European ATM Service Description for the CalculatedPreDepartureSequenceDelivery Service

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Abstract

This document describes the service "Calculated Pre-Departure Sequence Delivery". It is the result of the "Service Design" step of the B.4.3 Working Method on Services. Service design has been performed in the context of Service Activity FT10 entailing Airport Collaborative Decision Making services.
The Calculated*PreDepartureSequenceDelivery* service supports the Airport CDM concept and its implementation by providing the Pre-Departure sequencer the capability to deliver the calculated TSAT and TTOT time values.

Authoring & Approval

Prepared By - *Authors of the document.*		
Name & Company	Position & Title	Date
[redacted] EUROCONTROL	[redacted]	12/04/2016
[redacted] EUROCONTROL		22/10/2014

Reviewed By - *Reviewers internal to the project.*		
Name & Company	Position & Title	Date
[redacted] DFS	[redacted]	03/11/2014
[redacted] NORACON		10/11/2014
[redacted] NATMIG		12/11/2014
[redacted] SEAC		03/05/2016
[redacted] NORACON		26/04/2016

Reviewed By - *Other SESAR projects, Airspace Users, staff association, military, Industrial Support, other organisations.*		
Name & Company	Position & Title	Date
[redacted] FINMECCANICA	[redacted]	27/11/2014
[redacted] SEAC		11/05/2016

Approved for submission to the SJU By - *Representatives of the company involved in the project.*		
Name & Company	Position & Title	Date
[redacted] NORACON	[redacted]	31/05/2016
[redacted] NORACON		31/05/2016

Rejected By - *Representatives of the company involved in the project.*		
Name & Company	Position & Title	Date
Name / Company	*<Position / Title>*	*DD/MM/YYYY*

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Table of Contents

List of tables

List of figures

Executive summary

This document describes the service “Calculated Pre-Departure Sequence Delivery. It is the result of the “Service Design” step of the B.4.3 Working Method on Services. The Service design has been performed in the context of Service Activity FT10 entailing Airport Collaborative Decision Making services.

The *CalculatedPreDepartureSequenceDelivery* service supports the Airport CDM concept and its implementation by providing the Pre-Departure sequencer the capability to deliver the calculated TSAT and TTOT time values.

FT10 was based on IP1- A-CDM. The activity has happened in the frame of OFA5.1.1 (WP6 and WP12). The work has been performed in joint collaboration with the AACO project of the ACI ACRIS working group.

The design complies with the ISRM Foundation.

1 Introduction

1.1 Purpose of the document

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

The service description document is also the foundation material for the standardisation process.

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.

1.3 Inputs from other projects

Operational requirements are derived from IP1 A-CDM [10].

1.4 Glossary of terms

No terms beyond the ones accepted by SESAR have been identified yet.

1.5 Acronyms and Terminology

1.5.1 Acronyms

Term	Definition
AACO	ACRIS Airport CDM Operational project
A-CDM	Airport Collaborative Decision Making
ACGT	Actual Commencement of Ground Handling Time
ACI	Airport Council International
ACISP	Airport CDM Information Sharing Platform
ACRIS	Airport Community Recommended Information Services
ACZT	Actual Commencement of De-icing Time
ADD	Architecture Description Document
AEZT	Actual End of De-icing Time
AIBT	Actual In-Block Time
AIDX	Aviation Information Data Exchange

Term	Definition
AIRM	Aeronautical Information Reference Model
ALDT	Actual Landing Time
AOBT	Actual Off-Block Time
ARDT	Actual Ready Time (for Movement)
ARZT	Actual Ready for De-icing Time
ASAT	Actual Start Up Approval Time
ASBT	Actual Start Boarding Time
ASRT	Actual Start Up Request Time
ATM	Air Traffic Management
ATOT	Actual Take Off Time
ATS	Air Traffic Services
CDM	Collaborative Decision Making
CLDM	Consolidated Logical Data Model
CSA	Common Situational Awareness
CTOT	Calculated Take Off Time
EATMA	European Air Traffic Management Architecture
E-ATMS	European Air Traffic Management System
ECZT	Estimated Commencement of De-icing Time
EDIT	Estimated De-icing Time
EEZT	Estimated End of De-icing Time
EIBT	Estimated In-Block Time
ELDT	Estimated Landing Time
EOBT	Estimated Off-Block Time
ERZT	Estimated Ready for De-icing Time
EXOT	Estimated Taxi-Out Time
FAA	Federal Aviation Administration
GUFI	Globally Unique Flight Identifier

Term	Definition
IATA	International Air Transport Association
ICAO	International Civil Aviation Organisation
IER	Information Exchange Requirement
IFPL	Individual Flight Plan message
IFPS	Integrated Initial Flight Plan Processing System
ISRM	Information Service Reference Model
MEP	Message Exchange Pattern
MG	ISRM Modelling Guidelines
NAF	NATO Architecture Framework
NAV	NATO All View
NFR	Non-Functional Requirement
NOV	NATO Operational View
NSOV	NATO Service Oriented View
NSV	NATO System View
OSED	Operational Service and Environment Definition
QoS	Quality of Service
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.
SIBT	Scheduled In-Block Time
SID	Standard Instrument Departure
SJU	SESAR Joint Undertaking (Agency of the European Commission)
SJU Work Programme	The programme which addresses all activities of the SESAR Joint Undertaking Agency.
SoaML	Service Oriented Architecture Modelling Language
SOBT	Scheduled Off-Block Time
SWIM	System Wide Information Management

Term	Definition
TOBT	Target Off-Block Time
TSAT	Target Start Up Approval Time
TTOT	Target Take Off Time
UFI	Unique Flight Identifier
UML	Unified Modelling Language
V&V	Validation and Verification
WSDL	Web Services Definition Language
XSD	XML Schema Definition

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

1.6 Introduction to the A-CDM Services

1.6.1 Joint Service Activity

The Service Activity concerns IP1 A-CDM which OFA 05.01.01 considers as the baseline for future concepts on Airport Operations Management.

Airport CDM is about partners (airport operators, aircraft operators/ground handlers, ATC and the Network Operations) working together more efficiently and transparently, with a special focus on information sharing. These A-CDM Partners often have their own information systems, which must be integrated in order to support the A-CDM processes. There is a need for establishing modern techniques and standardisation across the industry for maximising the benefits of the automation required at each airport, using approaches like Service Oriented Architecture (SOA), web services, and XML data exchanges that are known to help and support interoperability.

The designed A-CDM services result from a joint service activity between SESAR and ACI. Within ACI (Airport Council International), the ACRIS (Airport Community Recommended Information Services) working group had set up the project AACO (ACRIS Airport CDM Operational project). Within SESAR the Service Coordination Group had set up the FT10 Service Activity.

As AACO and FT10 were quite similar, it was decided to run a joint service activity, with common objective, scope and deliverable. This joint service activity has been run with close and effective collaboration, following the SESAR Method on Services.

The main driver of the service activity is to enable all European CDM-Airports to provide the same re-usable services to Airlines, Ground Handlers and ATCs for A-CDM information sharing.

The focus is on airlines for getting an overview of their flights across Europe plus being able to update TOBT for several airports with the same interface. Additional Focus: OFA5.1.1 and SESAR (DMAN etc.) driven, pre-departure sequencing is a fundamental SESAR concept that needs TSAT and TTOT.

As a consequence the scope has been defined as

- Publication of information to enable Common Situational Awareness (CSA) for inbound flights, outbound flights and corresponding CDM flight alerts.
- Updating of key time values for turnarounds (TOBT) and outbound flights (TSAT and TTOT).

Out of scope:

- Inbound updates (ELDT, EIBT): Out of scope since it may not fit into the focus areas. If there is enough reason to decide it is in scope of the focus area, there may be a possible extension later on.
- Actual timestamps. As there are many different sources at different airports, there is little potential for reuse. If there is enough reason to decide it is in scope of the focus area, there may be a possible extension later on.
- Communication with the Flight Crew

- For all elements out-of-scope there is no recommended practice on how to implement it. Information exchanges with the Network Manager are part of SVA001 on AOP/NOP Integration.

1.6.2 Overview of the AirportCDM services

1.6.2.1 Taxonomy

In the scope of the work, four A-CDM services have been identified. Each of these services is defined as a specialisation of the abstract AirportCDM Service

The following diagram describes the service taxonomy of the AirportCDM services.

