European ATM Service Description for the ReportAircraftETAMinMax Service

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Abstract

These services reflect 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 availability of IER from the P04.05 TN has also allowed these requirements to be captured and modelled.

The service identified covers the operations dealing with the request and publication of the ETA Min Max Report.
The service is called the ReportAircraftETAMinMax service, the service provides a report on the maximum and minimum times the flight can be over a specified point.
The user can also specify a period for which the same report will be repeatedly published until the contract is cancelled by the user.
This service enables ground based users to determine the limits by which a flight can be time constrained

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Executive summary

The service identified covers the operations dealing with the request and publication of the ETA Min Max Report.

The service is called the ReportAircraftETAMinMax service, the service provides a report on the maximum and minimum times the flight can be over a specified point.

The user can also specify a period for which the same report will be repeatedly published until the contract is cancelled by the user.

This service enables ground based users to determine the limits by which a flight can be time constrained.

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	ReportAircraftETAMinMax
ID	{069E5385-DCFD-4bce-ACDC-BDA113FEA2DF}
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 the identified operational and IER requirements used to define capability relating to downlink and Figure 2 shows those related to uplink.

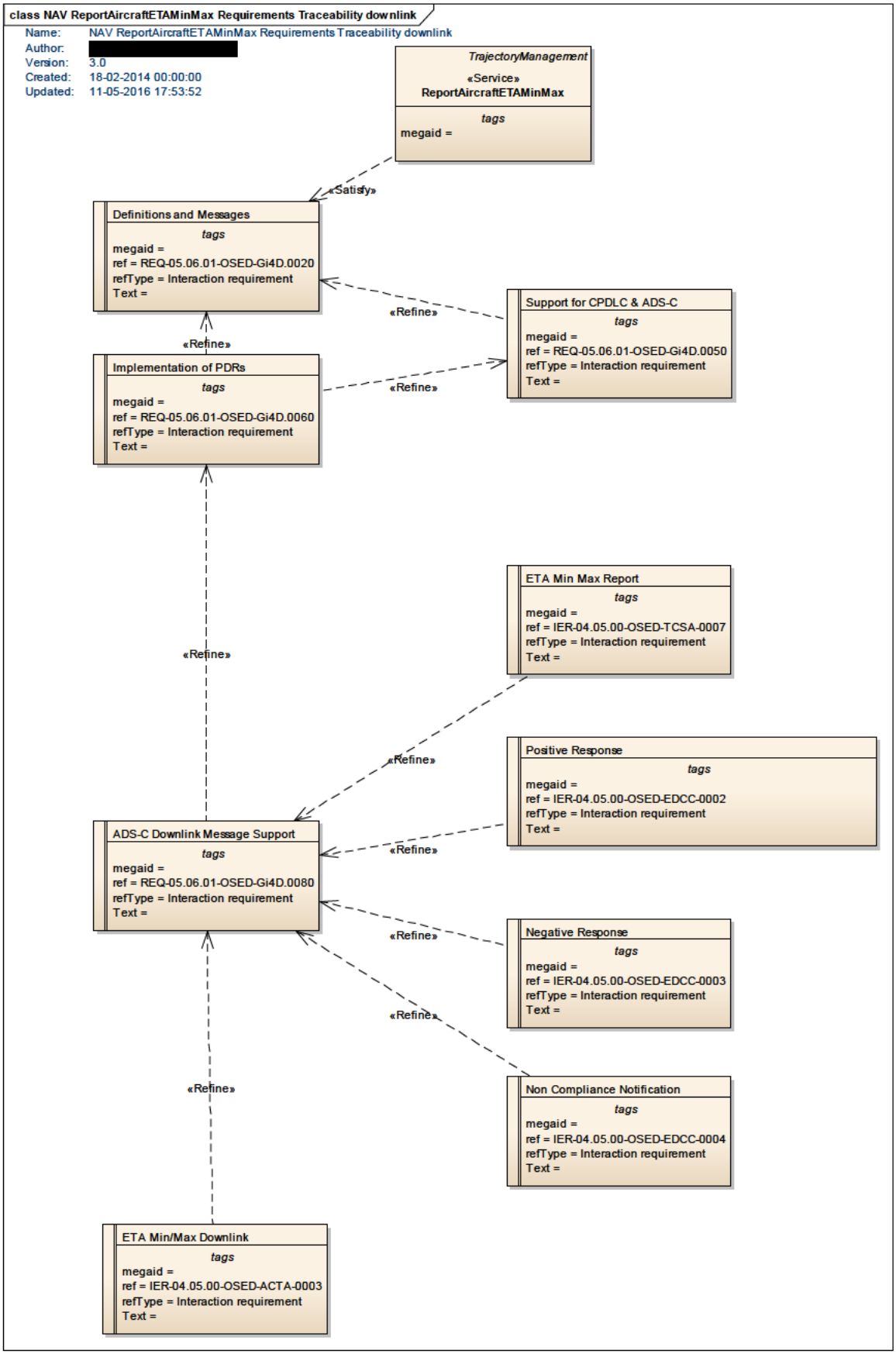

Figure 1 Service to Requirements Mapping Downlink

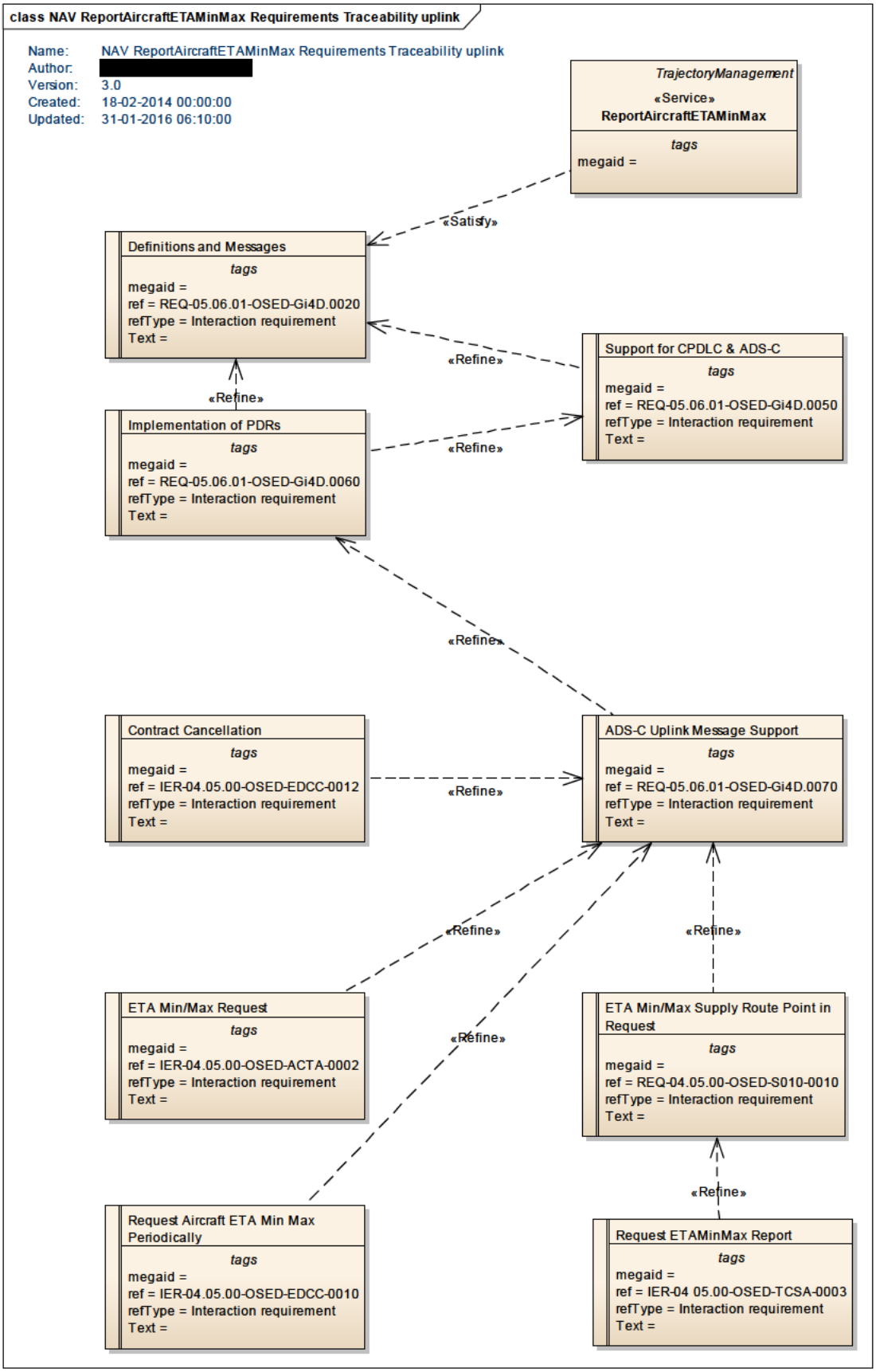

Figure 2 Service to Requirements Mapping Uplink

The requirements take from OSED 05.05.01 are given below:

Element Name	Author	Notes
ADS-C Downlink Message Support	[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
ADS-C Uplink Message Support	[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
