportAir	[redacted]	A class representing an Extended Projected Profile (EPP) demand data report supplied by an airborne system. This is the response to a data EPP demand and is effectively the publication of the requested data as known by the aircraft flight management system.

Table 11: Periodic Report AIRM linkage

5.1.2.3 Operation replyExtendedProjectedProfileEventReport

5.1.2.3.1 Operation Functionality

This operation is provided by the consumer of the requested report to enable it to receive the EPP Event Report publication. Its payload is the EPPEventReportAir which consists of the report containing the 4D trajectory the aircraft systems know about within the requested limits. The report also contains the optional speed schedule and Meteo information. The report also provides an indication of why the report was generated i.e. which of the supplied conditions were met.

5.1.2.3.2 Operation Parameters

The input parameter message structure EPPEventReportAir is shown below. As can be seen the report is a specialisation of an event report air which in turn is a specialisation of a Report Air.

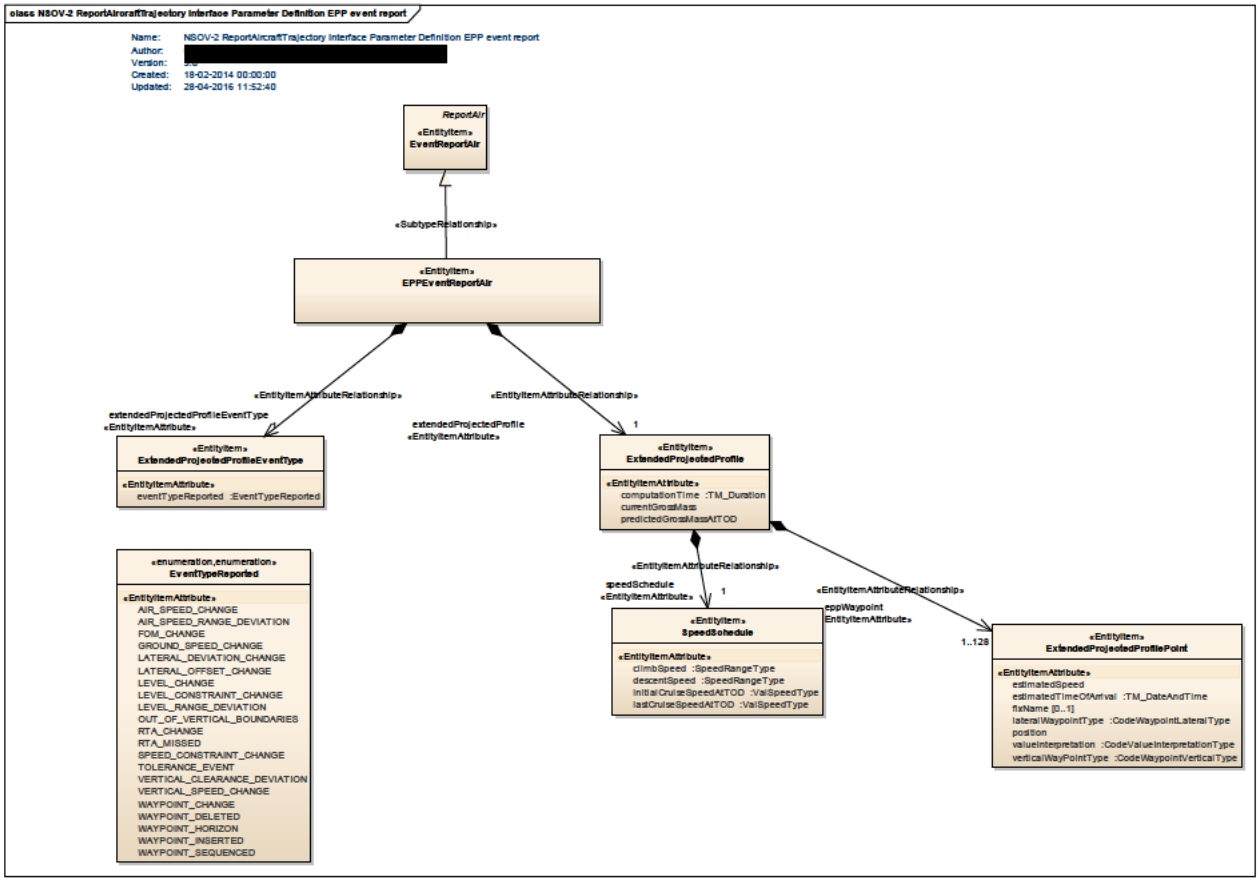

Figure 14 NSOV-2 ReportAircraftTrajectory Interface Parameter Definition EPP Event Report