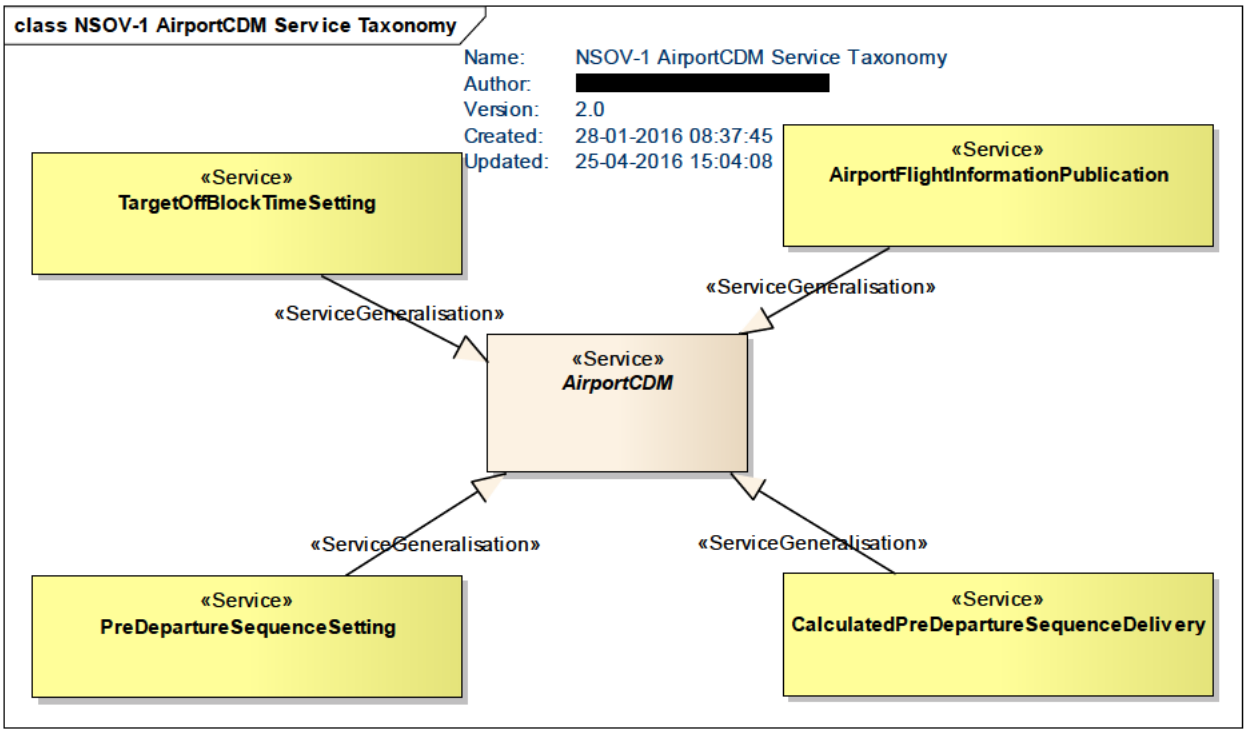

Figure 1 NSOV-1 AiportCDM Service Taxonomy

1.6.2.2 Services in Operational Node context

The following diagram describes the operational nodes interaction for the four A-CDM services, in which the Airport OPS Support node is providing the four services and the other nodes are consuming some of the services.

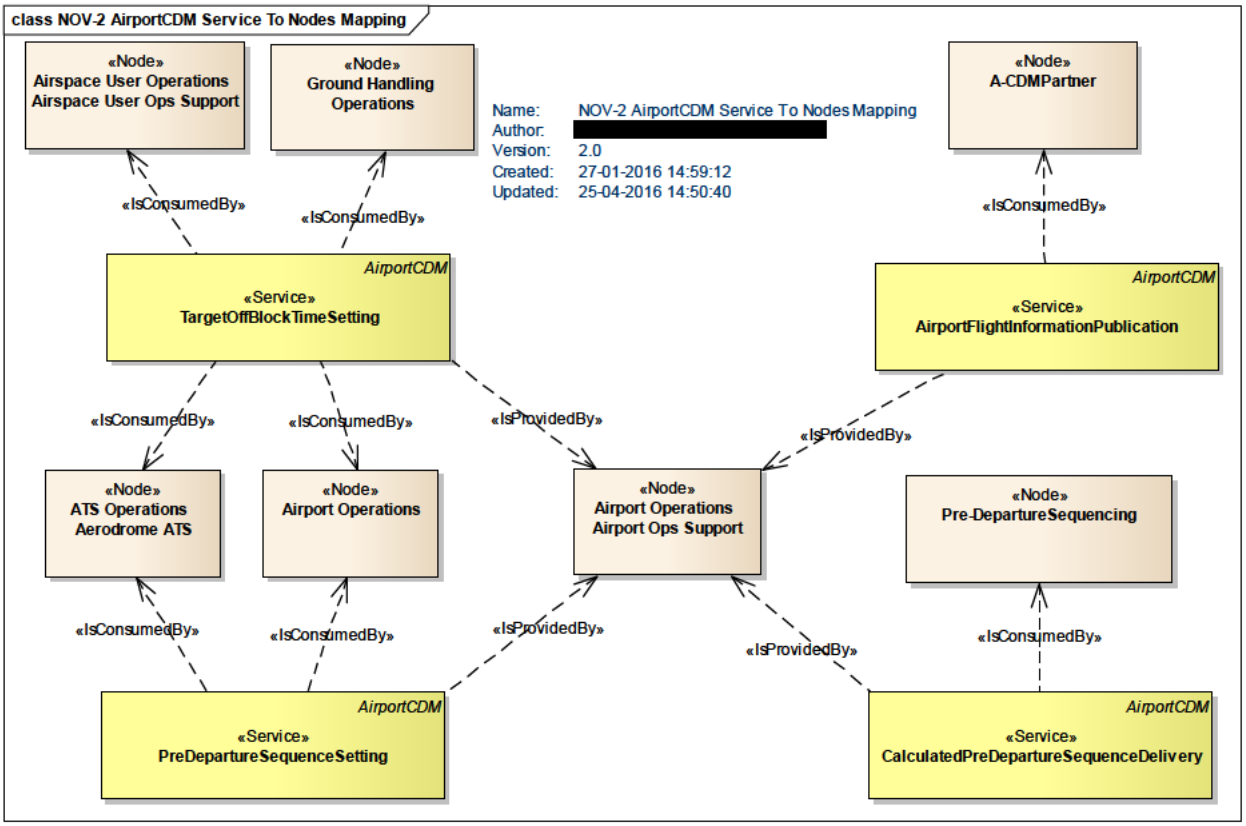

Figure 2 NOV-2 AirportCDM Service to Node Mapping

1.6.2.3 Overview with Interfaces and Operations

Each service is fully detailed in its own Service Description Document (SDD).

The rest of this section provides an overview of the services (name, interfaces and operations) in table and diagram format.

Service	Service Interface Definition	Operation
AirportFlightInformationPublication	AirportFlightInformationPublisher	subscribeInboundFlight
		subscribeOutboundFlight
		subscribeFlightAlert
		unsubscribeInboundFlight
		unsubscribeOutboundFlight
		unsubscribeFlightAlert
	AirportFlightInformationSubscriber	publishInboundFlight
		publishOutboundFlight
		publishFlightAlert
TargetOffBlockTimeSetting	TOBTSettingReceiver	setTOBT
		deleteTOBT
PreDepartureSequenceSetting	PreDepartureSequenceSettingReceiver	setTSAT
		setTTOT
CalculatedPreDepartureSequenceDelivery	CalculatedPreDepartureSequenceListener	postTSAT
		postTTOT