Definitions and Messages	[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
ETA Min Max Report		[redacted]	The aircraft responds to the request by publishing its minimum and maximum times at the specified point on its trajectory.
	Element Tagged Value Name	**Value**	
	megaid		
	ref	IER-04.05-OSED-TCSA-0007	
	refType	Interaction requirement	
	Text		

Element Name		Author	Notes
ETA Min/Max Downlink		[redacted]	See Process for AMAN allocation of CTA.
	Element Tagged Value Name	**Value**	
	megaid		
	ref	IER-04.05-OSED-ACTA-0003	
	refType	Interaction requirement	
	Text		

Element Name		Author	Notes
ETA Min/Max Request		[redacted]	See Process for AMAN allocation of CTA.
	Element Tagged Value Name	**Value**	
	megaid		
	ref	IER-04.05-OSED-ACTA-0002	
	refType	Interaction requirement	
	Text		

Element Name		Author	Notes
ETA Min/Max Supply Route Point in Request		[redacted]	The service provider shall allow the user to request ETA Min/Max for a route point supplied by the user.
	Element Tagged Value Name	**Value**	
	megaid		
	ref	REQ-04.05.00-OSED-S010-0010	
	refType	Interaction requirement	
	Text		

Element Name	Author	Notes
Implementation of PDRs	[redacted]	On top of the Version H baseline the following PDRs **shall** be implemented: (PDR = Problem Description Report) • 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	Interaction requirement
	Text	

Element Name	Author	Notes
Request Aircraft ETA Min Max Periodically	[redacted]	The ground based user requests the maximum and minimum times the aircraft can be over the specified point on a regular periodic basis.

	Element Tagged Value Name	Value
	megaid	
	ref	IER-04.05-OSED-EDCC-0010
	refType	Interaction requirement
	Text	

Element Name	Author	Notes
Request ETAMinMax Report	[redacted]	The ground based user requests the maximum and minimum times the aircraft can be over the specified point.

	Element Tagged Value Name	Value
	megaid	
	ref	IER-04.05-OSED-TCSA-0003
	refType	Interaction requirement
	Text	

Element Name	Author	Notes
Support for CPDLC & ADS-C	[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	Interaction 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:

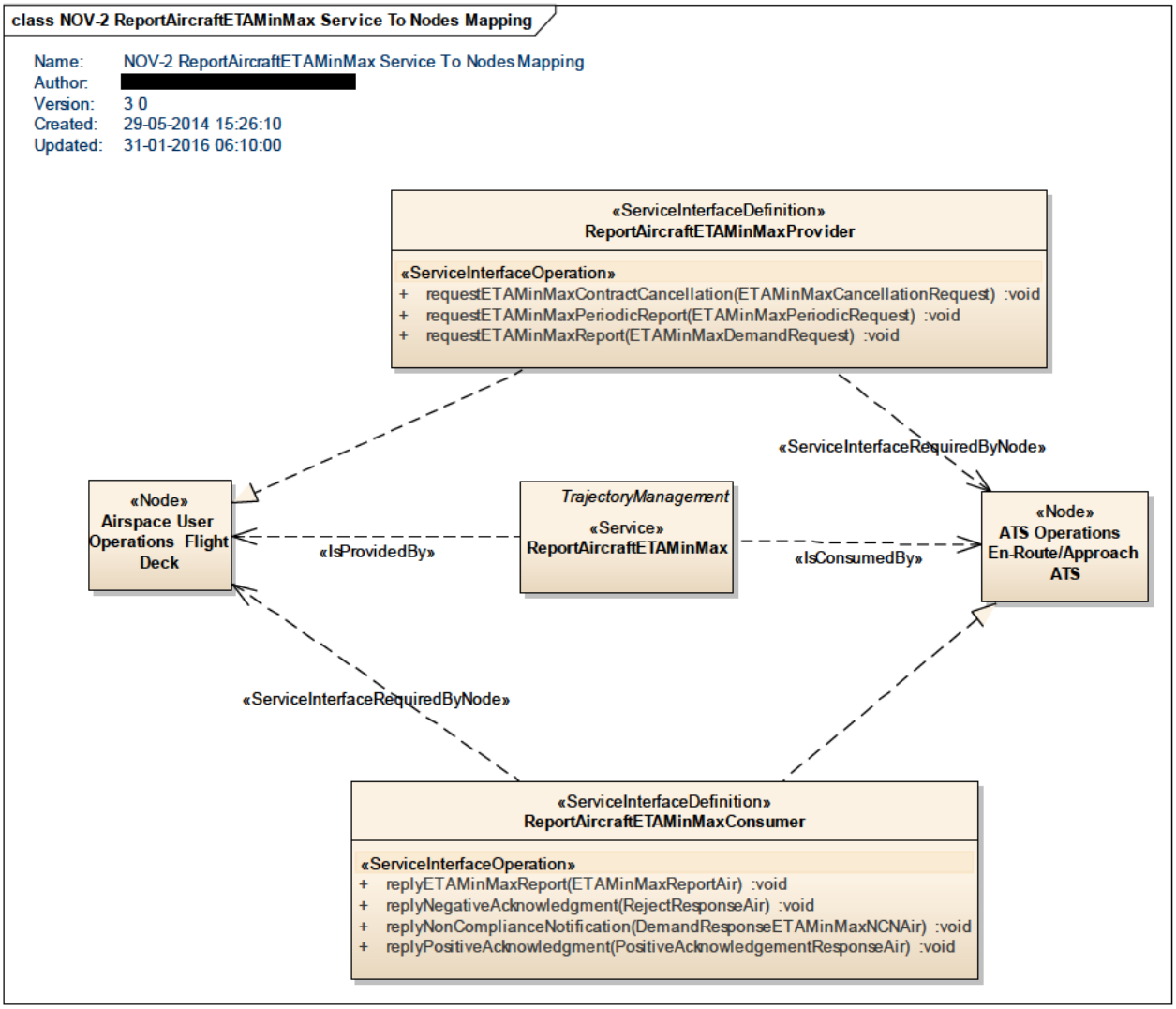

Figure 3: NOV-2 ReportAircraftETAMinMax Service to Nodes Mapping diagram

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 4. The service supports a number of operations which are described in more detail later in this document.

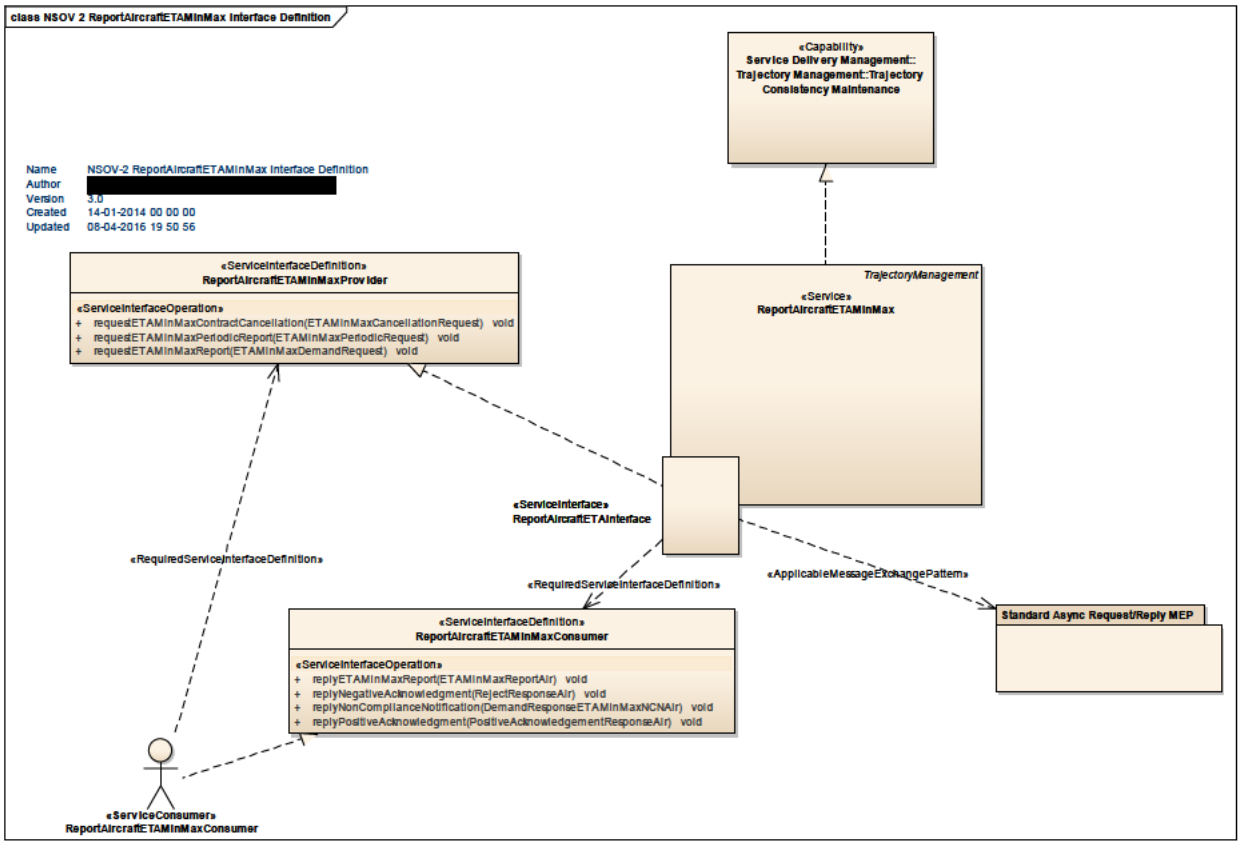

Figure 4 NSOV-2 Service Interface Overview

The NSOV-4 overview showing the interaction between Approach unit and aircraft in relation to the request and publication of an aircraft ETA Min Max report is shown in Figure 5

