



PJ.15-01 TRL6

PostOperationsIndicators

Service Description

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PJ15 COMMON SERVICES

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Abstract

This document provides the description of the PostOperationsIndicators Service that supports the provision of the Sub-Regional Demand Capacity Balancing (DCB) Common Service.

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Appendix A Service Description Document (SDD)

A.1 Introduction

A.1.1 Purpose of the document

The purpose of this Service Description Document (SDD) is to provide a description of the services designed within SESAR2020.

The purpose of the SDD is to provide a complete design description of the “PostOperationsIndicators” service identified by the Solution PJ.15-01 Sub-Regional Demand Capacity Balancing (DCB) Common Service, to describe the service to such a level that it is possible to make decisions in activities such as Service Implementation and evolution planning. The document serves as a complement to a model based description, which can be found in the EATMA Repository (MEGA).

A.1.2 Scope

The scope of this document is to provide the logical service definition that aims to support the provision of the Sub-Regional DCB Common Service, as defined by PJ.15-01. It includes artefacts such as service interfaces, service operations and service payload (data elements and entities), while maintaining a technology-agnostic nature, meaning that the definition of the service does not recommend or constrain any specific technology choices.

A.1.3 Intended readership

The intended audience for this document is the SESAR Joint Undertaking, the partners in the SESAR 2020 Programme, the ATM stakeholders (e.g. Airspace Users, ANSPs, Airports and manufacturing industry) with those third parties directly affected by its findings and the contributors having dependencies with the solution such as PJ09.

PJ19.03, as responsible for the coordination of Systems and Service development in the Programme, and other transversal projects, may also have an interest.

In addition, it is expected that those PJ.15-01 Solution partners that are involved in Technical Validation exercises planned for TRL-6 will use this document as guidance for their development activities.

A.1.4 Structure of the document

The SDD is originally an annex of the TS/IRS document. However, given the specific nature of PJ.15 and after coordination with SJU, it was agreed that PJ15 Solutions would provide the SDD(s) as independent deliverable(s), by producing one SDD per service. Specifically, three SDD are expected to be delivered by PJ.15-01 for TRL-6 phase.

An initial skeleton of the document, including its structure and most of the diagrams and tables, was produced by using the automatic document generation capability of the MEGA tool. Later, the structure was tailored by PJ.15-01 to adapt it to its needs, and some of the sections were completed with textual descriptions and non-MEGA diagrams.

The structure of the document is as follows:

- Section A.1 introduces the document, by providing an explanation of the scope and purpose.
- Section A.2 describes how the service has been identified.

- Section A.3 provides a description of the business and operational context of the service.
- Section A.4 gives an overview of the service functionality.
- Section A.5 depicts the interfaces and operations of the service.
- Sections A.6 and A.7 depict the payload exchanged through the service.
- Section A.8 describes the dynamic behavior of the service.

A.1.5 Glossary of terms

Term	Definition	Source
Business model	A framework for creating economic, social, and/or other forms of value. The term 'business model' is thus used for a broad range of informal and formal descriptions to represent core aspects of a business, including purpose, offerings, strategies, infrastructure, organizational structures, trading practices, and operational processes and policies.	EUROCONTROL ATM Lexicon
Capability	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.	SESAR2020 PJ19.05 EATMA Guidance Material Version 10
Centralised (service) – a particular type of Common Service	A Centralised Service is an ANS support service exercised at pan-European and central network level for organisation and cost-efficiency purpose avoiding multiplication of investments, leading to reduced infrastructure costs, supporting the ANSPs and the Member States of the EU to come closer or actually achieving the EU cost efficiency performance targets.	EUROCONTROL
Common Service	A service providing a capability in the same form to consumers that might otherwise have been undertaken by themselves'	SESAR B04.05 D02
Consumer	A user of a service	SESAR B04.05 D02
Customer	A consumer of a service under a specific contract.	SESAR B04.05 D02
Data Element	A formalized representation of data. Data Elements are exchanged by Technical Systems when invoking Service Operations in Service Interfaces or using System Ports.	SESAR2020 PJ19.05 EATMA Guidance Material Version 10
Data Entity	A definition (type) of an item of interest. Data Entities are the building blocks used to define Data Elements.	SESAR2020 PJ19.05 EATMA Guidance Material Version 10
Node	A logical entity that performs activities. Note: nodes are specified independently of any physical organisation.	SESAR2020 PJ19.05 EATMA Guidance Material Version 10
Security and safety in the context of a	Non-Functional Requirements (NFR) and Quality of service (QoS) requirements can be specified at various levels of maturity and from different viewpoints such as from the collaborative enterprise, the logical level, technology and	ISRM – Modelling guidelines