Table 1 Summary table of the AirportCDM services

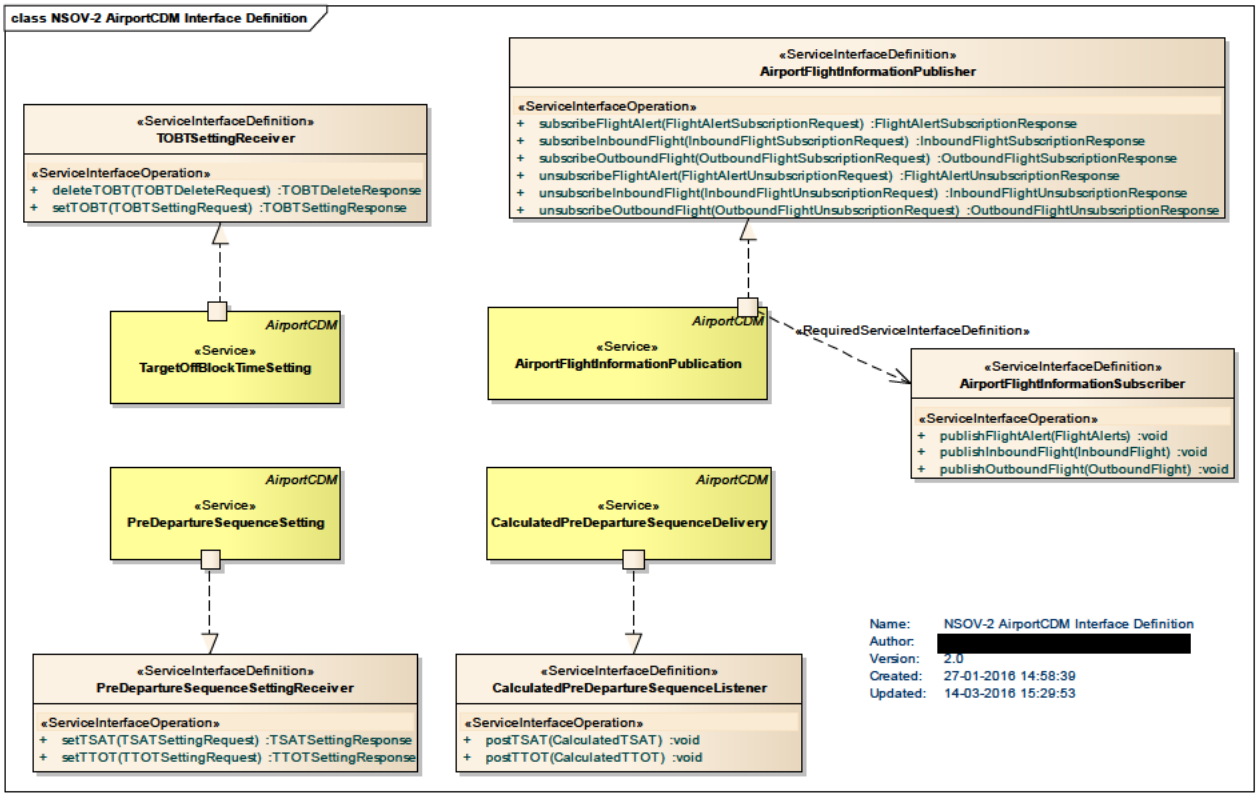

Figure 3 NSV-12 AirportCDM Interface Definition

1.6.2.4 Services in System context

The following diagram describes the service provision of the A-CDM services in which Airport CDM Information Sharing Platform (ACISP) is the provider for all four services. It also shows which system is potentially a consumer for each of the services

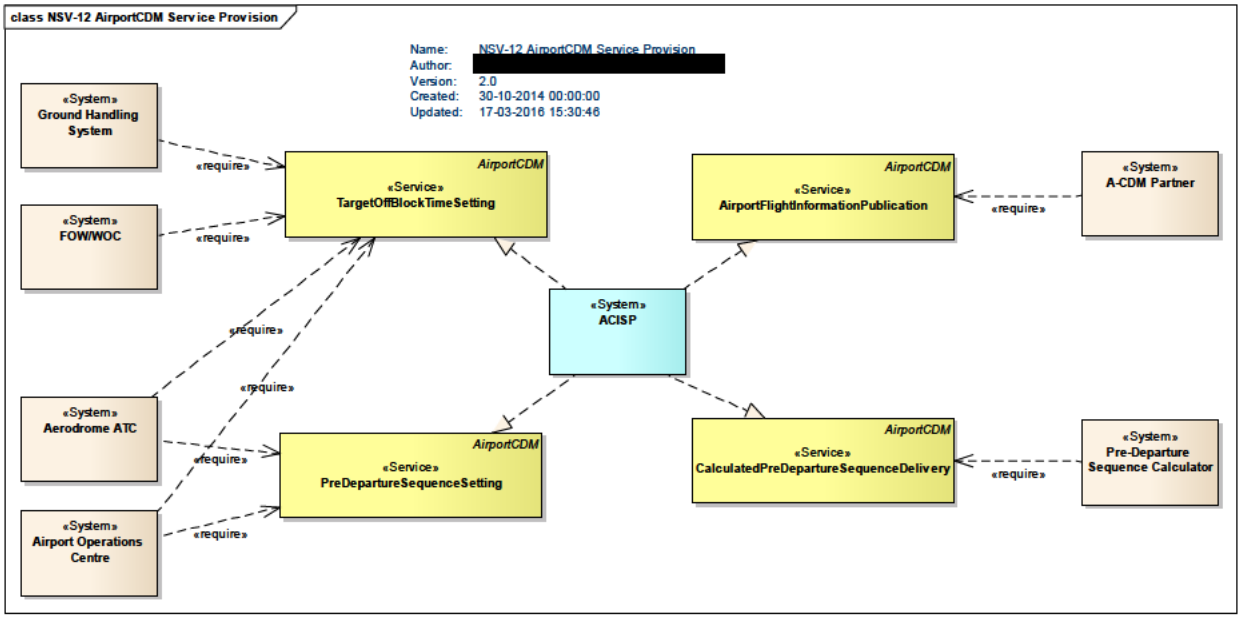

Figure 4 NSV-12 AirportCDM Service Provision

1.6.3 Beyond Service Design

Interoperability is not only about services, it also concerns the exchange standard used to encode and structure exchanged information. Both SESAR SWIM and ACI ACRIS favour the use of XML standards for data exchange.

For exchanging flight information, which is the scope of the A-CDM services two XML standards have been identified: AIDX and FIXM. The Aviation Information Data Exchange (AIDX) is a mature exchange standard, developed by IATA and supported by ACI. AIDX is being used operationally. The Flight Information Exchange Model (FIXM), still under development, is supported by the international ATM community, with players such as EUROCONTROL, FAA, SESAR, and Airservices Australia, among others.

Both FIXM and AIDX were recognised as valid candidates for encoding the service payload of the A-CDM services implementation instances. However, depending on the nature of the A-CDM partner, e.g. ATC Tower or Ground Handler, FIXM or AIDX might seem more “natural”.

The decision taken is to allow for both options, SESAR prototypes will experience the A-CDM services with FIXM, while ACRIS prototypes will do so with AIDX. This would not only provide feedback on both approaches, it also might help learning in bridging them.

As FIXM in its current development status does not support all data elements required for the A-CDM services, the FIXM extension mechanism has been used to close the gap. This has resulted in the “Europe A-CDM FIXM Extension v1.0” for FIXM 2.0 which is publicly available at www.fixm.aero.

2 Service identification

Name	CalculatedPreDepartureSequenceDelivery
ID	{AA9C50F8-74BF-4eaf-877C-1B94C2142BAE}
Version	2.0
Keywords	Airport, CDM, Time event
Architect(s)	[redacted] (EUROCONTROL)

Lifecycle status	Date	References
Identified	08/11/2013	See reference [11]
Allocated	19/12/2013	See reference [12]
Designed	28/11/2014	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

A-CDM explicitly foresees time values to be automatically calculated from other available information. This service addresses the automatic calculation of the TSAT and TTOT by a Pre-Departure Sequencer (PDS). It is not required as a service when the PDS and the ACISP are collocated.

The calculated value is simply posted. No response is expected.

In the current scope, Calculated Pre-Departure Sequence Delivery includes TSAT and TTOT.

3.1 Information Exchange Requirements

The following diagram describes the information exchange requirements that the *CalculatedPreDepartureSequenceDelivery* service is satisfying:

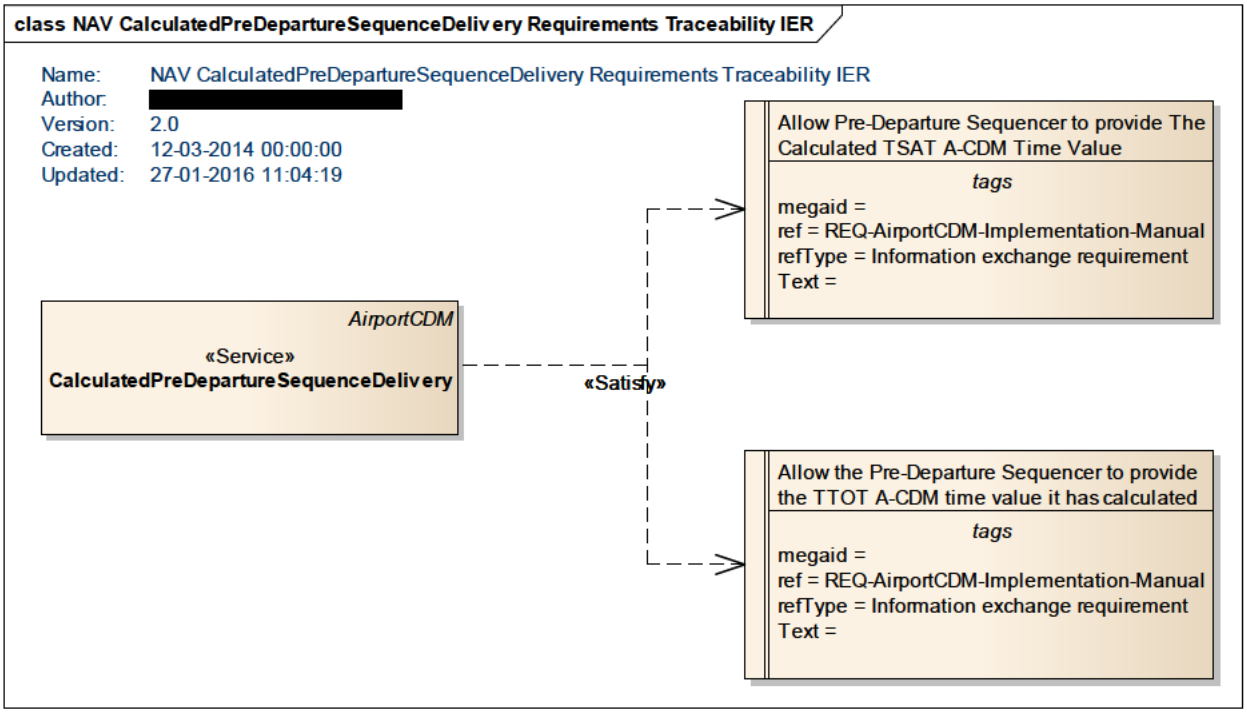

Figure 5: NAV *CalculatedPreDepartureSequenceDelivery* Requirements Traceability IER diagram

The *CalculatedPreDepartureSequenceDelivery* service is defined to satisfy two IERs, which were derived from the A-CDM Implementation Manual [10]:

- To allow the Pre-Departure Sequence Calculator to provide the calculated TSAT of a flight.
- To allow the Pre-Departure Sequence Calculator to provide the calculated TTOT of a flight.