Element Name	Author	Notes
EPPEventReportAir	[redacted]	A class representing an Extended Projected Profile (EPP) event data report supplied by an airborne system. This is the response to a data EPP event contract where the supplied constraints of the event are met, and is effectively the publication of the requested data as known by the aircraft flight management system.

Element Name			Author	Notes
ExtendedProjectedProfileEventType			[redacted]	The class that supplies receive of the EPP Event report as to the type of event that triggered the publication of the report. At least one constraint must be supplied although all are optional.
	Attribute Name	Type		Notes
	eventTypeReported	EventTypeReported		The type of EPP Report generated.
	Tagged Value Name	Value		
	CLDMSemanticTrace	CLDM_out_of_scope		

Table 12: EPP Event Report Payload AIRM linkage

5.1.2.4 Operation replyPositiveAcknowledgment

5.1.2.4.1 Operation Functionality

This operation is provided by the consumer of the requested report (or the issuer of the report request) to enable it to receive a positive acknowledgment to its request. Its payload is the PositiveAcknowledgmentResponseAir which consists of an indication as to the requested report type.

The response is issued when there is a significant delay in the requested report being produced; it indicates however that the request is acceptable.

5.1.2.4.2 Operation Parameters

The input parameter message structure PositiveAcknowledgmentResponseAir is shown below. As can be seen the response is a specialisation of a Downlink.

