
# European ATM Service Description for the NetworkOperationPlan Service

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***Abstracte this style/font for writing the abstract.***

The NetworkOperationPlan Service provides current network information at the airport concerned. A number of different actors within the airport consumes this service. The supplier of this information is the Network Manager.

# Authoring & Approval

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| Rational for rejection |
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This deliverable consists of SJU foreground.

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# Executive summary

This document is the result of the activity “Service Design” for Fast Track 1/2 regarding the reception of the network information in the airports. It covers the design of the service NetworkOperationPlan following the ISRM Modelling Guidelines [5] and covering the set of requirements written in the 6.5.1 OSED [11].

The NetworkOperationPlan service is in charge of publishing the network information to the interested airports enhancing the collaboration between the Network Manager and the Airports.

# 1 Introduction

## 1.1 Purpose of the document

The purpose of this Service description is to provide a holistic overview of a particular 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.

In particular, the NetworkOperationPlan Service supplies the data common to the Network Operations Plan (NOP) and the Airport Operations Plan (AOP) to the airport in order to synchronize the data and maintain a common view of the overall network demand. The publication consists of limited flight data supplied as part of departure and arrival lists.

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

N/A

## 1.4 Glossary of terms

## 1.5 Acronyms and Terminology

### 1.5.1 Acronyms

| Term | Definition |
|---|---|
| **ATM** | Air Traffic Management |
| **AOP** | Airport Operation Plan |
| **EATMA** | European Air Traffic Management Architecture |
| **IER** | Information Exchange Requirement |
| **ISRM** | Information Service Reference Model |
| **NSOV** | NATO Service Oriented View |
| **NOV** | NATO Operational View |
| **NOP** | Network Operation Plan |
| **OSED** | Operational Service and Environment Definition |
| **QoS** | Quality of Service |

| Term | Definition |
|---|---|
| **SESAR** | Single European Sky ATM Research Programme |
| **SESAR Programme** | The programme that defines the Research and Development activities and Projects for the SJU. |
| **SJU** | SESAR Joint Undertaking (Agency of the European Commission) |
| **SWIM** | System Wide Information Management |

### 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] |

# 2 Service identification

| | |
|---|---|
| **Name** | NetworkOperationPlan |
| **ID** | {4E131369-AE26-4bc3-BC7A-278954F045A8} |
| **Version** | 2.1 |
| **Keywords** | AOP NOP NM Airport Network Manager Synchronization |
| **Architect(s)** | [redacted] (DFS) / [redacted] (Indra) |

| Lifecycle status | Date | Reference |
|---|---|---|
| **Identified** | N/A | No active SCG |
| **Allocated** | N/A | No active SCG |
| **Designed** | 30/03/2012 | This document |
| **Validated** | 31/07/2012 | [13]EXE-06.03.01-VP-609 VALP<br>[14] EXE-06.03.01-VP-549 VALP<br>[15] EXE-13.02.03-VP-749 VALP |
| **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

The operational context and requirements are available from operational project 06.05.01. The DOD [10] does supply some high level requirements that have been linked to the requirements from the OFA 5.1.1 OSED [11] and is shown in the diagram below.

## 3.1 Information Exchange Requirements

The service is supporting the following DOD high-level requirement:

| | |
|---|---|
| **REQ-06.02-DOD-6200.0054** | The Airport Operations shall take into account information from airports at regional level to improve the estimated time of arrival for all flights bound to the region. |

**Table 1. DOD requirement**

This DOD requirement is refined in the OFA 5.1.1 OSED [11] and the resulting IERs are represented in the following diagrams:

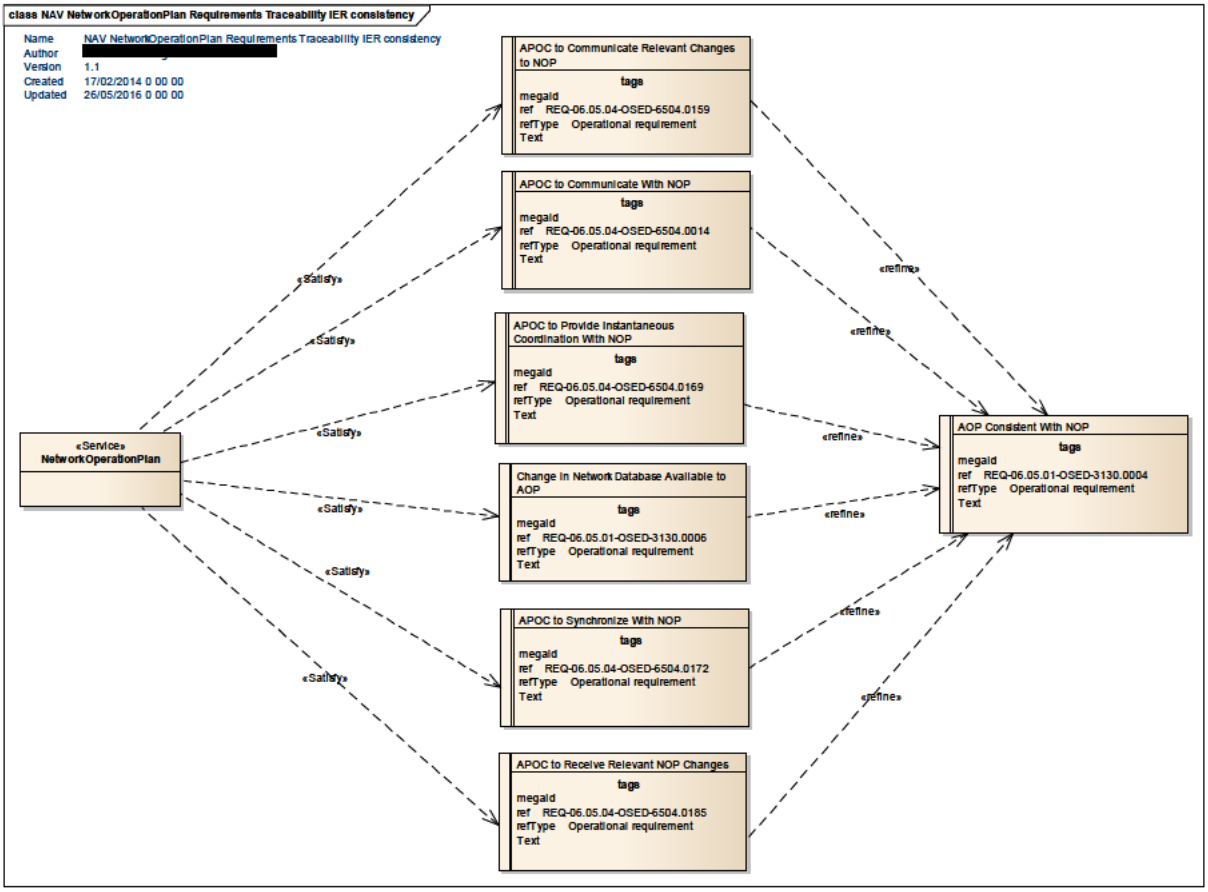


**Figure 1: NAV NetworkOperationPlan IER Traceability regarding the consistency AOP NOP**

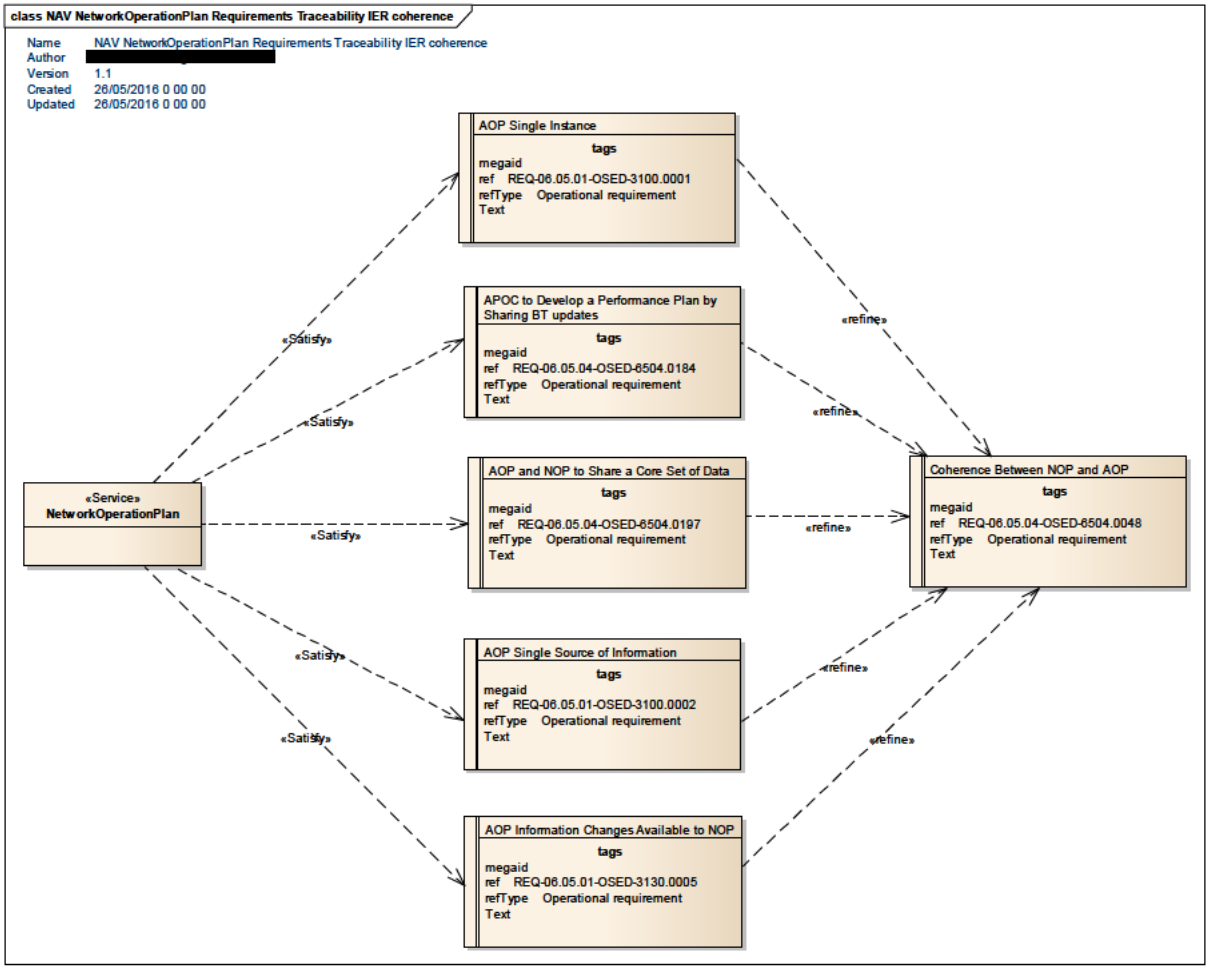


**Figure 2: NAV NetworkOperationPlan IER Traceability regarding the coherence AOP NOP**

## 3.2 Other Requirements

### 3.2.1 Non-Functional Requirements

NA.