3.2 Other Requirements

3.2.1 Non-Functional Requirements

The following diagram describes the non-functional requirements for the *CalculatedPreDepartureSequenceDelivery* service.

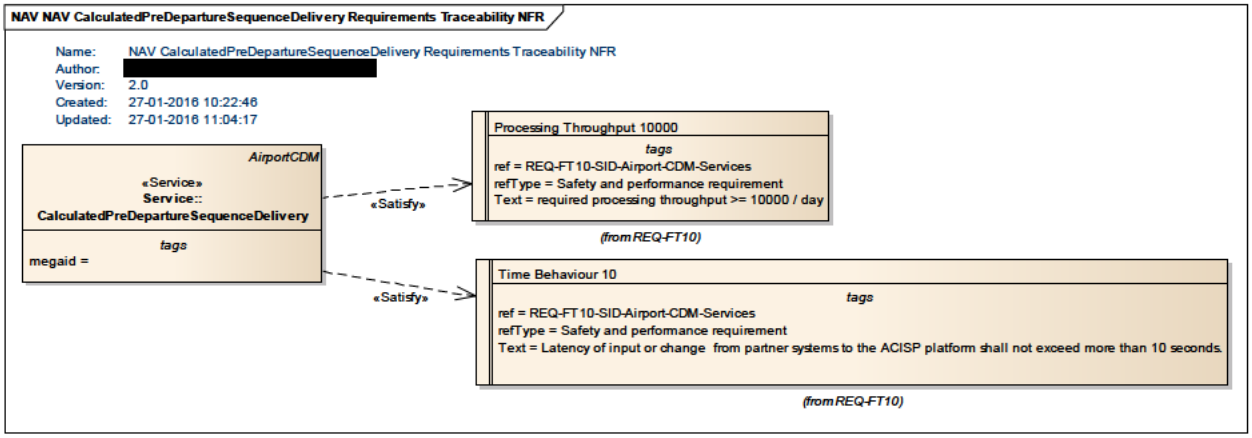

Figure 6: NAV CalculatedPreDepartureSequenceDelivery Requirements Traceability NfR diagram

3.2.2 Relevant Industrial Standards

No standard is currently required for the service.

3.2.3 Nodes

The following diagram describes the operational nodes which are expected to provide and/or consume the *CalculatedPreDepartureSequenceDelivery* service.

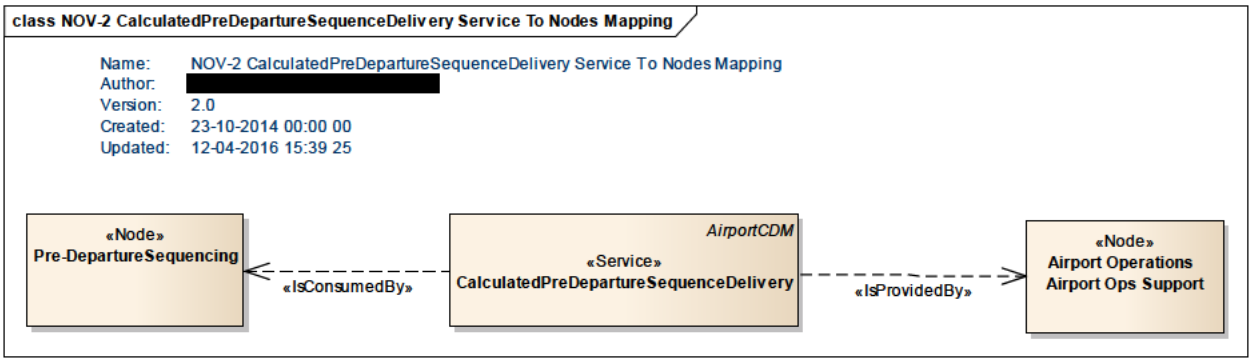

Figure 7 NOV-2 *CalculatedPreDepartureSequenceDelivery* Service To Nodes Mapping

4 Service overview

The *CalculatedPreDepartureSequenceDelivery* service is part of a series of services that help automate the A-CDM process at a CDM Airport. It delivers the TSAT or/and TTOT A-CDM time value of a flight when these values are updated by the Pre-Departure Sequencer (PDS). Such a service is required when the PDS is managed by ATC. The service concerns a given airport: the consumer receives the TSAT/TTOT of all flights, one after the other.

The service is of type delivery: The consumer provides a value; and the provider consumes it. No response is expected. The subscription to the service is done outside SWIM.

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 following diagrams describe the functions and capabilities provided by this service:

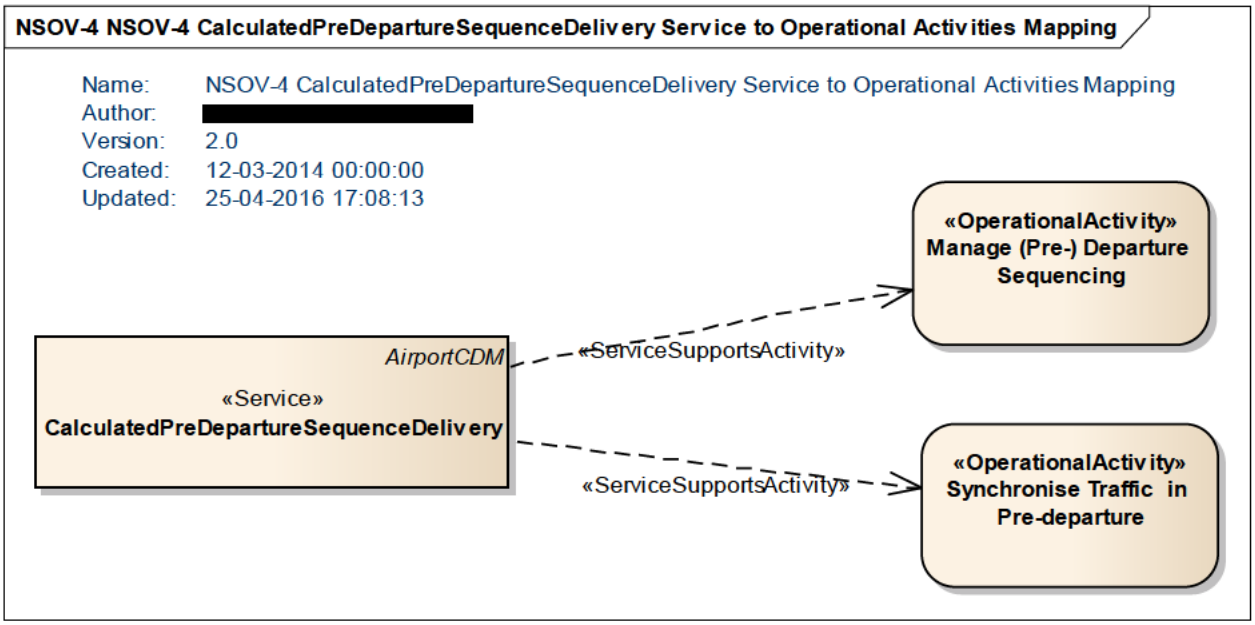

Figure 8: NSOV-4 *CalculatedPreDepartureSequenceDelivery* Service to Operational Activities Mapping diagram

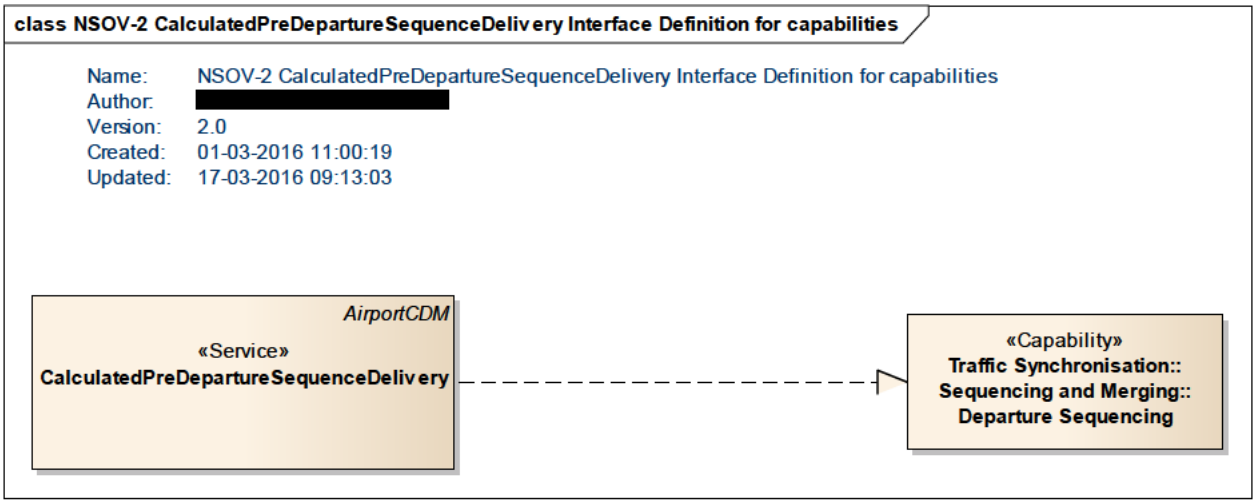

Figure 9: NSOV-2 *CalculatedPreDepartureSequenceDelivery* Interface Definition diagram for capabilities

4.4 Service Interfaces

The *CalculatedPreDepartureSequenceDelivery* service is based on a single interface with a single interface definition with two operations: *postTSAT* and post*TTOT*. This interface is instantiated by the service provider and used by the service consumer to access the service interface definition operations.