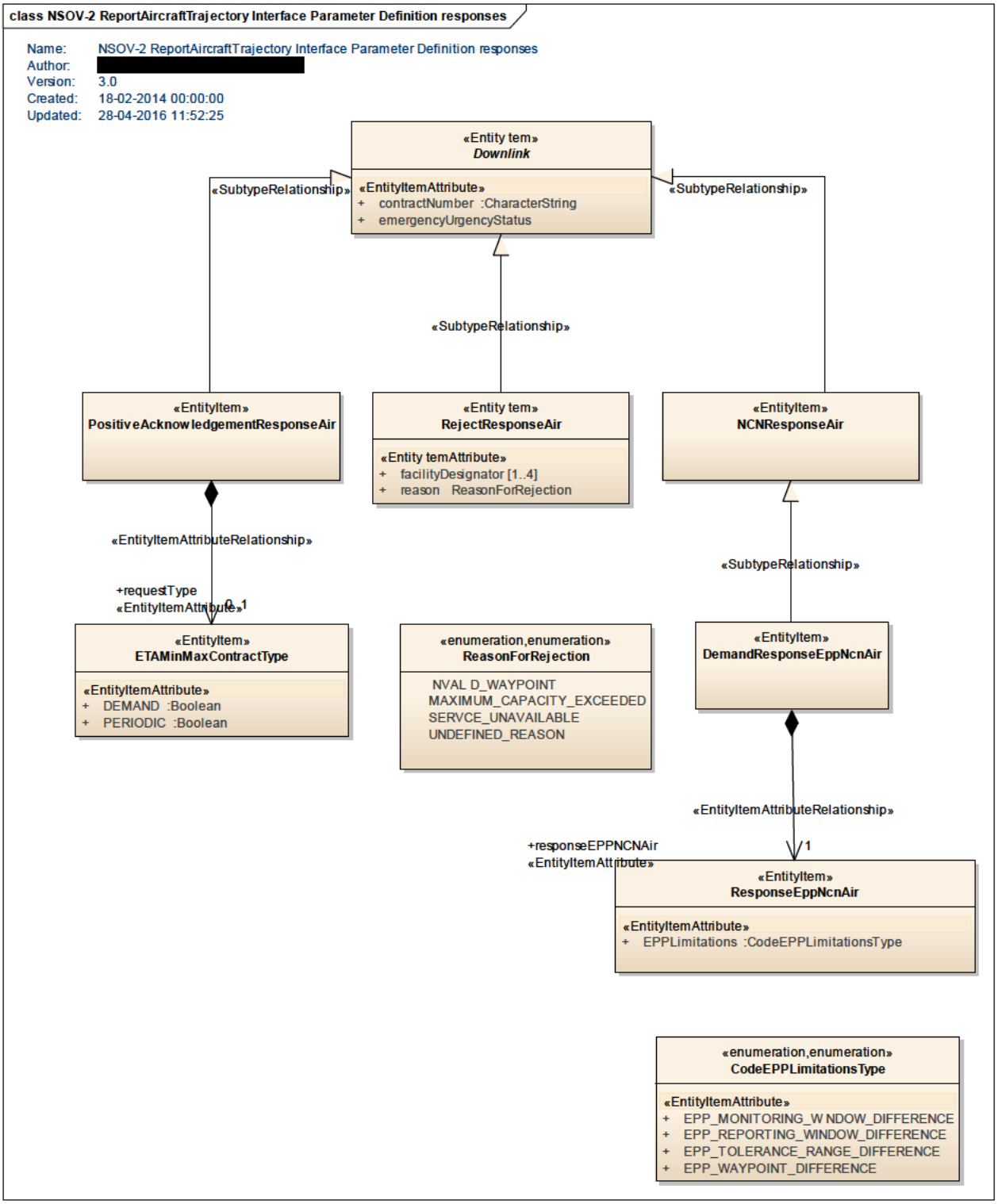

Figure 15 NSOV-2 ReportAircraftTrajectory Interface Parameter Definition Possible Response

Element Name	Author	Notes
PositiveAcknowledgementResponseAir	[redacted]	A class representing a Positive Acknowledgment Response supplied by an air system. It indicates that the previous request can be successfully processed.

Element Name			Author	Notes
ETAMinMaxContractType			[redacted]	The type of request this is a positive response to. Periodic occurs when the period specified expires and demand is a direct request for the publication by return.
	Attribute Name	Type		Notes
	DEMAND	Boolean		
	Tagged Value Name	Value		
	CLDMSemanticTrace	CLDM_out_of_scope		
	Attribute Name	Type		Notes
	PERIODIC	Boolean		
	Tagged Value Name	Value		
	CLDMSemanticTrace	CLDM_out_of_scope		

Element Name			Author	Notes
RejectResponseAir			[redacted]	The parameters of the rejection. It indicates that the previous request can not be successfully processed and supplies the reason code for the negative response.
	Attribute Name	Type		Notes
	facilityDesignator			The set of (1..4) facility designators applicable if the reason code is maximum capacity exceeded.
	Tagged Value Name	Value		
	CLDMSemanticTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:StakeholderAndActivities:Stakeholder:Unit@designator		
	Attribute Name	Type		Notes
	reason	ReasonForRejection		Reason for rejection.
	Tagged Value Name	Value		
	CLDMSemanticTrace	CLDM_out_of_scope		

Element Name	Author	Notes
NCNResponseAir	[redacted]	The not capable response to a request of the aircraft FMS. It indicates that the request is of a valid type and format but that the FMS cannot comply with it for other reasons.

Element Name	Author	Notes
DemandResponseEppNcnAir	[redacted]	A class representing a NonComplianceResponse supplied by an air system. It indicates that the previous EPP request can not be conformed with and supplies justification.

Element Name			Author	Notes
ResponseEppNcnAir			[redacted]	The parameters for the non compliance response.
	Attribute Name	Type		Notes
	EPPLimitations	CodeEPPLimitationsType		The type of limitation exceeded by the aircraft

			in order to trigger the EPP transmission
	Tagged Value Name	**Value**	
	CLDMSemanticTrace	CLDM_out_of_scope	

Table 13: Possible Response AIRM Linkage

5.1.2.5 Operation replyNegativeAcknowledgment

5.1.2.5.1 Operation Functionality

This operation is provided by the consumer of the requested report (or the issuer of the report request) to enable it to receive a negative acknowledgment to its request. Its payload is the RejectResponseAir which consists of a reason for rejection and other information.