### 3.2.2 Relevant Industrial Standards

These are the standards that can be considered relevant for this service:

- A-CDM because is currently supporting the protocol of communication between the Airport and Network manager in many airport in Europe
- ED-133 because will be able to support exchanges not only between ATC, but also between Airports and the Network Manager in Europe
- FIXM because will be able to support all kind of Flight data exchanges globally including the Airport and Network Manager Information.

### 3.2.3 Nodes

The following diagram represents the Nodes that will be providing and consuming the service:

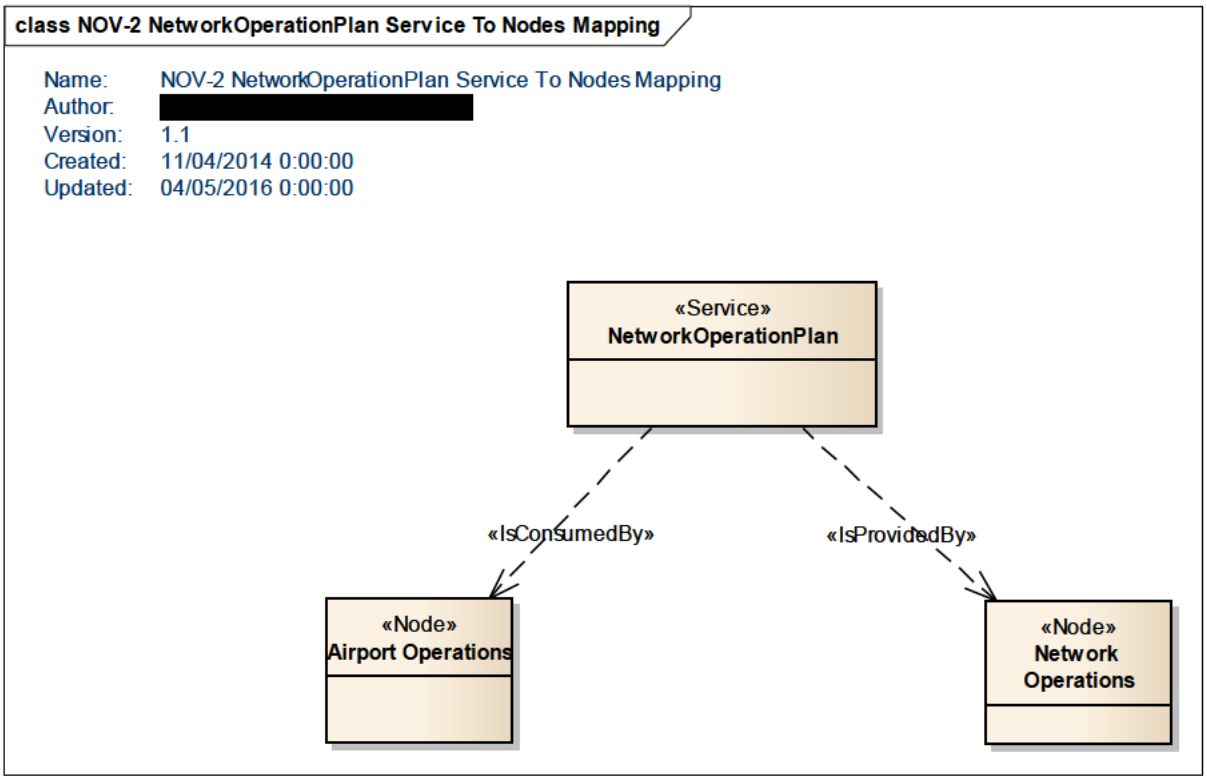


**Figure 3: NOV-2 NetworkOperationPlan Service to Nodes Mapping diagram**

# 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 mappings from Service to Operational Activities are shown in the following diagram:

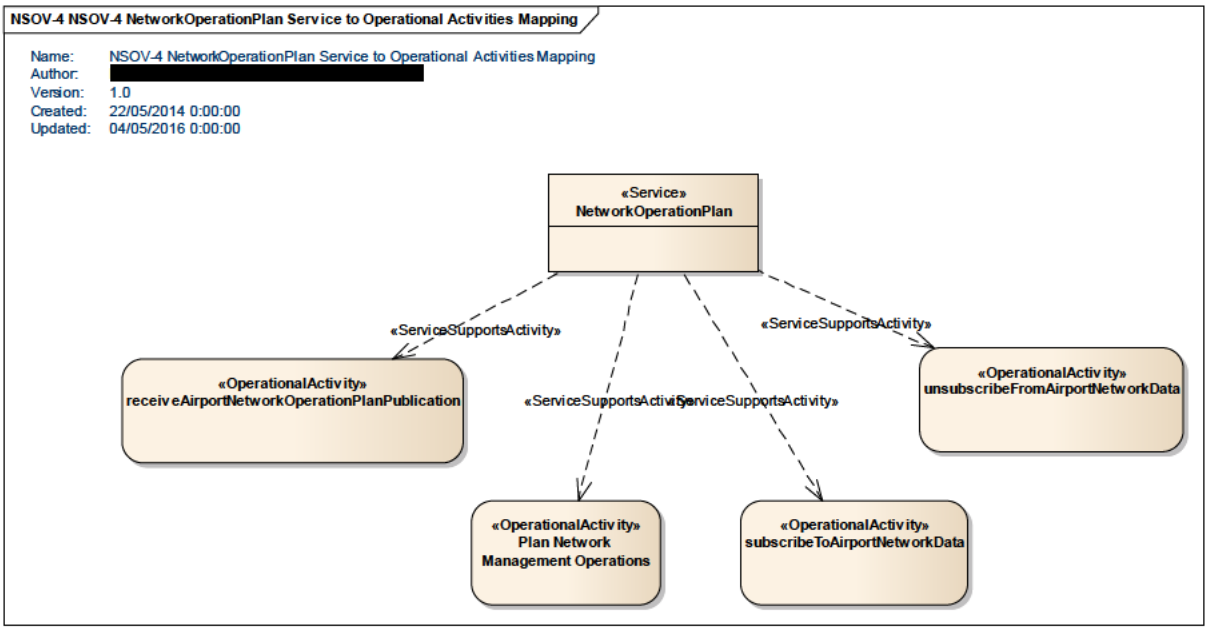


**Figure 4: NSOV-4 NetworkOperationPlan Service to Operational Activities Mapping diagram**

For the service to capabilities mapping, see the NSOV-2 Service Interface Definition diagram in Section 4.4.

## 4.4 Service Interfaces

The ProvidedNetworkOperationPlan service interface definition allows the consumer to subscribe or unsubscribe to the data, while the RequiredNetworkOperationPlan Subscriber service interface definition allows the service provider to publish the message containing the data. The messages for subscription and un-subscription are only logical abstract wrappers, since the actual management of the publication mechanism is done at the level of the SWIM Technical Infrastructure.

The following diagram describes the interfaces of the service including the selected Message Exchange Pattern Publish/Subscribe Push.