The following diagram describes the service interface definitions of this service:

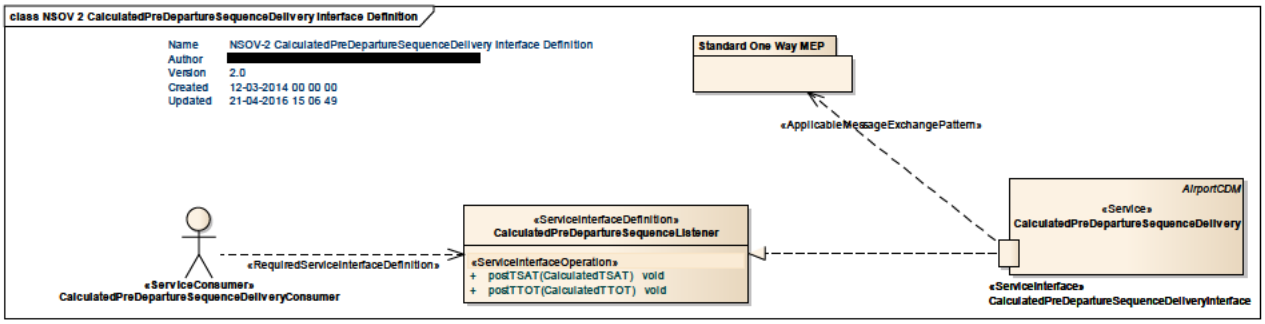

Figure 10: NSOV-2 *CalculatedPreDepartureSequenceDelivery* Interface Definition diagram

ServiceInterface	ServiceInterfaceDefinition	ServiceInterface Operation	Role
CalculatedPreDepartureSequenceDeliveryInterface	CalculatedPreDepartureSequenceListener	postTSAT	provided
CalculatedPreDepartureSequenceDeliveryInterface	CalculatedPreDepartureSequenceListener	postTTOT	provided

Table 2: Service Interface and operations

5 Service interface specifications

5.1 Service Interface CalculatedPreDepartureSequenceDeliveryInterface

The *CalculatedPreDepartureSequenceDelivery* service is based on the single interface CalculatedPreDepartureSequenceDeliveryInterface, providing One-Way Message Exchange Pattern (MEP) interaction.

5.1.1 Service Interface Definition CalculatedPreDepartureSequenceListener

The *CalculatedPreDepartureSequenceListener* interface definition provides means to:

- Post the calculated TSAT of a flight, through *postTSAT* service interface operation.
- Post the calculated TTOT of a flight, through *postTTOT* service interface operation;

A graphical representation of this interface is given in Figure 10: NSOV-2 CalculatedPreDepartureSequenceDelivery Interface Definition diagram.

5.1.1.1 Operation postTSAT

5.1.1.1.1 Operation Functionality

The *postTSAT* Service Interface Operation receives the Target Start-Up Approval Time for a specific flight. The operation does not return any message as output parameter.

5.1.1.1.2 Operation Parameters

The operation requires one input parameter: *CalculatedTSAT* message. After the operation is processed, the service does not provide any output parameter.

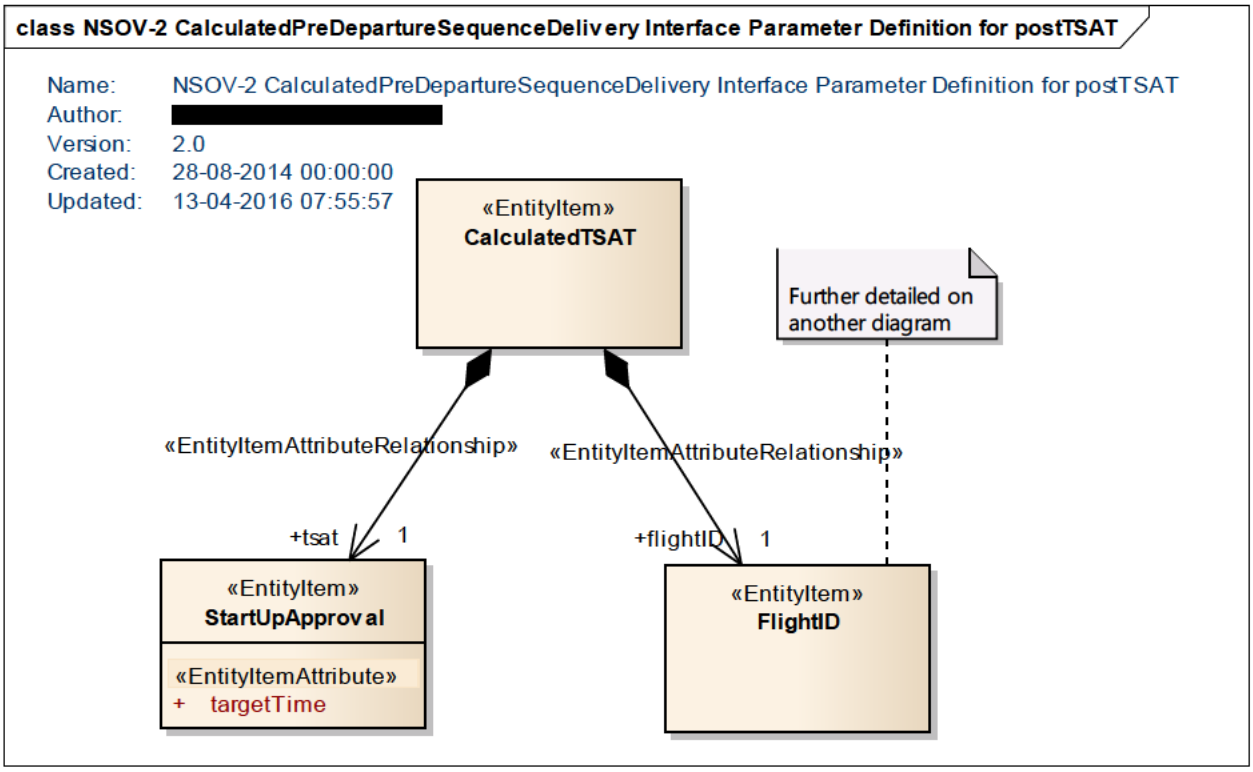

Figure 11: NSOV-2 *CalculatedPreDepartureSequenceDelivery* Interface Parameter Definition for postTSAT

CalculatedTSAT is a message which provides the Target Start-Up Approval Time value of a specific flight. In particular, the message is composed of the following elements:

- ***StartUpApproval***: ATC approval for starting up of the aircraft engines by the flight crew.
  - ***targetTime***: TSAT (Target Start Up Approval Time): the time provided by ATC taking into account TOBT. CTOT and/or the traffic situation that an aircraft can expect receive start up / push back approval.

- ***FlightID***: Identification of the concerned flight, see 5.2.2 Payload elements common to several AirportCDM services.

The service interface parameters are further explained in section 5.2 Service Payload .

5.1.1.2 Operation postTTOT

5.1.1.2.1 Operation Functionality

The *postTTOT* Service Interface Operation receives the Target Take Off Time for a specific flight. The operation does not return any message as output parameter.

5.1.1.2.2 Operation Parameters

The operation requires only one input parameter: *CalculatedTTOT* message. After the operation is processed, the service does not provide any output parameter.