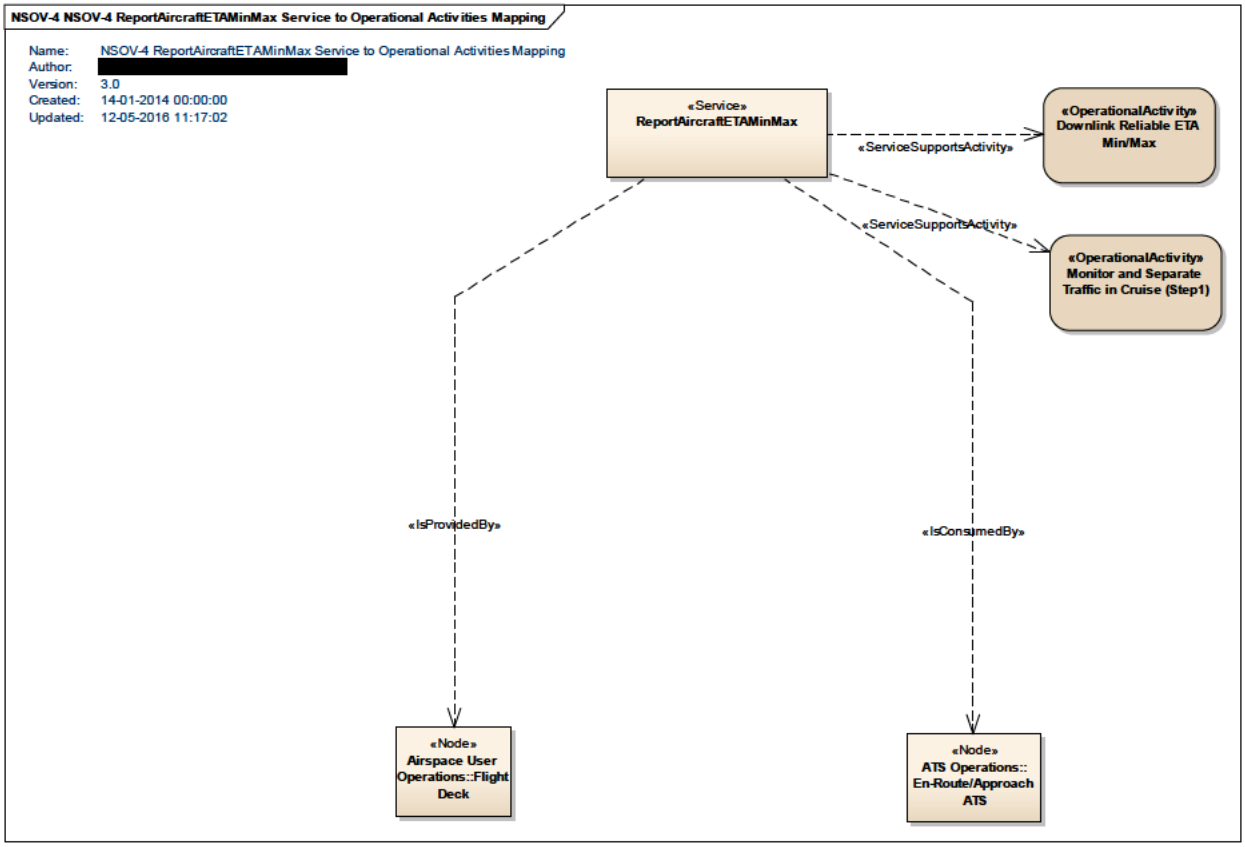

Figure 5 NSOV-4 Aircraft Trajectory Service to Operational Activities Mapping

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 4.

ServiceInterface	ServiceInterfaceDefinition	ServiceInterfaceOperation	Role
ReportAircraftETAInterface	ReportAircraftETAMinMaxProvider	requestETAMinMaxReport	provided
ReportAircraftETAInterface	ReportAircraftETAMinMaxProvider	requestETAMinMaxPeriodicReport	provided
ReportAircraftETAInterface	ReportAircraftETAMinMaxProvider	requestETAMinMaxContractCancellation	provided
ReportAircraftETAInterface	ReportAircraftETAMinMaxConsumer	replyETAMinMaxReport	required
ReportAircraftETAInterface	ReportAircraftETAMinMaxConsumer	replyPositiveAcknowledgment	required
ReportAircraftETAInterface	ReportAircraftETAMinMaxConsumer	replyNegativeAcknowledgment	required
ReportAircraftETAInterface	ReportAircraftETAMinMaxConsumer	replyNonComplianceNotification	required

Table 2: Service Interfaces

5 Service interface specifications

The interfaces of the ReportAircraftETAMinMax service are shown in Figure 4. They are described in more detail in the sections below.

5.1 Service Interface ReportAircraftETAInterface

5.1.1 Service Interface Definition ReportAircraftETAMinMaxProvider

The interface offers operations, to support the requesting of an ETAMinMax Report or to set up or cancel a periodic contract.

5.1.1.1 Operation RequestAircraftMinMaxReport

5.1.1.1.1 Operation Functionality

This operation enables the consumer to request of the publication of an Aircraft ETA Min Max report from the aircraft onboard systems. The user of the service supplies a unique identifier for the flight and the specific fix on the route of flight for which the 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, ETAMinMaxDemandRequest 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.