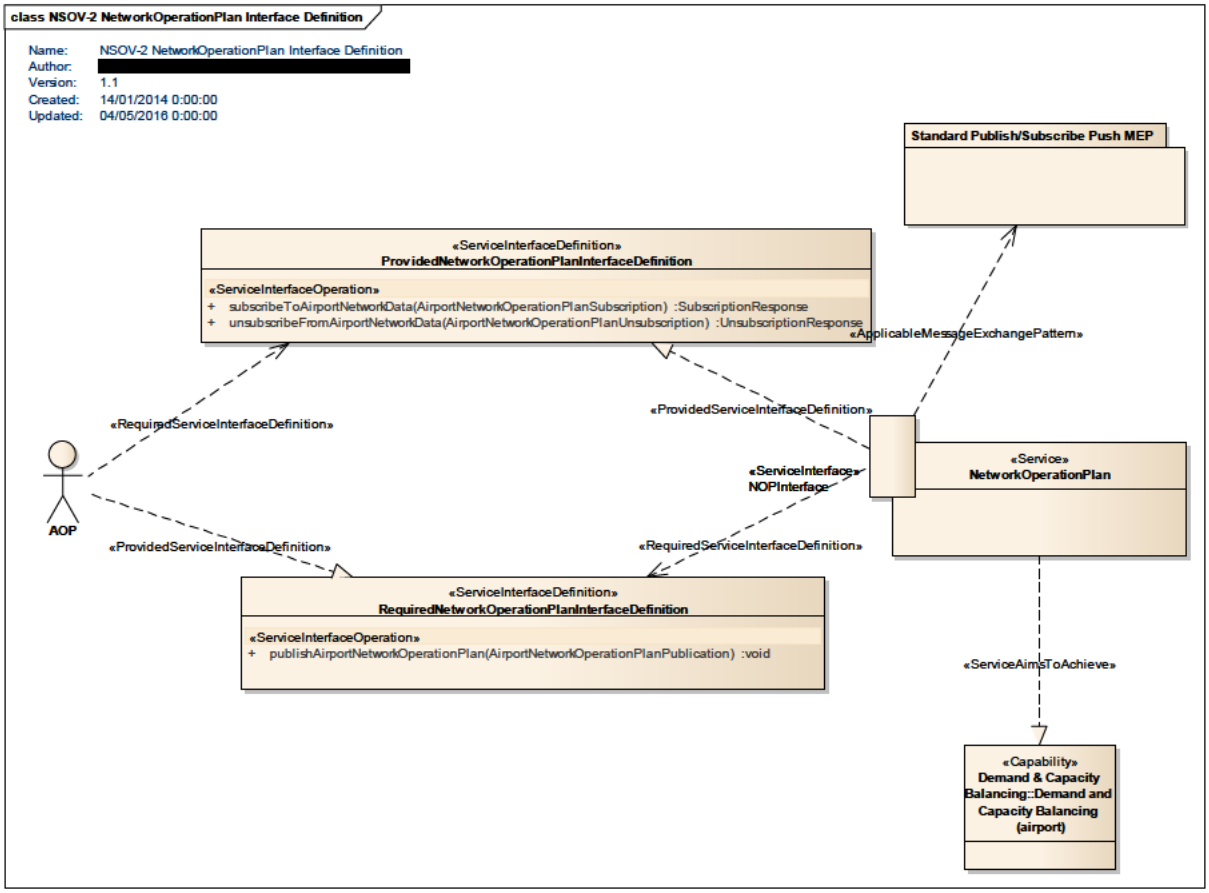


**Figure 5: NSOV-2 NetworkOperationPlan Interface Definition diagram**

| ServiceInterface | ServiceInterfaceDefinition | ServiceInterfaceOperation | Role |
|---|---|---|---|
| NOPInterface | ProvidedNetworkOperationPlan InterfaceDefinition | subscribeToAirportNetworkData | provided |
| NOPInterface | ProvidedNetworkOperationPlan InterfaceDefinition | unsubscribeToAirportNetworkData | provided |
| NOPInterface | RequiredNetworkOperationPlan InterfaceDefinition | publishAirportNetworkPlan | required |

**Table 2: Service Interfaces**

# 5 Service interface specifications

## 5.1 Service Interface NOPInterface

This is the only interface for this service. It implements the Standard Publish/Subscribe Push message exchange pattern, and exposes two service interface definitions, one for the provider and one for the consumer side.

### 5.1.1 Service Interface Definition ProvidedNetworkOperationPlanInterfaceDefinition

#### 5.1.1.1 Operation subscribeToAirportNetworkData

The service operation allows the service consumer to subscribe to the NetworkPlan information for a particular airport.

##### 5.1.1.1.1 Operation Functionality

The service operation allows the consumer to select the desired airport for receiving the Network information.

##### 5.1.1.1.2 Operation Parameters

| Element Name | Author | Notes |
|---|---|---|
| AirportNetworkOperationPlanSubscription | [redacted] | Message type to supply the basic filter used in requesting Network Operational Plan information. |
| SubscriptionResponse | | Reply to the subscription operation. |

**Table 3. Payload Elements for the subscribeToAirportNetworkPlan**

The operation has been modelled with a return type representing the generic outcome for a subscription

#### 5.1.1.2 Operation unsubscribeFromAirportNetworkData

The service operation allows the service consumer to unsubscribe from the service.

#### 5.1.1.3 Operation Functionality

The service operation allows the service consumer to unsubscribe to the NetworkPlan information for a particular airport.

#### 5.1.1.4 Operation Parameters

| Element Name | Author | Notes |
|---|---|---|
| AirportNetworkOperationPlanUnsubscription | [redacted] | Message type to supply the unsubscription. |
| UnsubscriptionResponse | | Reply to the unsubscription operation. |

**Table 4. Payload Elements for the unsubscribeToAirportNetworkPlan**

The operation has been modelled with a return type representing the generic outcome for a un-subscription

The following diagram shows the subscription and un-subscription parameters:

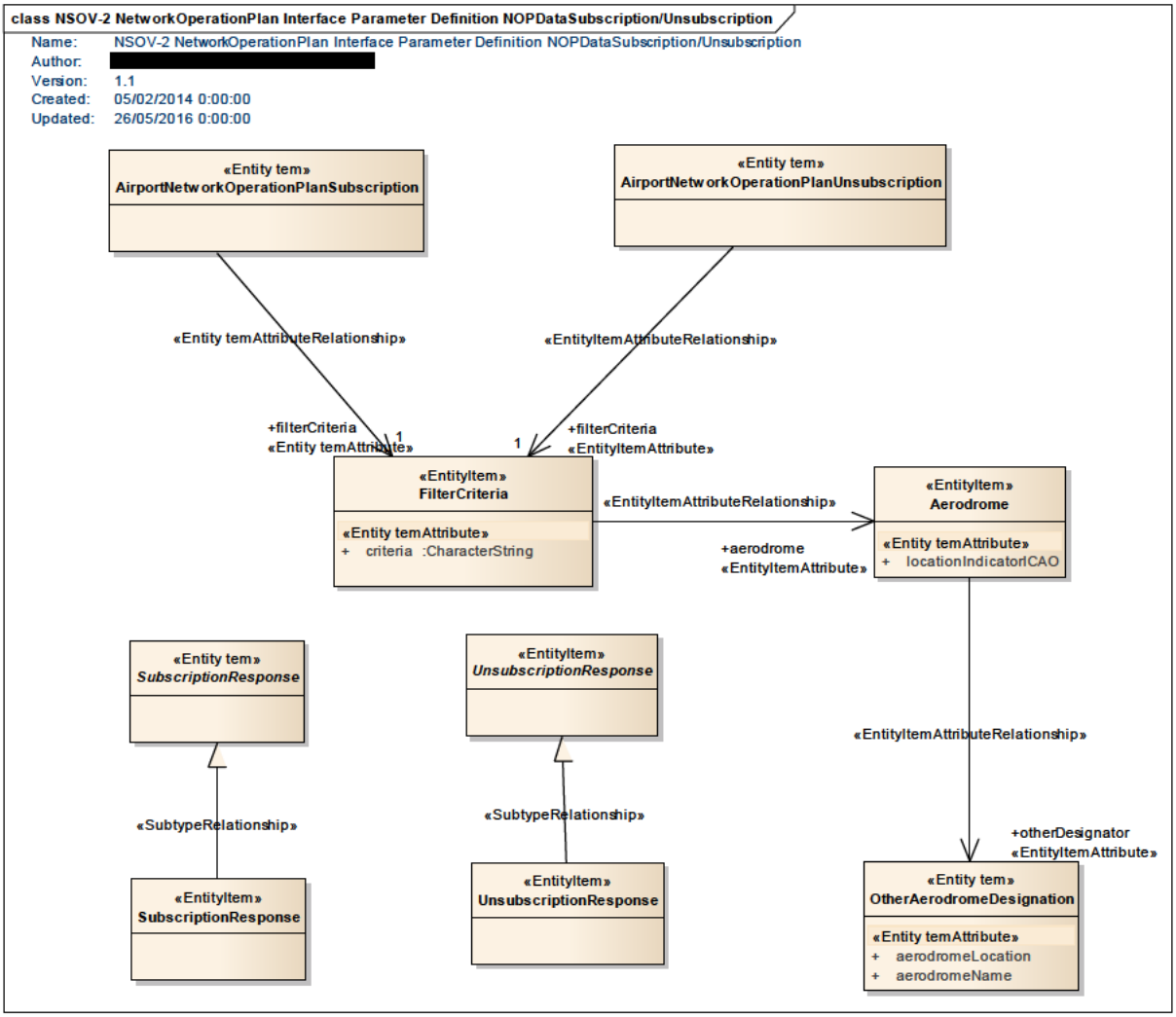


**Figure 6: NSOV-2 NetworkOperationPlan Interface subscription/unsubscription Parameter Definition diagram**

## 5.1.2 Service Interface Definition RequiredNetworkOperationPlanInterfaceDefinition

### 5.1.2.1 Operation publishAirportNetworkOperationPlan

The service operation allows the service provider to publish the NetworkOperationPlan information for a particular airport.

#### 5.1.2.1.1 Operation Functionality

The service operation allows the provider to publish the Network information.

#### 5.1.2.1.2 Operation Parameters

| Element Name | Author | Notes |
|---|---|---|
| AirportNetworkOperationPlanPublication | [redacted] | Message type to supply the publication of some fields of the Network Operational Plan needed by the Airport |

**Table 5. Payload Elements for the publishAirportNetworkPlan**

The operation is modelled without a return type. The operation has a single input parameter which represents the full service payload as represented above. The diagram below show the details of this payload.