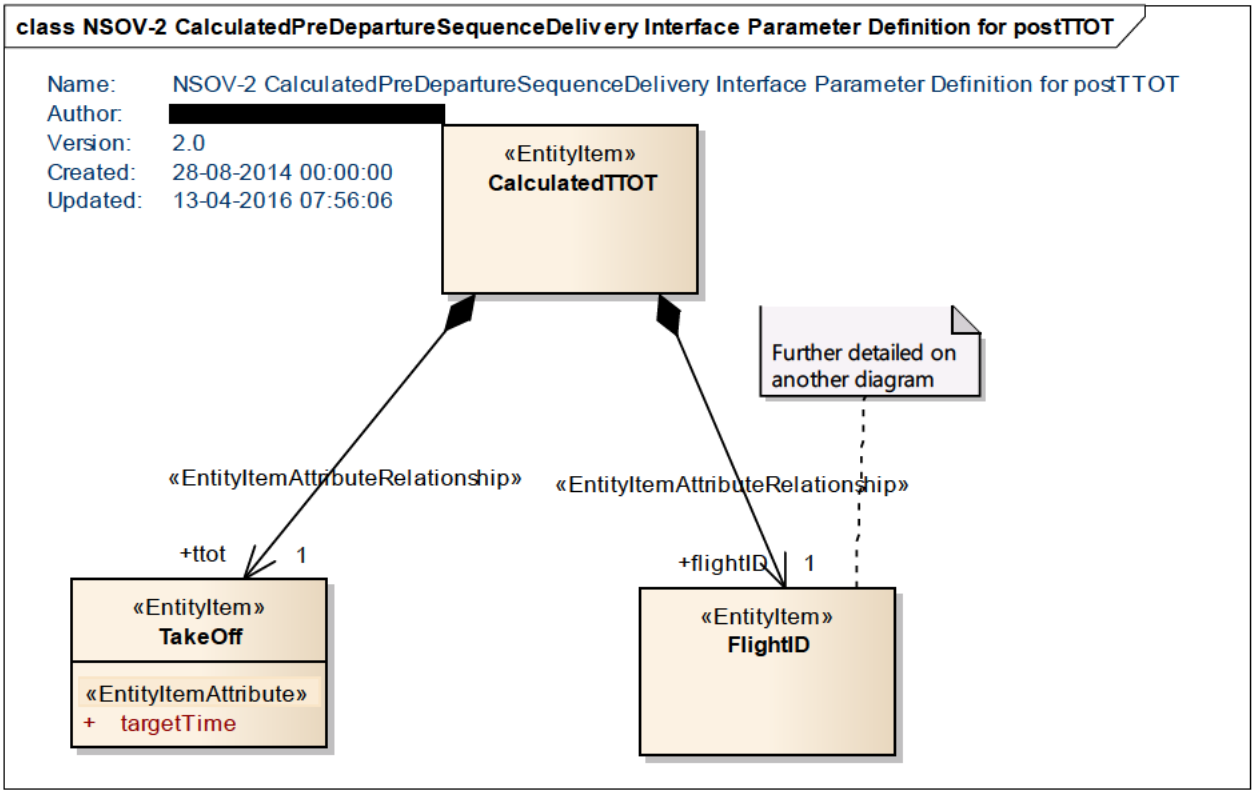

Figure 12: NSOV-2 *CalculatedPreDepartureSequenceDelivery* Interface Parameter Definition for postTTOT

CalculatedTTOT is a message which provides the Target Take Off Time value of a specific flight. In particular, the message is composed of the following elements:

- ***TakeOff***: The phase of the flight from the application of take-off power until reaching the first prescribed power reduction, or until reaching the vfr pattern or 1,500 feet (450 metres) above runway and elevation, whichever comes first or the termination (abort) of the take-off.
    - ***targetTime***: TTOT (Target Take Off Time): the Target Take Off Time taking into account the TOBT/TSAT plus the EXOT (Estimated Taxi-Out Time).

- ***FlightID***: Identification of the concerned flight, see 5.2.2 Payload elements common to several AirportCDM services.

The service interface parameters are further explained in section 5.2 Service Payload .

5.2 Service Payload

5.2.1 Payload elements specific to this service

Element Name		Author	Notes
CalculatedTSAT		[redacted]	Message which provides the Target Start-Up Approval Time value of a specific flight.
	Element Tagged Value Name	Value	
	EATMA_NAF::CLDMSemanticTrace	CLDM_out_of_scope	
Element Name		Author	Notes

CalculatedTTOT	[redacted]	Message which provides the Target Take Off Time value of a specific flight.

	Element Tagged Value Name	Value
	EATMA_NAF::CLDMSemanticTrace	CLDM_out_of_scope

Table 3: Specifc Payload elements with tracing to AIRM

5.2.2 Payload elements common to several AirportCDM services

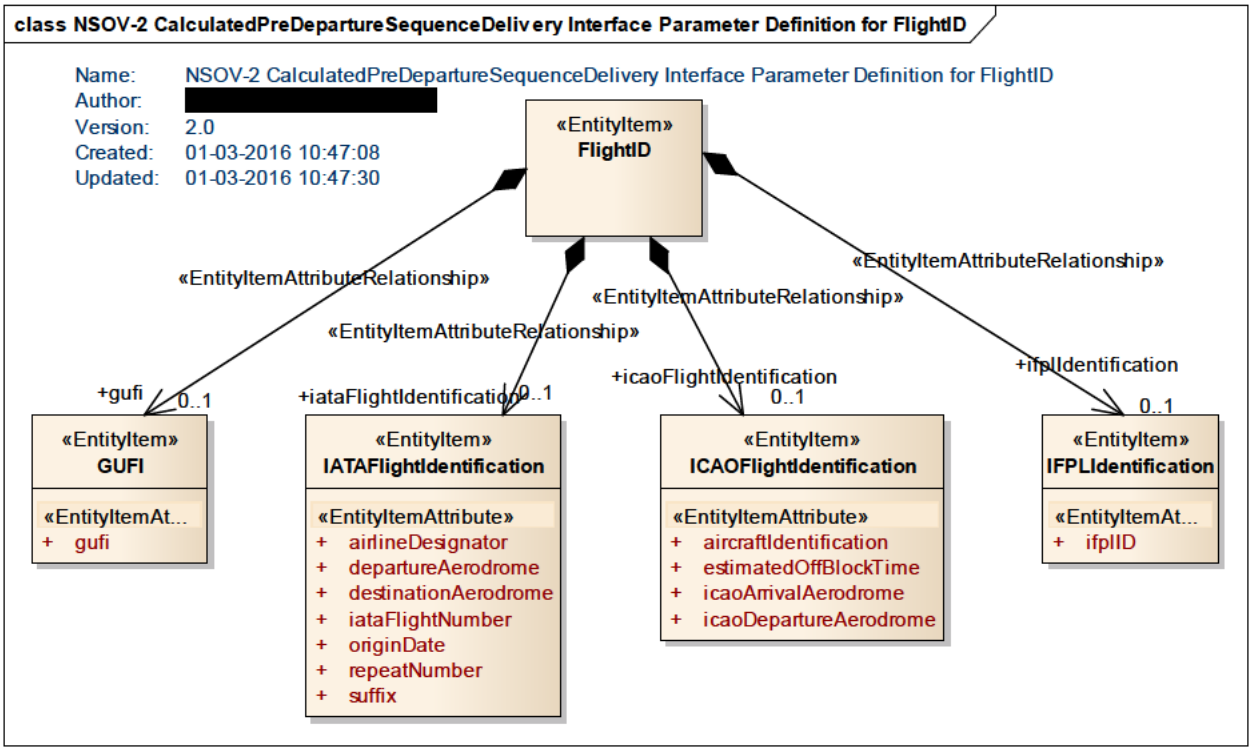

Figure 13: NSOV-2 *CalculatedPreDepartureSequenceDelivery* Interface Parameter Definition for FlightID

Element Name	Author	Notes
AirportCDMServiceResponseStatus	[redacted]	General structure of responses of an A-CDM service.

	Element Tagged Value Name	Value
	CLDMSemanticTrace	CLDM_out_of_scope

	Attribute Name	Type	Notes
	reasonForRejection	CharacterString	Specifies briefly the reason of rejection of the related request.

	Tagged Value Name	Value
	CLDMSemanticTrace	CLDM_out_of_scope

	Attribute Name	Type	Notes
	status	CharacterString	Specifies whether the related request has been accepted or not. Values: • ACCEPTED • REJECTED

	Tagged Value Name	Value
	CLDMSemanticTrace	CLDM_out_of_scope

Element Name	Author	Notes

FlightID	[redacted]	General structure to allow different flight identifiers. Many identifiers can coexist.

	Element Tagged Value Name	Value
	CLDMSemanticTrace	CLDM_out_of_scope

Element Name	Author	Notes
GUFI	FT10 Walter Van Hamme	Globally Unique Flight Identifier.

	Element Tagged Value Name	Value
	CLDMSemanticTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Flight:Flight@globallyUniqueFlightIdentifier

	Attribute Name	Type	Notes
	gufi		A reference that uniquely identifies a specific flight and that is independent of any particular system.

	Tagged Value Name	Value
	CLDMSemanticTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Flight:Flight@globallyUniqueFlightIdentifier
	IMDefinitionTrace	urn:x-ses:sesarju:airm:v410:InformationModel:SubjectFields:Flight:FlightIdentifier:GloballyUniqueFlightIdentifier

Element Name	Author	Notes
IATAFlightIdentification	[redacted]	Flight identification structure as defined by IATA, also known as UFI (Unique Flight Identifier).