The response is issued when there the aircraft systems determine that the request cannot be complied with. The reason it cannot be processed is returned in the response

5.1.2.5.2 Operation Parameters

The input parameter message structure RejectResponseAir is shown in Figure 15 and the associated AIRM linkage in Table 13.

5.1.2.6 Operation replyNonComplianceNotification

5.1.2.6.1 Operation Functionality

This operation is provided by the consumer of the requested report (or the issuer of the report request) to enable it to receive a Non Conformance Notification to its request. Its payload is the DemandResponseEPPNCNAir which consists of an indicator that the requested report is not supported by the aircraft systems.

The response is issued when there the aircraft systems determine that the request is not supported by the aircraft systems. This differs from the negative response in that it is a permanent state whereas a negative response is only temporary and may be successful if retried with different parameters at a different time.

5.1.2.6.2 Operation Parameters

The input parameter message structure DemandResponseEPPNCNAir is shown in Figure 15 and the associated AIRM linkage in Table 13.

6 Service dynamic behaviour

6.1 Service Interface AircraftTrajectoryInterface

The interface offers four operations, to request from the publication service the EPP report. There is a single operation to demand the report by return and two operations to instigate contracts that cause the report to be published periodically or when a specified event occurs. The final operation is to cancel a previously requested contact and thus cause the cessation of any future report publications.

The dynamic behaviour of the service is shown in the diagrams of this section:

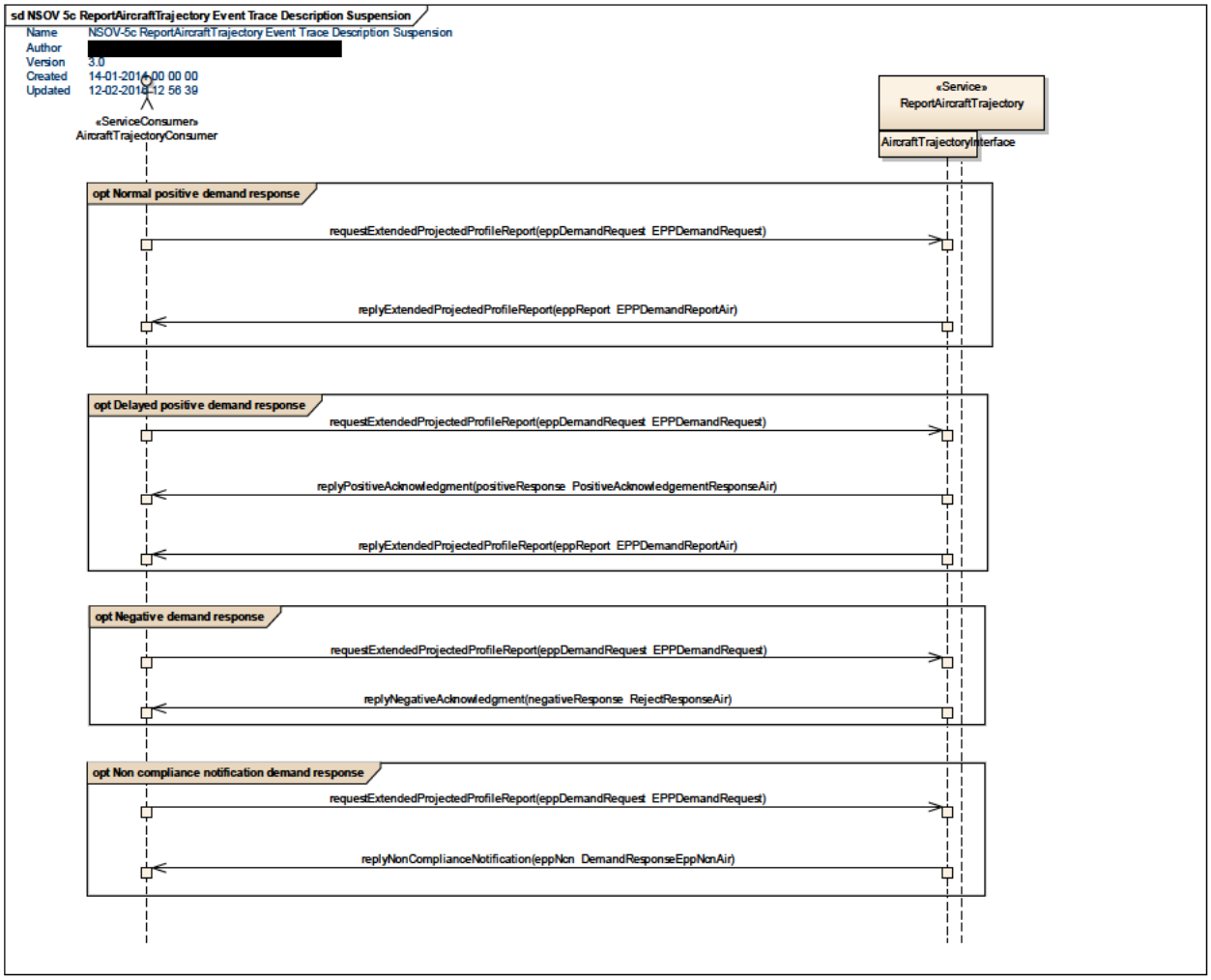

Figure 16 NSOV-5c ReportAircraftTrajectory service event-trace description demand