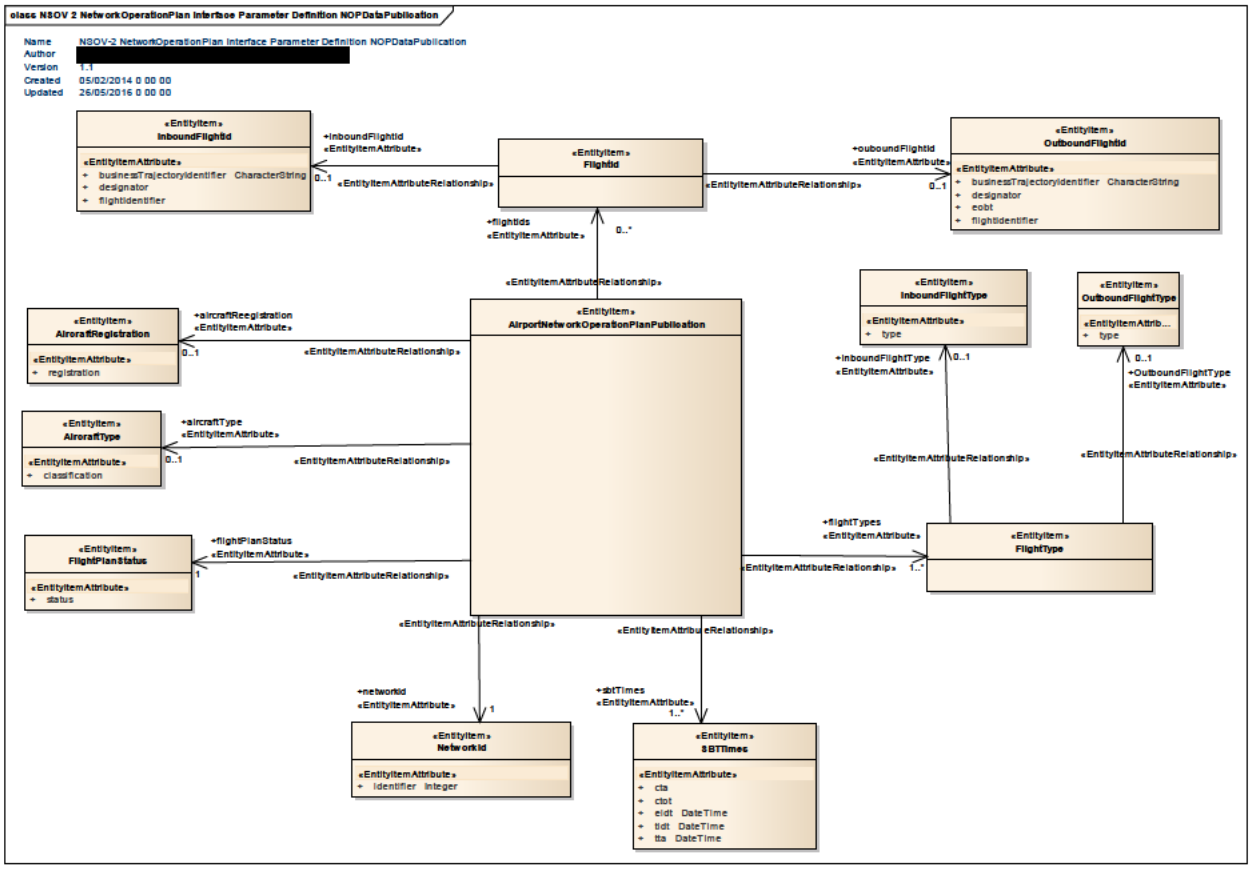


**Figure 7: NSOV-2 NetworkOperationPlan Interface publish Parameter Definition diagram**

| Element Name | | Author | Notes |
|---|---|---|---|
| SubscriptionResponse | | [redacted] | Reply to the subscription operation. |
| | Element Tagged Value Name | Value | |
| | CLDMSemanticTrace | CLDM_out_of_scope | |
| Element Name | | Author | Notes |
| UnsubscriptionResponse | | [redacted] | Reply to the unsubscription operation. |
| | Element Tagged Value Name | Value | |
| | CLDMSemanticTrace | CLDM_out_of_scope | |
| Element Name | | Author | Notes |
| Wind | | [redacted] | The wind information. |
| | Element Tagged Value Name | Value | |
| | CLDMSemanticTrace | urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Meteorology:Wind | |
| | Attribute Name | Type | Notes |
| | windDirection | | The angle representing the direction of the wind source. |

| | Tagged Value Name | Value |
|---|---|---|
| | CLDMSemanticTrace | urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Meteorology:Wind@windDirection |

| | Attribute Name | Type | Notes |
|---|---|---|---|
| | windSpeed | | The speed of the wind at the current time at the airport. |

| | Tagged Value Name | Value |
|---|---|---|
| | CLDMSemanticTrace | urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Meteorology:Wind@windSpeed |

| Element Name | Author | Notes |
|---|---|---|
| AirportMetNowcastPublication | [redacted] | Message type to supply the publication of an airport's meteorological nowcast. |

| | Element Tagged Value Name | Value |
|---|---|---|
| | CLDMSemanticTrace | CLDM_out_of_scope |
| | encoding | |

| Element Name | Author | Notes |
|---|---|---|
| AirportMetNowcastSubscription | [redacted] | Message type to supply the basic filter used in requesting an airport's meteorological nowcast. |

| | Element Tagged Value Name | Value |
|---|---|---|
| | CLDMSemanticTrace | CLDM_out_of_scope |
| | encoding | |

| Element Name | Author | Notes |
|---|---|---|
| AirportMetNowcastUnsubscription | [redacted] | Message type to supply the basic filter used in requesting an airport's meteorological nowcast. |

| | Element Tagged Value Name | Value |
|---|---|---|
| | CLDMSemanticTrace | CLDM_out_of_scope |
| | encoding | |

| Element Name | Author | Notes |
|---|---|---|
| AerodromeCondition | [redacted] | Clustering of Q codes data for the MetNowcastPublication service message |

| | Element Tagged Value Name | Value |
|---|---|---|
| | CLDMSemanticTrace | urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Meteorology:AerodromeCondition |

| | Attribute Name | Type | Notes |
|---|---|---|---|
| | qnh | | The QNH pressure setting for altimeters to read zero at the airport. |

| | Tagged Value Name | Value |
|---|---|---|
| | CLDMSemanticTrace | urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:Meteorology:AerodromeCondition@qnh |

**Table 6: Payload tracing to AIRM**

# 6 Service dynamic behaviour

The interface offers three operations, namely to subscribe/unsubscribe from the publication of the data, and to notify the consumer on the data being available. The service dynamic behaviour can be shown using the NSOV-5c Service-Event diagram created for the purpose. The following diagram shows that the interaction envisaged between provider and consumer is an asynchronous publish/subscribe "push" type MEP.