Common Service	engineering perspectives. Conceptually, NFR and QoS are not always distinguishable. Common Services will focus at the first two viewpoints	
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.	SESAR2020 PJ19.05 EATMA Guidance Material Version 10
Service contract (SLA)	A service contract represents an agreement between the stakeholders involved for how a service is to be provided and consumed. A service contract is specified through the service interface, the QoS and Service policies.	SESAR B.04.03 – Working method on service
Service Interface	The mechanism by which a service communicates. Note: a Service Interface specifies the Service Interface Definition provided and required by the Service.	SESAR2020 PJ19.05 EATMA Guidance Material Version 10
Service Operation	A function or procedure which enables programmatic communication with a Service via a Service Interface.	SESAR2020 PJ19.05 EATMA Guidance Material Version 10
Service Provider	An organization supplying services to one or more internal or external consumers.	SESAR B.04.05 – D02
Service taxonomy	The service taxonomy describes the organization of services provided between ATM stakeholders. It is used to organize the responsibilities of the service design as well as to provide a means of identifying services in the run-time environment.	SESAR B.04.03 – Working method on service
Stakeholder	A stakeholder is an individual, team, or organization (or classes thereof) with interest in, or concerns relative to, an enterprise (e.g. the European ATM). Concerns are those interests, which pertain to the enterprise's development, its operation or any other aspect that is critical or otherwise important to one or more stakeholders.	SESAR2020 PJ19.05 EATMA Guidance Material Version 10

Table 1: Glossary of Terms

A.1.6 Acronyms and Terminology

Term	Definition
ANSP	Air Navigation Service Provider
ATM	Air Traffic Management
DCB	Demand and Capacity Balancing
EATMA	European ATM Architecture
IER	Information Exchange Requirement
IRS	Interface Requirements Specification
KPI	Key Performance Indicator
MEP	Message Exchange Pattern
NAF	NATO Architecture Framework
NFR	Non-Functional Requirements
NM	Network Manager
NSOV	NAF Service-Oriented View
PJ	Project (in SESAR2020)
QoS	Quality of Service
SDD	Service Description Document
SESAR	Single European Sky ATM Research Programme
SJU	SESAR Joint Undertaking (Agency of the European Commission)
TRL	Technology Readiness Level
TS	Technical Specification

Table 2: Acronyms and Terminology

A.2 Service Identification

Name of the Service	PostOperationsIndicators
Identifier	ojzzEyFjQXJJ
Version	EATMA Draft
Architect(s)	XU Junchen
Last Modification Date	1/3/2019

Table 3: Service identification (I)

IOC	
FOC	12/31/2029

Table 4: Service Identification (II)

A.3 Operational and Business Context

Two potential scenarios have been identified and developed as hypothetical deployment scenarios for the Sub-Regional DCB Common Service in [1].

- New Sub-regional DCB Service
- Refreshment of Legacy Sub-regional DCB Service

Although the two scenarios are distinct from the business perspective (in terms of proposed value, expected cost, transition aspects, etc.), they are highly similar from the architecture perspective. The complete architecture description can be found in [2].

Three services have been identified and designed in TRL6 phase (including this PostOperationsIndicators service), and all of them support both scenarios. However, as shown in [2], many information exchanges are identified to be able to achieve the full realisation of the Sub-Regional DCB Common Service. The identification of these three services has been driven by the preferences of the partners participating in the TRL6 Technical Validation Exercises [3], by taking into account the scope of the exercises.

In TRL5, the definition of the three services might be enhanced to include new features in case they are used for any Technical Validation exercise. New services could also be identified and designed for the same reason. This will be discussed by the partners when entering the TRL5 phase.

A.3.1 Operational Context

The functional scope of the service is aligned with the description provided in the Sub-Regional DCB Common Service provided in the Business Model [1]:

The purpose of the Sub-regional Demand Capacity Balancing (DCB) Service (Supporting the DCB capability within the ICAO Global Operational Concept) is to facilitate an improved usage of the airspace at sub-regional level, through enhanced planning and consequently more appropriate tactical intervention in support of AU and AO operations. Consequently the intent of the Sub-regional DCB common service is to enable the Europe-wide benefits of an integrated Sub-regional operation through reduced cost of service provision.