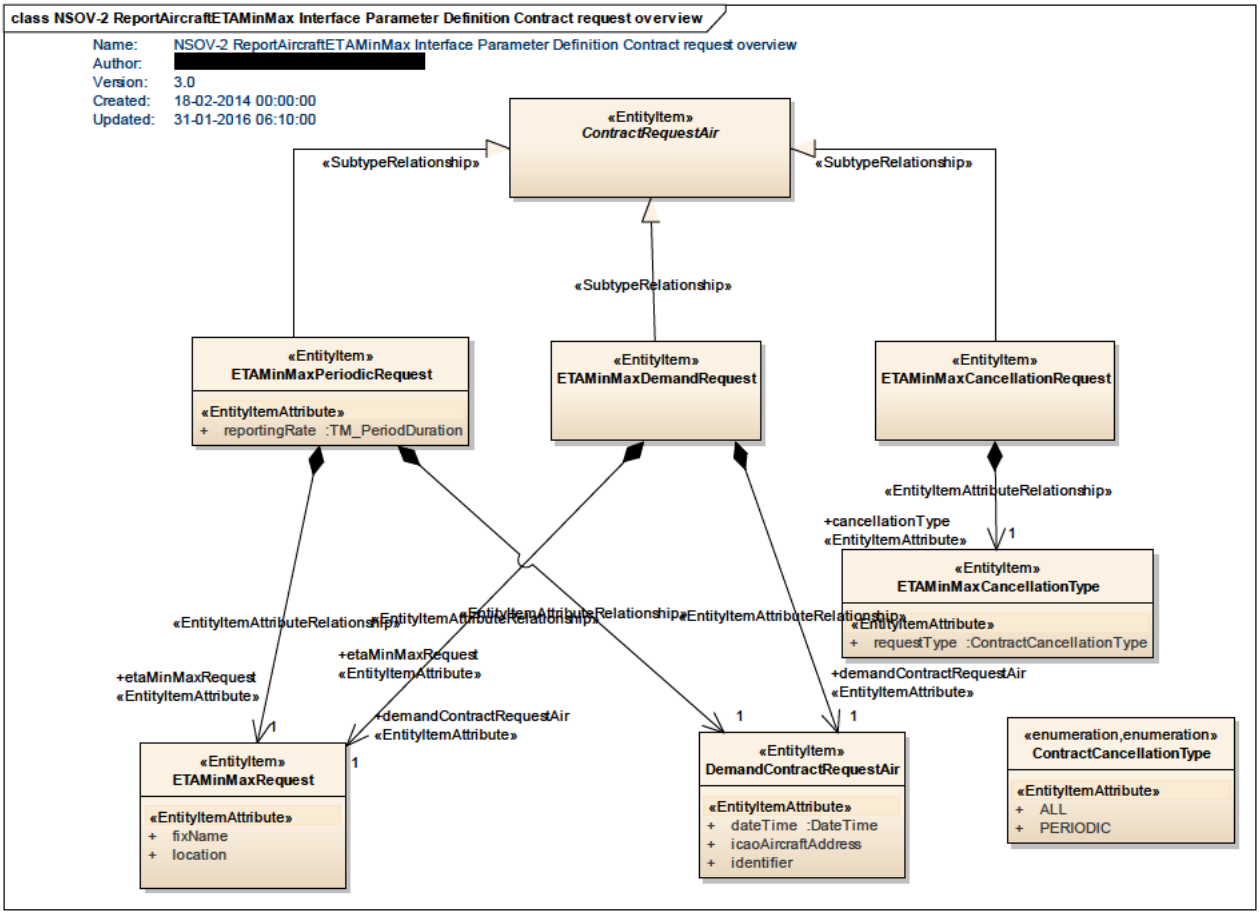

Figure 6 NSOV-2 ReportAircraftETAMinMax Interface Parameter Definition ETAMinMaxDemandRequest

Element Name	Author	Notes
ETAMinMaxDemandRequest	[redacted]	A class representing an ETA Min Max demand request. It is the class that contains the data defined in the standard for the request of an ETA Min Max set of times for the specified position or fix.

Element Name			Author	Notes
ETAMinMaxRequest			[redacted]	The parameters for a requested ETA Min Max report. It is the specified point for which the report is requested.
	Attribute Name	**Type**		**Notes**
	fixName			The position as named fix of the request to return the maximum and minimum times of arrival.
	Tagged Value Name	**Value**		
	CLDMSemanticTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:AirspaceInfrastructure:AirspacePoint:DesignatedPoint@name		
	Attribute Name	**Type**		**Notes**
	location			The position as named fix of the request to

Element Name			Author	Notes
ETAMinMaxRequest			[redacted]	The parameters for a requested ETA Min Max report. It is the specified point for which the report is requested.
	Attribute Name	Type		Notes
				return the maximum and minimum times of arrival.
	Tagged Value Name	Value		
	CLDMSemanticTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Surveillance:AircraftDerivedData@position		

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 RequestAircraftMinMaxPeriodicReport

5.1.1.2.1 Operation Functionality

This operation enables the consumer to request of the publication of an Aircraft ETA Min Max report from the aircraft onboard systems on a regular periodic basis. The user of the service supplies a unique identifier for the flight and the specific fix on the route of flight for which the report is requested. It also supplies the period for which the report is to be repeatedly published. The data related to the ADS-C contract session has been ignored at this logical level.

5.1.1.2.2 Operation Parameters

The input parameter message structure ETAMinMaxPeriodicRequest is shown in Figure 6. As can be seen the demand request is a specialisation of the ContractRequestAir, which includes other types of request for ADS-C services.

Element Name			Author	Notes
ETAMinMaxPeriodicRequest			[redacted]	A class representing an ETA Min Max periodic request. It is the class that contains the data defined in the standard for the request of an ETA Min Max set of times for the specified position or fix. A period is also supplied for the report to be repeated periodically.
	Attribute Name	**Type**		**Notes**
	reportingRate	TM_PeriodDuration		The interval between successive periodic reports.
	Tagged Value Name	**Value**		
	CLDMSemanticTrace	CLDM_out_of_scope		

Table 4: ETAMinMaxPeriodicRequest Mapping

5.1.1.3 Operation RequestAircraftMinMaxContractCancellation

5.1.1.3.1 Operation Functionality

This operation enables the consumer to request the cessation of an earlier periodic Aircraft ETA Max Min report contract. The user of the service supplies a unique identifier for the flight type of contract that is to be cancelled (the user is limited to periodic or all, both of which mean the same thing). The data related to the ADS-C contract session has been ignored at this logical level.

5.1.1.3.2 Operation Parameters

The input parameter message structure ETAMinMaxCancellationRequest is shown in Figure 6. As can be seen the demand request is a specialisation of the ContractRequestAir, which includes other types of request for ADS-C services.

Element Name	Author	Notes
ETAMinMaxCancellationRequest	[redacted]	A class representing the request to cancel an earlier ETA Min Max Report Contract. The request indicates the type of contract to cancel which may be periodic or all.

Element Name			Author	Notes
ETAMinMaxCancellationType			[redacted]	The class to identify the type of ETA Min Max contract to be cancelled.
	Attribute Name	**Type**		**Notes**
	requestType	ContractCancellationType		The type of contract to cancel, may be Periodic or All.
	Tagged Value Name	**Value**		
	CLDMSemanticTrace	CLDM_out_of_scope		

Table 5: ETAMinMAxCancellationRequest Mapping

5.1.2 Service Interface Definition ReportAircraftETAMinMaxConsumer

The interface offers a few operations, to receive the published report and other related responses.

5.1.2.1 Operation ReceiveETAMinMaxReport

5.1.2.1.1 Operation Functionality

This operation is provided by the consumer of the requested report to enable it to receive the report publication. Its payload is the ETAMinMaxReportAir which consists of the report containing the minimum and maximum times the aircraft can be over the specified point.