	Element Tagged Value Name	Value
	CLDMContextTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Stakeholders:Stakeholder:AircraftOperator@designatorICAO
	CLDMSemanticTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Flight:FlightIdentifier:IATAUniqueFlightIdentifier
	IMDefinitionTrace	urn:x-ses:sesarju:airm:v410:InformationModel:SubjectFields:Flight:FlightIdentifier:IATAUniqueFlightIdentifier

	Attribute Name	Type	Notes
	airlineDesignator		Code of the aircraft operator of the identified flight, usually IATA but it can be ICAO, as defined in the Schedule [AIDX, UFI].

	Tagged Value Name	Value
	CLDMContextTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Flight:FlightIdentifier:IATAUniqueFlightIdentifier@flightDesignator
	CLDMSemanticTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Stakeholders:Stakeholder:AircraftOperator@designatorIATA

	Attribute Name	Type	Notes
	departureAerodrome		Code of scheduled departure airport usually IATA bur can be ICAO or other as defined in the Scheduled [AIDX, UFI].

	Tagged Value Name	Value

	CLDMContextTrace		urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Flight:FlightIdentifier:IATAUniqueFlightIdentifier@adep
	CLDMSemanticTrace		urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:BaseInfrastructure:AerodromeInfrastructure:Aerodrome@designatorIATA
Attribute Name		**Type**	**Notes**
destinationAerodrome			Code of scheduled arrival airport usually IATA but can be ICAO or other as defined in the Schedule [AIDX, UFI].
	Tagged Value Name	**Value**	
	CLDMContextTrace		urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Flight:FlightIdentifier:IATAUniqueFlightIdentifier@ades
	CLDMSemanticTrace		urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:BaseInfrastructure:AerodromeInfrastructure:Aerodrome@designatorIATA
Attribute Name		**Type**	**Notes**
iataFlightNumber			IATA flight number of the identified flight as defined in the Schedule [AIDX, UFI].
	Tagged Value Name	**Value**	
	CLDMContextTrace		urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Flight:FlightIdentifier:IATAUniqueFlightIdentifier@flightDesignator
	CLDMSemanticTrace		urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Flight:FlightIdentifier:FlightDesignator@flightNumber
	IMDefinitionTrace		urn:x-ses:sesarju:airm:v410:InformationModel:SubjectFields:Flight:FlightIdentifier:IATAFlightNumber
Attribute Name		**Type**	**Notes**
originDate			Scheduled flight origin date based on the flight as defined in the Schedule [AIDX, UFI].
	Tagged Value Name	**Value**	
	CLDMSemanticTrace		urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Flight:FlightIdentifier:IATAUniqueFlightIdentifier@originFlightDate
	IMDefinitionTrace		urn:x-ses:sesarju:airm:v410:InformationModel:SubjectFields:Flight:FlightIdentifier:OriginFlightDate
Attribute Name		**Type**	**Notes**
repeatNumber			Repeat or departure attempt.
	Tagged Value Name	**Value**	
	CLDMSemanticTrace		urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Flight:FlightIdentifier:IATAUniqueFlightIdentifier@repeatNumber
	IMDefinitionTrace		urn:x-ses:sesarju:airm:v410:InformationModel:SubjectFields:Flight:FlightIdentifier:RepeatNumber
Attribute Name		**Type**	**Notes**

	suffix		suffix of the repeatNumber as defined in the Schedule [AIDX, UFI].

Tagged Value Name	Value
CLDMSemanticTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Flight:FlightIdentifier:FlightDesignator@suffix
IMDefinitionTrace	urn:x-ses:sesarju:airm:v410:InformationModel:SubjectFields:Flight:FlightIdentifier:FlightDesignatorSuffix

Element Name	Author	Notes
ICAOFlightIdentification	[redacted]	Flight identification structure based on usual ICAO fields present in the Flight Plan.

Element Tagged Value Name	Value
CLDMSemanticTrace	CLDM_out_of_scope
IMDefinitionTrace	urn:x-ses:sesarju:airm:v410:InformationModel:SubjectFields:Flight:FlightIdentifier:ICAOFlightID

Attribute Name	Type	Notes
aircraftIdentification		Name used by ATS units to identify and communicate with the aircraft.

Tagged Value Name	Value
CLDMSemanticTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Flight:FlightIdentifier:AircraftIdentification

Attribute Name	Type	Notes
estimatedOffBlockTime		Date and time at which the aircraft will off-block according to ICAO flight plan field.

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:OffBlock@time
IMDefinitionTrace	urn:x-ses:sesarju:airm:v410:InformationModel:SubjectFields:Flight:FlightEvent:EstimatedOffBlockTime

Attribute Name	Type	Notes
icaoArrivalAerodrome		ICAO code of scheduled destination aerodrome.

Tagged Value Name	Value
CLDMContextTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Flight:Flight@destinationAerodrome
CLDMSemanticTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:BaseInfrastructure:AerodromeInfrastructure:Aerodrome@locationIndicatorICAO

Attribute Name	Type	Notes
icaoDepartureAerodrome		ICAO code of the scheduled departure aerodrome.

Tagged Value Name	Value
CLDMContextTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Flight:Flight@departureAerodrome

	CLDMSemanticTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:BaseInfrastructure:AerodromeInfrastructure:Aerodrome@locationIndicatorICAO

Element Name	Author	Notes
IFPLIdentification	[redacted]	Flight identification based on a unique identifier assigned to a flight plan.

	Element Tagged Value Name	Value
	CLDMSemanticTrace	CLDM_out_of_scope

	Attribute Name	Type	Notes
	ifplID		Unique identifier of a flight plan once is submitted to the IFPS (Initial integrated Flight Processing System). The identifier is assigned by IFPS.

	Tagged Value Name	Value
	CLDMSemanticTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Flight:Flight@ifplIdentifier

Element Name	Author	Notes
OffBlockReady	[redacted]	Event at which all doors of an aircraft are closed and departure will be possible immediately after reception of the ATC clearance.

	Element Tagged Value Name	Value
	CLDMContextTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:AirTrafficOperations:AerodromeOperations:DepartureOperations@offBlockReady
	CLDMSemanticTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Flight:FlightEvent:OffBlockReady

	Attribute Name	Type	Notes
	actualTime		ARDT (Actual Ready Time): when the aircraft is ready for start up / push back or taxi immediately after clearance delivery, meeting the requirements set by the TOBT definition.

	Tagged Value Name	Value
	CLDMContextTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Common:Codelists:CodePlanningStatusType@ACTUAL
	CLDMSemanticTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Flight:FlightEvent:OffBlockReady@time
	IMDefinitionTrace	urn:x-ses:sesarju:airm:v410:InformationModel:SubjectFields:Flight:FlightEvent:ActualReadyTime

	Attribute Name	Type	Notes

	targetTime		TOBT (Target Off-Block Time): the time that an operator / handling agent estimates that an aircraft will be ready, all doors closed, boarding bridge removed, push back vehicle present, ready to start up / push back immediately upon reception of clearance from the TWR. TOBT can be calculated as ELDT+EXIT+MTTT or ALDT+EXIT+MTTT or AIBT+MTTT. If TOBT is earlier that EOBT, then EOBT value is displayed as TOBT, until updated / confirmed by the Aircraft Operator or Ground Handler. Confirmation can also be triggered automatically based on a time parameter before TOBT.

	Tagged Value Name	Value
	CLDMContextTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Common:Codelists:CodePlanningStatusType@TARGET
	CLDMSemanticTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Flight:FlightEvent:OffBlockReady@time
	IMDefinitionTrace	urn:x-ses:sesarju:airm:v410:InformationModel:SubjectFields:Flight:FlightEvent:TargetOffBlockTime

	Attribute Name	Type	Notes
	tobtUpdateCount		The number of updated to TOBT after TSAT has been issued (eg. max 3 updates after TSAT issue).

	Tagged Value Name	Value
	CLDMSemanticTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Flight:FlightEvent:OffBlockReady@tobtUpdateCount

Element Name	Author	Notes
StartUpApproval	[redacted]	ATC approval for starting up of the aircraft engines by the flight crew.

	Element Tagged Value Name	Value
	CLDMContextTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:AirTrafficOperations:AerodromeOperations:DepartureOperations@startUpApproval
	CLDMSemanticTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:AirTrafficOperations:ATMServiceDeliveryManagement:StartUpClearance

	Attribute Name	Type	Notes
	actualRequestTime		ASRT (Actual Start Up Request Time): time the pilot requests start up clearance.

	Tagged Value Name	Value
	CLDMContextTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Common:Codelists:CodePlanningStatusType@ACTUAL

	CLDMSemanticTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:AirTrafficOperations:ATMServiceDeliveryManagement:StartUpClearance@startUpApprovalRequestTime
	IMDefinitionTrace	urn:x-ses:sesarju:airm:v410:InformationModel:SubjectFields:AirTrafficOperations:AirspaceUserOperations:ActualStartUpRequestTime

	Attribute Name	Type	Notes
	actualTime		ASAT (Actual Start Up Approval Time): time that an aircraft receives its start up approval.