Therefore, the “PostOperationsIndicators” Service that supports the provision of the Sub-Regional DCB Common Service is described as follows:

<< The PostOperationsIndicators service provides indicators regarding the daily operations handled by the Air Traffic Centres and the Airports in a given Sub-Region.

During the post-execution phase, the Sub-regional system will provide the assessment of the operational performance indicators previously identified within the sub-region in order to detect deviations from targets and analyse potential causes. The Sub-Regional Manager will send this information to the Network Manager who will analyse it to develop the KPI report including the analysis of the KPIs adherence after operations and to define corrective actions to achieve agreed targets, when necessary.

These indicators correspond to:

- Total traffic: Amount of movements within an ATC Unit per day (these includes the count of flights taking off from, landing or crossing in the ATC Unit).
- Regulated Traffic: Amount of traffic with applied regulations within an ATC Unit per day.
- Delayed Traffic: Amount of traffic that has been delayed within an ATC Unit per day.
- Average Delay: Total delay divided by the total movements within an ATC Unit per day.
- Maximum Delay: The largest amount of minutes that a single traffic has been delayed within an ATC Unit per day.
- Total Delay: the sum of delay for all flights within an ATC Unit per day.

This service will provide these indicators for historical data, with a minimum of 3 days of delay with respect the current/actual day.>>

A.3.2 Information Exchange Requirements

N/A

A.3.3 Other Requirements

N/A

A.4 Service Overview

A.4.1 Service Taxonomy

N/A¹

A.4.2 Service Levels (NFRs)

In order to ensure that the service is designed in such a way that is ready to support the exchange of information between the stakeholders, and thus effectively contribute to the achievement of the Sub-Regional DCB Common Service, a set of indicators have been defined in PJ.15-01 to measure the Quality of Service (QoS).

For each of the indicators, a success threshold (minimum value to be achieved) has been set by expert judgement by taking into account the overall validation objectives for TRL6, as well as the context where the technical validation exercises will be taking place. These indicators will be used as driver for the development and integration activities, and the technical validation results should capture the degree of compliance regarding these indicators and the success thresholds.

Table 5 provides the list of the indicators defined in PJ.15-01 for TRL6 phase, along with their definition and their success threshold.

Indicator	Definition	Success threshold
Service availability	Percentage of time that the service is up and running	Greater than or equal to 95%
Message integrity	Percentage of messages transmitted by the service provider that correctly reaches the consumer system	Greater than or equal to 95%
Data integrity	For each message that correctly reaches the consumer system, the percentage of attributes that have been received with no error or corruption	Greater than or equal to 95%
Time of response	Time that it takes for the service provider to process the service request and generate the required output ready to be distributed to the consumer	Smaller than or equal to 5 seconds
Time of transmission	Time that it takes for a message to go from the provider system to the consumer system	Smaller than or equal to 30 seconds

Table 5: Quality of Service for PostOperationsIndicators service in TRL6

¹ For the time being, the SESAR2020 Service Portfolio 2017 [4] does not include this service in the service taxonomy. However, following the approval of CR 01717 in DS18a, this should be included in the next version of the document, due late 2018.

A.4.3 Service Functions and Capabilities

Table 6 below shows that the “PostOperationsIndicators” service is supporting the “Sub-Regional DCB Common Service Provision” Capability in the EATMA V10 Capability Model. It is a Level 3 capability which falls under the “Service Delivery Management” capability area. The complete Capability model can be found at <https://www.eatmportal.eu/working/rnd/atm-capability-model>

Supported Capability	Parent Capability	Level 1 Capability
Sub-Regional DCB Common Service Provision		
	ATM Service Management	
		Service Delivery Management

Table 6: EATMA Capability supported by Service

A.4.4 Service Interfaces

Table 7 provides the description of the PostOperationsIndicators Service.