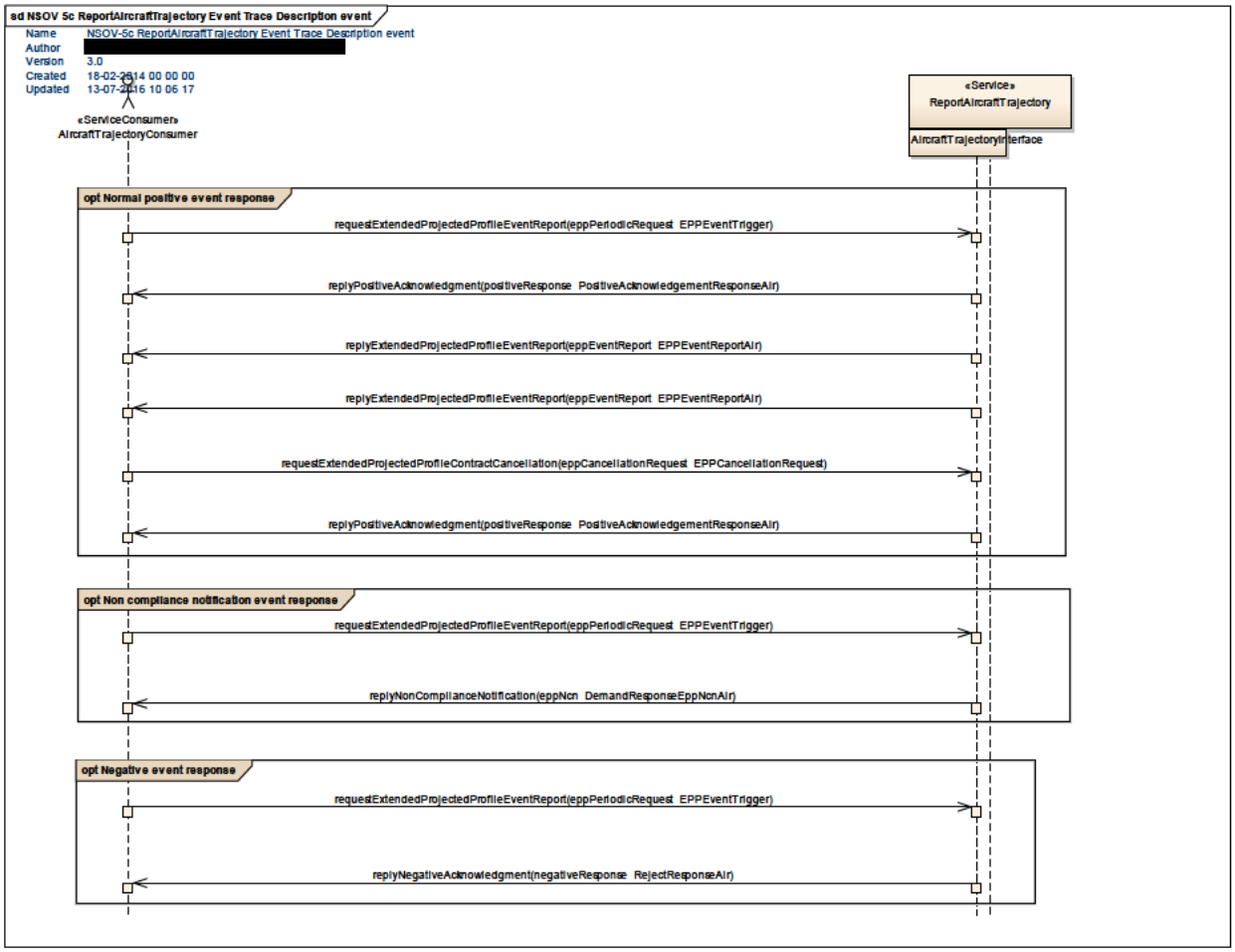

Figure 17 NSOV-5c ReportAircraftTrajectory service event-trace description event

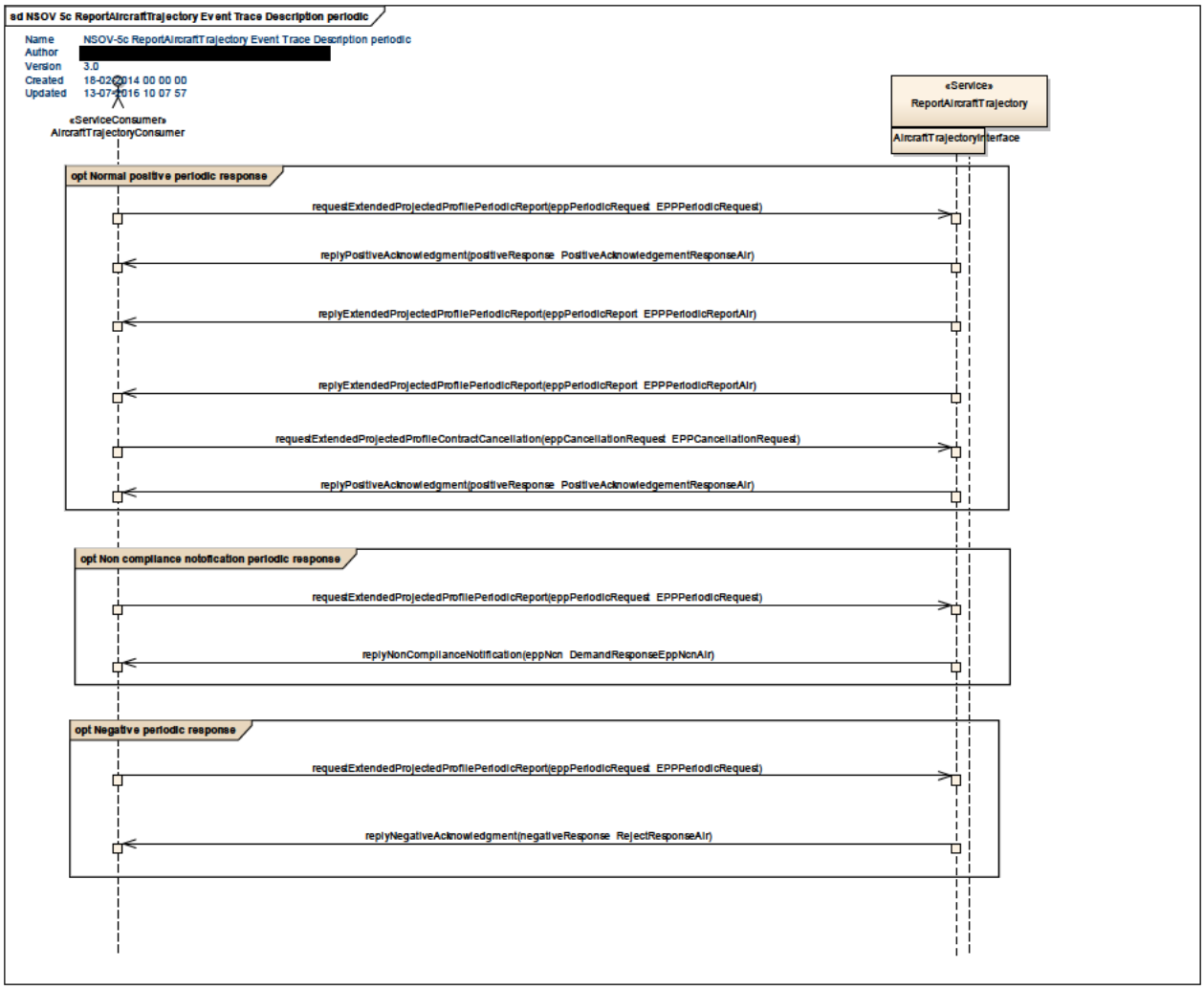

Figure 18 NSOV-5c ReportAircraftTrajectory service event-trace description periodic

7 Service provisioning (optional)

8 Validation and Verification

8.1 Verification

The verification of the service makes sure that the model was designed correctly. An automatic verification script ensures the modelling in the ISRM complies with:

1. The rules in the ISRM RuleBook (Ref [6]).
2. Verification from a business point of view: the service can be understood from an ATM point of view?
3. Verification of the service regarding the SOA principles.

8.1.1 Verification Results

The detailed findings, coming from execution of the verification scripts, are recorded in Verification_Report_ReportircraftTrajectory_Service file, located in the *D65 delivery package*.

8.2 Validation

The validation of a SOA service exercises the service in a prototype in the context of a validation exercise.

Two validation exercises covering the exchange of information covered by this service were performed in MUAC and NUAC (Swedish and Danish) airspace and focused on En-route and TMA aspects of i4D and Controlled Time of Arrival (CTA). Like most validation exercises in Step1, these exercises did not use the SWIM infrastructure and hence the service has not been validated.

References to these non-SWIM enabled validation exercises are given in [15] and [17].