	Tagged Value Name	Value
	CLDMContextTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Common:Codelists:CodePlanningStatusType@ACTUAL
	CLDMSemanticTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:AirTrafficOperations:ATMServiceDeliveryManagement:StartUpClearance@time
	IMDefinitionTrace	urn:x-ses:sesarju:airm:v410:InformationModel:SubjectFields:AirTrafficOperations:ATMServiceDeliveryManagement:ActualStartUpApprovalTime

	Attribute Name	Type	Notes
	targetTime		TSAT (Target Start Up Approval Time): the time provided by ATC taking into account TOBT. CTOT and/or the traffic situation that an aircraft can expect receive start up / push back approval.

	Tagged Value Name	Value
	CLDMContextTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Common:Codelists:CodePlanningStatusType@TARGET
	CLDMSemanticTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:AirTrafficOperations:ATMServiceDeliveryManagement:StartUpClearance@time
	IMDefinitionTrace	urn:x-ses:sesarju:airm:v410:InformationModel:SubjectFields:AirTrafficOperations:ATMServiceDeliveryManagement:TargetStartUpApprovalTime

Element Name	Author	Notes
TakeOff	[redacted]	The phase of the flight from the application of take-off power until reaching the first prescribed power reduction, or until reaching the vfr pattern or 1,500 feet (450 metres) above runway and elevation, whichever comes first or the termination (abort) of the take-off.

	Element Tagged Value Name	Value
	CLDMSemanticTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Flight:FlightEvent:TakeOff

	Attribute Name	Type	Notes

	actualTime		ATOT (Actual Take-Off Time): the time that an aircraft takes off from the runway (Equivalent to ATC ATD - Actual Time of Departure, ACARS=OFF).

	Tagged Value Name	Value
	CLDMContextTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Common:Codelists:CodePlanningStatusType@ACTUAL
	CLDMSemanticTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Flight:FlightEvent:TakeOff@time
	IMDefinitionTrace	urn:x-ses:sesarju:airm:v410:InformationModel:SubjectFields:Flight:FlightEvent:ActualTakeOffTime

	Attribute Name	Type	Notes
	calculatedTime		CTOT (Calculated Take Off Time): a time calculated and issued by the appropriate Central Management unit, as a result of tactical slot allocation, at which a flight is expected to become airborne. (ICAO Doc 7030/4 - EUR, Table 7).

	Tagged Value Name	Value
	CLDMContextTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Common:Codelists:CodePlanningStatusType@CALCULATED
	CLDMSemanticTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Flight:FlightEvent:TakeOff@time
	IMDefinitionTrace	urn:x-ses:sesarju:airm:v410:InformationModel:SubjectFields:Flight:FlightEvent:CalculatedTakeOffTime

	Attribute Name	Type	Notes
	targetTime		TTOT (Target Take Off Time): the Target Take Off Time taking into account the TOBT/TSAT plus the EXOT (Estimated Taxi-Out Time).

	Tagged Value Name	Value
	CLDMContextTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Common:Codelists:CodePlanningStatusType@TARGET
	CLDMSemanticTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Flight:FlightEvent:TakeOff@time
	IMDefinitionTrace	urn:x-ses:sesarju:airm:v410:InformationModel:SubjectFields:Flight:FlightEvent:TargetTakeOffTime

Table 4: Common Payload elements with tracing to AIRM

6 Service dynamic behaviour

6.1 Service Interface CalculatedPreDepartureSequenceDeliveryInterface

The *CalculatedPreDepartureSequenceDelivery* service supports one MEP: One-Way (asynchronous by definition).

The following diagram describes the interaction between the service consumer and the service:

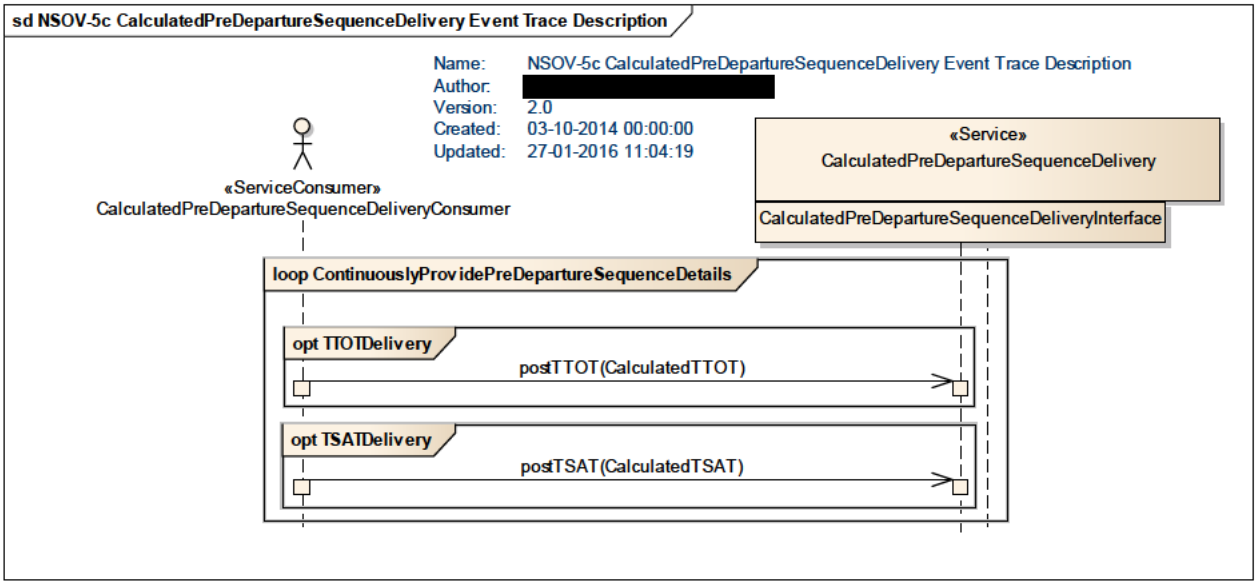

Figure 14: NSOV-5c *CalculatedPreDepartureSequenceDelivery* Event Trace Description

7 Service provisioning

The following diagram describes the service provision of the *CalculatedPreDepartureSequenceDelivery* service:

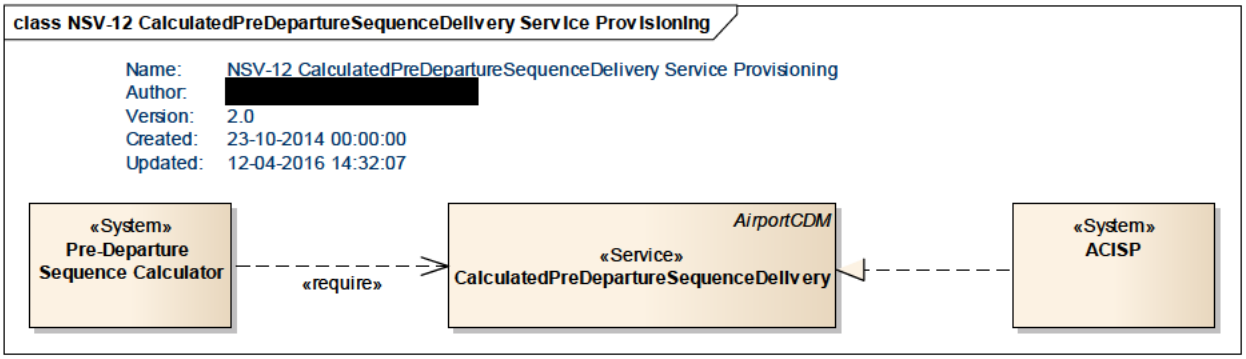

Figure 15: NSV-12 *CalculatedPreDepartureSequenceDelivery* Service Provision

The *CalculatedPreDepartureSequenceDelivery* service is naturally provided by the A-CDM Information Sharing Platform (ACISP) and consumed by the Pre-Departure Sequence Calculator, when the last is not integrated within the ACISP.

8 Validation and Verification

8.1 Verification

Verification performed according to the ISRM Rulebook [6] following the ISRM Verification Guidelines [7]. This includes use of verification scripts. Verification is partly automatic, partly semi-automatic and partly manual.

8.1.1 Verification Results

The verification reports for the service can be found in the Verification Reports directory located in the D65 delivery package:

Designed_Services_-_CalculatedPreDepartureSequenceDelivery.xls

Designed_Services_-_CalculatedPreDepartureSequenceDelivery_Common_Area.xls

Based on the results in the verification reports the service has been successfully verified.

8.2 Validation

This service has been used in Validation Exercise EXE-06.03.01-VP-669 but has not been formally validated.

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] Airport CDM Implementation Manual	V4	http://www.eurocontrol.int/publications/airport-cdm-implementation-manual-version-4
[11] FT10 SID v 0.8	00.00.80	08.03.10 D09
[12] B.4.3 A-CDM Service Allocation FT-10	00.01.01	B.04.03 IP1
[13] ISRM 1.2 Delivery Report	00.01.00	08.03.10 D62

-END OF DOCUMENT-