5.1.2.1.2 Operation Parameters

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

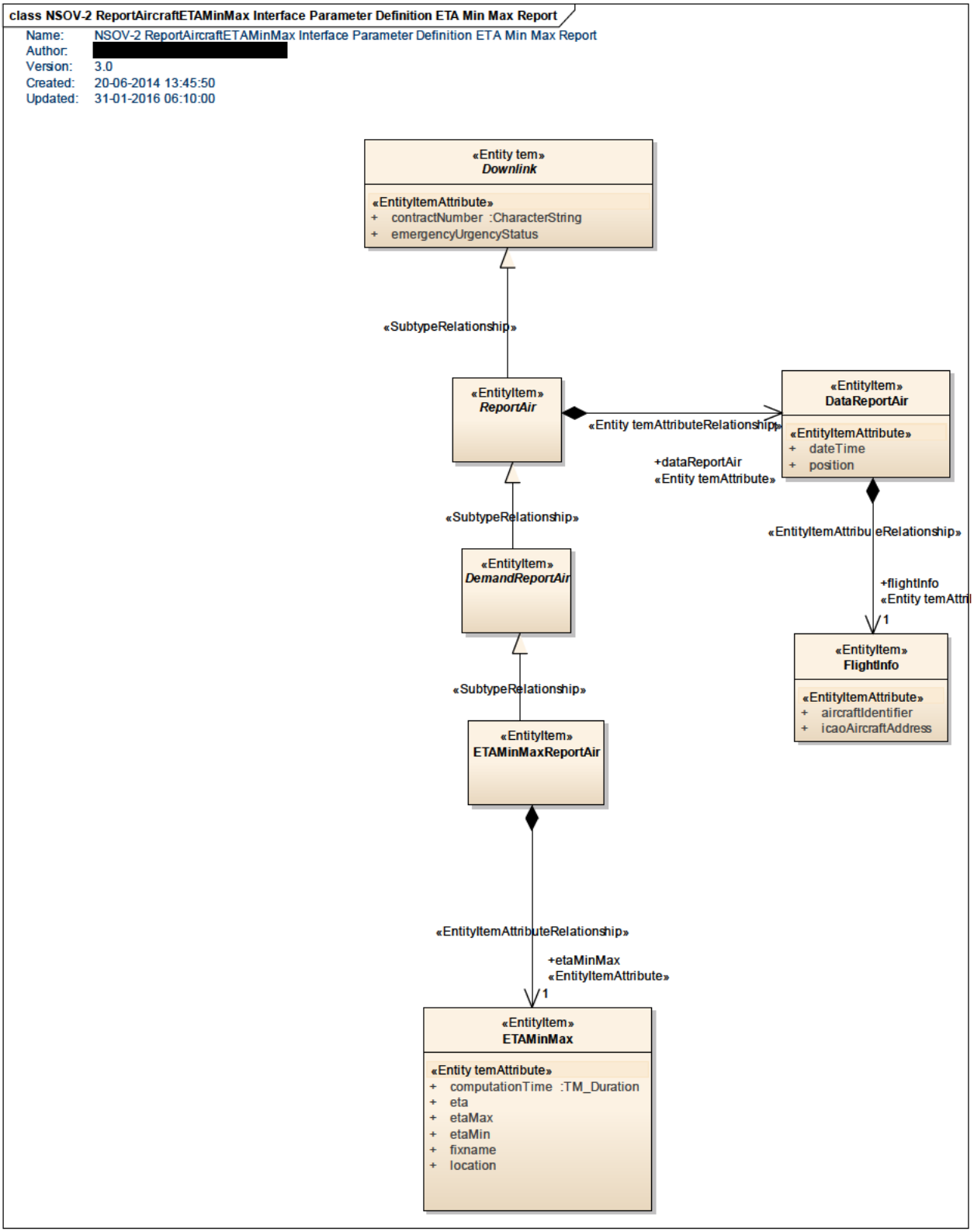

Figure 7 NSOV-2 ReportAircraftETAMinMax Interface Parameter Definition ETAMinMaxReportAir

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	

Element Name	Author	Notes
FlightInfo	[redacted]	A class to represent flight information which is used to uniquely identify the airframe from a ground perspective.

	Attribute Name	Type	Notes
	aircraftIdentifier		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	
	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

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

Element Name	Author	Notes
ETAMinMax	[redacted]	The optional ETA Min Max contains the data related to the maximum and minimum times the flight can be over the specified constraint point (this may be the arrival airport or some other enroute fix). The times can be achieved anyway the pilot and FMS want to achieve them, this may include having to descend if the speed required is not commensurate with the cruise level.

Element Tagged Value Name	Value
IMDefinitionTrace	ses:sesarju:airm:v400:InformationModel:SubjectFields:AirTrafficOperations:InformationServicesProducts:SurveillanceInformationProduct:ETAMinMax

Attribute Name	Type	Notes
computationTime	TM_Duration	The computational time for the ETA. Type : TM_Duration

Tagged Value Name	Value
CLDMSemanticTrace	CLDM_out_of_scope

Attribute Name	Type	Notes
eta		The nominal estimated time of arrival at the specified location.

Tagged Value Name	Value
CLDMContextTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Common:Codelists:CodePlanningStatusType@ESTIMATED
CLDMSemanticTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Flight:FlightEvent:OverPoint@time

Attribute Name	Type	Notes
etaMax		The maximum (latest) time the aircraft can be at the requested point. NOTE: Max ETA is not yet modelled in AIRM.

Tagged Value Name	Value
CLDMContextTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Common:Codelists:CodePlanningStatusType@ESTIMATED
CLDMSemanticTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Flight:FlightEvent:OverPoint@time

Attribute Name	Type	Notes

	etaMin		The minimum (earliest) time the aircraft can be at the requested point type: DateTime

Tagged Value Name	Value
CLDMContextTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Common:Codelists:CodePlanningStatusType@MINIMUM
CLDMSemanticTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Flight:FlightEvent:OverPoint@time

Attribute Name	Type	Notes
fixname		The optional name of the identified location for which the ETA is requested.

Tagged Value Name	Value
CLDMSemanticTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:AirspaceInfrastructure:AirspacePoint:TrajectoryPoint@designator

Attribute Name	Type	Notes
location		The location (lat / long) of the point for which the ETA was requested.