9 References

Name	Version	Document ID / Location
[1] Project deliverables template	03.00.00	SJU templates & guidelines package, Project deliverables template
[2] SESAR Operational Service and Environment Definition	03.00.00	SJU templates & guidelines package, OSED template
[3] SESAR Safety and Performance Requirements	03.00.00	SJU templates & guidelines package, SPR template
[4] ISRM Tooling Guidelines	00.07.00	08.03.10 D44
[5] ISRM Modelling Guidelines	00.07.00	08.03.10 D44
[6] ISRM Foundation Rulebook	00.07.00	08.03.10 D44
[7] ISRM Verification Guidelines	00.07.00	08.03.10 D44
[8] European ATM Architecture (EATMA) Guidance Material v4	00.04.02	B.04.01 D66
[9] ISRM Service Portfolio	00.08.01	08.03.10 D65
[10] Step 1 OSED - Iteration 1	00.01.00	05.06.01 D058
[11] DEL05.02-M315 - Step 1 DOD Report - 2013 Update	00.01.00	05.02 D101
[12] RTCA SC-214/EUROCAE WG-78 Air Traffic Services Safety and Interoperability Requirements P/OICS – ADS-C – B3	H	FAA EUROCAE WG 78 ADS-C Requirements
[13] Initial Step 1 Technical Note	00.01.00	04.05 D101
[14] Phase 1 TMA Trajectory Management Framework Initial OSED	00.03.00	05.05.01 D01
[15] i4D+CTA Validation Report - Step A	00.02.00	04.03 D111
[16] EXE-05.06.01-VP-203 - Interim report	00.01.01	05.06.01 D060
[17] Validation Report of the I4D first flight to support Release 1 - issue01	01.01.00	09.01 D21-01
[18] European ATM Service Identification	00.01.02	08.03.07 D09-001

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