## 6.1 Service Interface NetworkOperationPlan

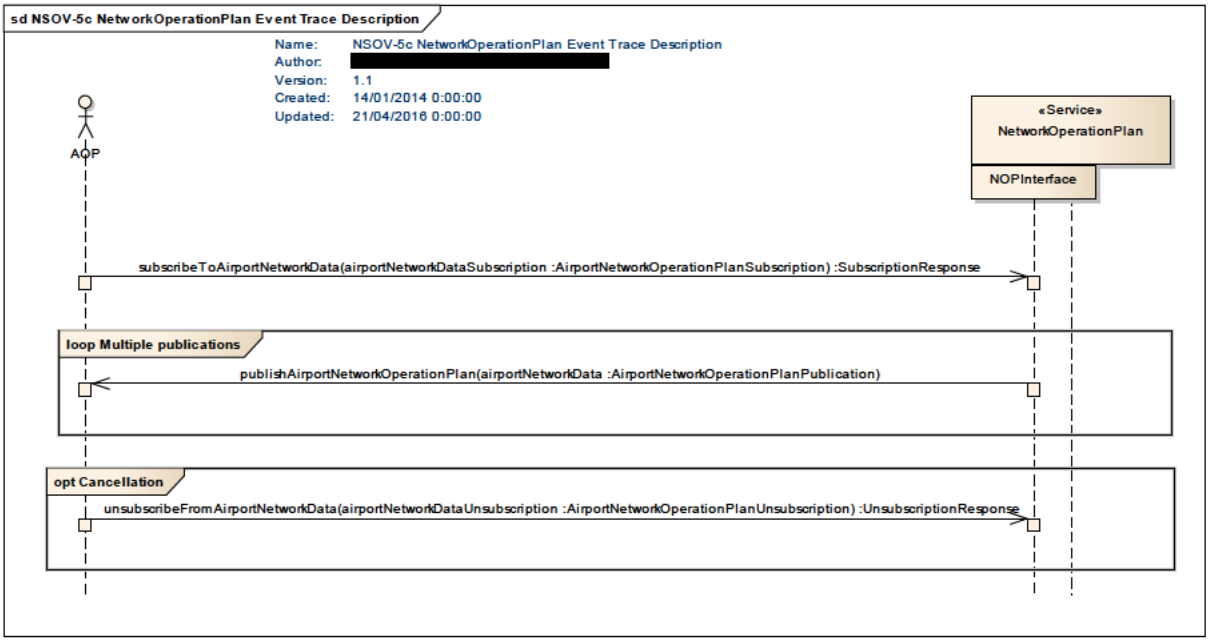


**Figure 8: NSOV-5c NetworkOperationPlan Event Trace Description**

# 7 Service provisioning (optional)

Service prototyping has been performed in the context of Airport validation exercises in SESAR (see in section 8). The technology so far used for the technical interface is Web Services. The detailed description of the technical service contract and service implementation for these exercises is part of technical deliverables by project 12.6.9.

Regarding the infrastructure provisioning, the data sharing needs and operational requirements indicate that the non-functional requirements for these services are relatively low:

| Item | NOP requirement (agreed by P12.06.09 and 08.03.10) |
|---|---|
| **Messaging pattern** | Publish/Subscribe |
| **Message delivery reliability** | None |
| **Real-time message delivery requirements** | None |
| **Security mechanisms (message signature, encryption..)** | None |
| **Message validation or transformation needs** | None |
| **Compression requirements** | None |
| **QoS** | None |
| **Sizing of the exchange** | Not Specified |
| **Transactionality** | Not needed |

Interpreting the table above it is only required to provide an enabling infrastructure service supporting best effort and non-real-time publish-subscribe messaging.

# 8 Validation and Verification

## 8.1 Verification

Verification was performed according to the ISRM Rulebook [6] and the ISRM Verification Guidance [7].

### 8.1.1 Verification Results

Verification was performed via manual inspection and assisted by a script developed in 8.3.10. The verification outcome is completely free of errors.

Verification reports are in these files “Designed_Services_-_NetworkOperationPlanService” and “Designed_Services_-_NetworkOperationPlanService_Common” available in [16].

## 8.2 Validation

Validation for this service was be performed as part of the SESAR validation in the following exercises:

- EXE-06.03.01-VP-609 [13]
- EXE-06.03.01-VP-549 [14]
- EXE-13.02.03-VP-749 [15]

# 9 References

| Name | Version | Document ID / Location |
|---|---|---|
| [1] Project deliverables template | 03.00.00 | SJU templates & guidelines package, Project deliverables template.dot |
| [2] OSED template | 03.00.00 | SJU templates & guidelines package, SESAR Operational Service and Environment Definition.dot |
| [3] SPR template | 03.00.00 | SJU templates & guidelines package, SESAR Safety and Performance Requirements.dot |
| [4] ISRM Tooling Guidelines | 00.07.00 | 08.03.10 D44 |
| [5] ISRM Modelling Guidelines | 00.07.00 | 08.03.10 D44 |
| [6] ISRM Rule Book | 00.07.00 | 08.03.10 D44 |
| [7] ISRM Verification Guidelines | 00.07.00 | 08.03.10 D44 |
| [8] EATMA Guidance Material | 00.04.02 | B.04.01 D66 |
| [9] ISRM service portfolio | 00.08.01 | 08.03.10 D65 |
| [10] Airport DOD | 01.00.01 | 06.02 D07 Airport DOD |
| [11] OFA 05.01.01 Operational Service and Environment Definition | 00.01.00 | 06.05.04 D07 |
| [12] ISRM Delivery Report | 00.01.00 | 08.03.10 D06 |
| [13] EXE-06.03.01-VP-609 VALP | 00.03.00 | 06.03.01 D03 |
| [14] EXE-06.03.01-VP-549 VALP | 00.03.00 | 06.03.01 D133 |
| [15] EXE-13.02.03-VP-749 VALP | 00.03.00 | 13.02.03 D342 |
| [16] Verification reports for the service | 00.00.01 | 08.03.10 D65 Designed_Services_-_NetworkOperationPlanService |

**-END OF DOCUMENT-**