Tagged Value Name	Value
CLDMSemanticTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Surveillance:AircraftDerivedData@position

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 6: ETAMinMaxReportAir linkage

5.1.2.2 Operation ReceivePositiveAcknowledgment

5.1.2.2.1 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. It is also issued in response to a Contract Cancellation Request

5.1.2.2.2 Operation Parameters

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

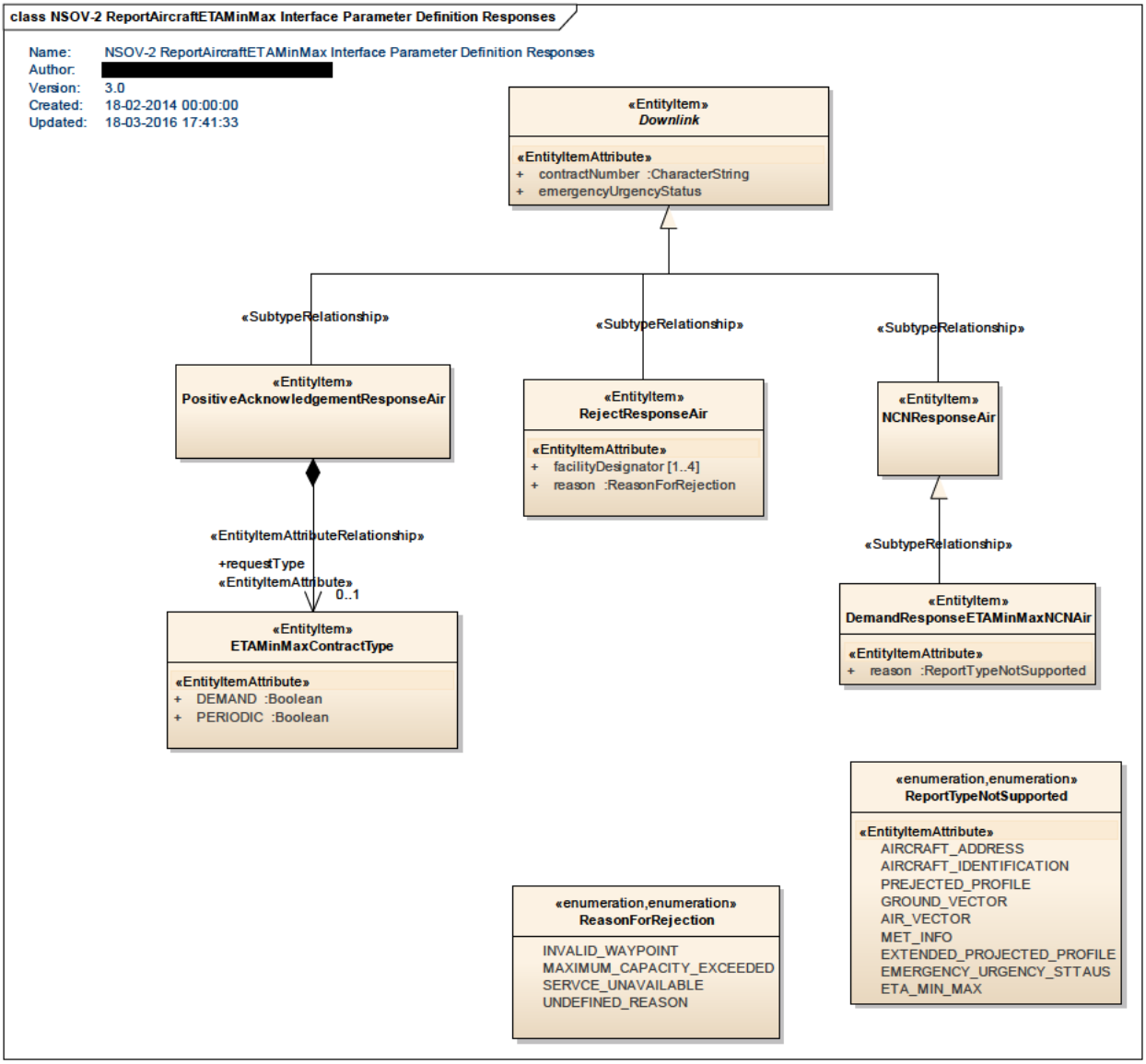

Figure 8 NSOV-2 ReportAircraftETAMinMax Interface Parameter Definition Possible Response

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
DemandResponseETAMinMaxNCNAir	[redacted]	A class representing a NonCompliance Response supplied by an air system. It indicates that the previous ETA Min Max Demand request can not be conformed with and supplies justification.

	Attribute Name	Type	Notes
	reason	ReportTypeNotSupported	reason for NCN rejection.

	Tagged Value Name	Value
	CLDMSemanticTrace	CLDM_out_of_scope

Table 7: Possible Response AIRM Linkage

5.1.2.3 Operation ReceiveNegativeAcknowledgment

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

5.1.2.3.2 Operation Parameters

The input parameter input parameter message structure RejectResponseAir is shown in Figure 8 and the associated AIRM linkage in Table 7.

5.1.2.4 Operation ReceiveNonComplianceNotification

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 Non Conformance Notification to its request. Its payload is the DemandResponseETAMinMaxNCNAir which consists of an indicator that the requested report is not supported by the aircraft systems.

The response is issued when the aircraft systems determine that the request is not supported. 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.

5.1.2.4.2 Operation Parameters

The input parameter message structure DemandResponseETAMinMaxNCNAir is shown in Figure 8 and the associated AIRM linkage in Table 7.

6 Service dynamic behaviour

6.1 Service Interface ReportAircraftETAInterface

There are no planned or envisaged service orchestration between the defined services and any others in the service catalogue. The expected usage of the defined demand service operations is shown below in Figure 9.

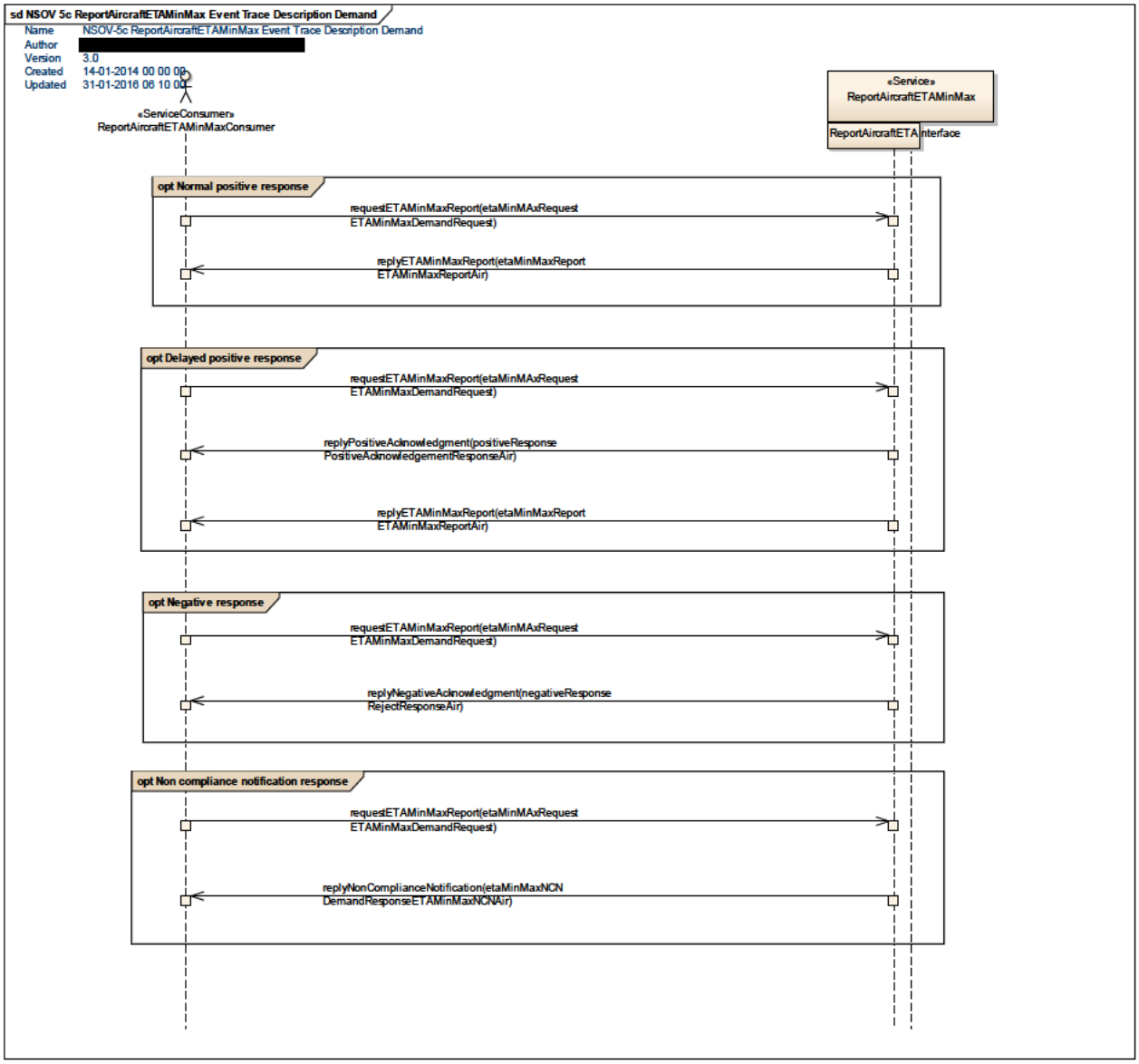

Figure 9 NSOV-5c Service Interfaces Demand

The expected usage of the defined periodic service operations is shown below in Figure 9.

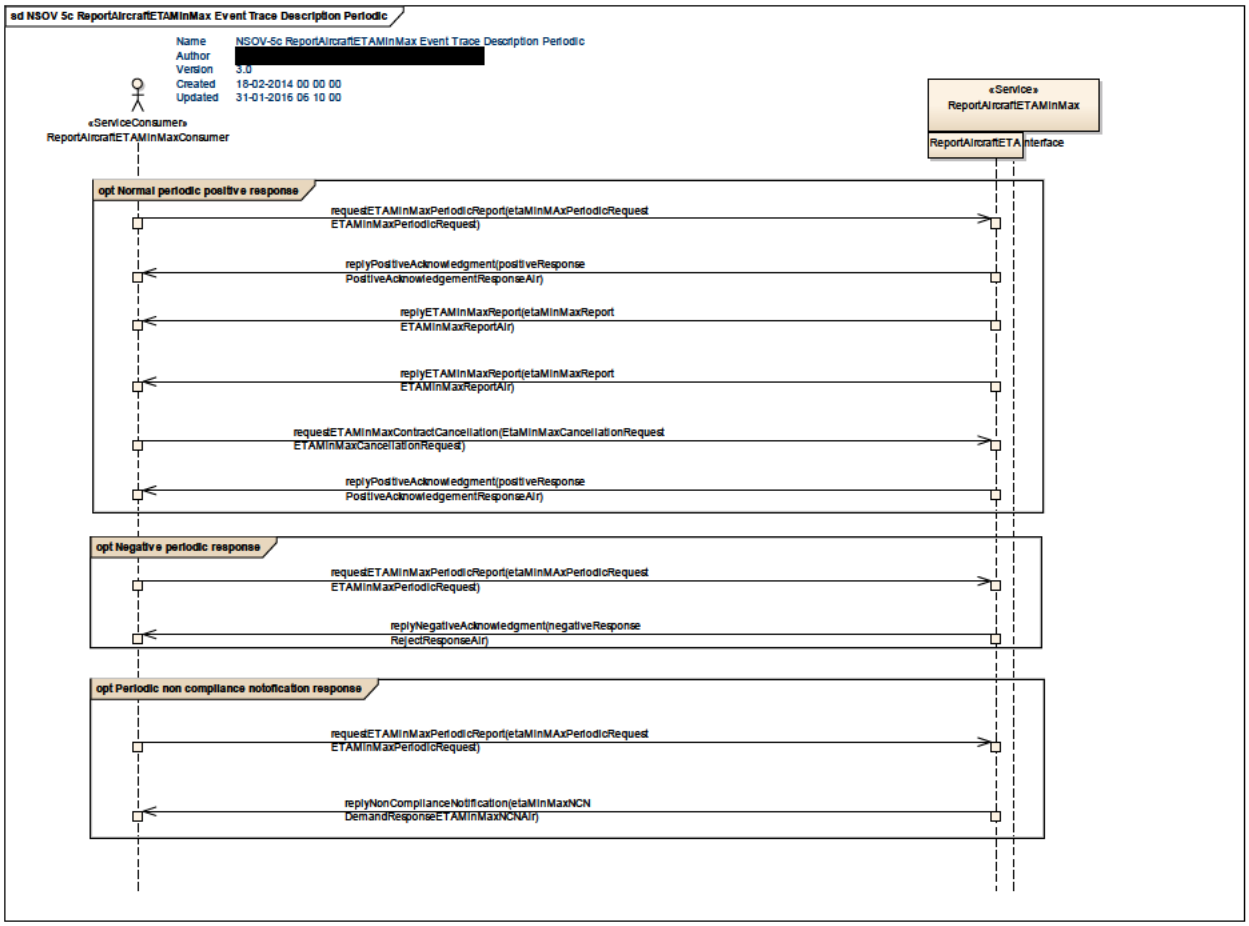

Figure 10 NSOV-5c Service Interfaces Periodic

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_ReportAircraftETAMinMax_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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