Service Name	Description
PostOperationsIndicators	<p>The PostOperationsIndicators service provides indicators regarding the daily operations handled by the Air Traffic Centres and the Airports in a given Sub-Region.</p> <p>During the post-execution phase, the Sub-regional system will provide the assessment of the operational performance indicators previously identified within the Sub-Region in order to detect deviations from targets and analyse potential causes. The Sub-Regional Manager will send this information to the Network Manager who will analyse it to develop the KPI report including the analysis of the KPIs adherence after operations and to define corrective actions to achieve agreed targets, when necessary.</p> <p>These indicators correspond to:</p> <ul style="list-style-type: none"> • Total traffic: Amount of movements within an ATC Unit per day (these includes the count of flights taking off from, landing or crossing in the ATC Unit). • Regulated Traffic: Amount of traffic with applied regulations within an ATC Unit per day. • Delayed Traffic: Amount of traffic that has been delayed within an ATC Unit per day. • Average Delay: Total delay divided by the total movements within an ATC Unit per day. • Maximum Delay: The largest amount of minutes that a single traffic has been delayed within an ATC Unit per day. • Total Delay: the sum of delay for all flights within an ATC Unit per day. <p>This service will provide these indicators for historical data, with a minimum of 3 days of delay with respect the current/actual day.</p>

Table 7: Description of the Service

The PostOperationsIndicators service has two service interfaces, as shown in Figure 1Error! Reference source not found. below.

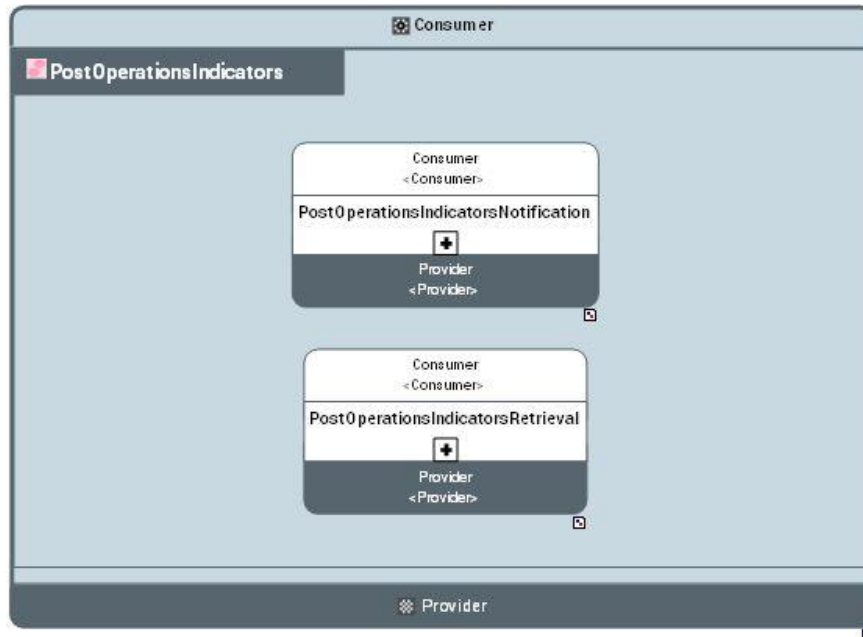


Figure 1: Service to Service Interface mapping

The Table 8 below summarizes the two interfaces of the PostOperationsIndicators Service, along with their description. These are further specified in the next section.

Service Interface Definition	Description
PostOperationsIndicatorsNotification	This interface allows the provider to notify the performance indicators related to an ATC Unit or an Airport to the consumer. The information is provided the day after the day of operation.
PostOperationsIndicatorsRetrieval	This interface allows the consumer to retrieve and receive the performance indicators related to an ATC Unit or an Airport, for a specific date in the past.

Table 8: Service Interface description

A.5 Service interface specifications

A.5.1 PostOperationsIndicatorsNotification

This interface allows the provider to notify on a daily basis, the performance indicators related to an ATC Unit or an Airport to the consumer. Under normal circumstances, the notification is done the day after the day of operation for which the indicators are provided. This is illustrated in Figure 2.

The interface design is using a standard Fire & Forget MEP.



Figure 2: “PostOperationsIndicatorsNotification” Interface Exchange diagram

This interface owns one Service Operation, as shown in Table 9 below. The next sub-section will further specify the operation.

Service Operation	Invoker participant	Input parameter	Invoked participant	Return
notifyPostOperationsIndicators	<Provider>	PostOperationsIndicators Notification	<Consumer>	-

Table 9: Operations of the “PostOperationsIndicatorsNotification” Interface

A.5.1.1 Operation notifyPostOperationsIndicators

The sequence of the exchanges needed to complete this operation is illustrated in Figure 3, while Table 10 captures the input and return payloads. For this operation, the service provider (<Provider> in Figure 2) is the invoker participant and the service consumer (<Consumer> in Figure 2) is the invoked participant.

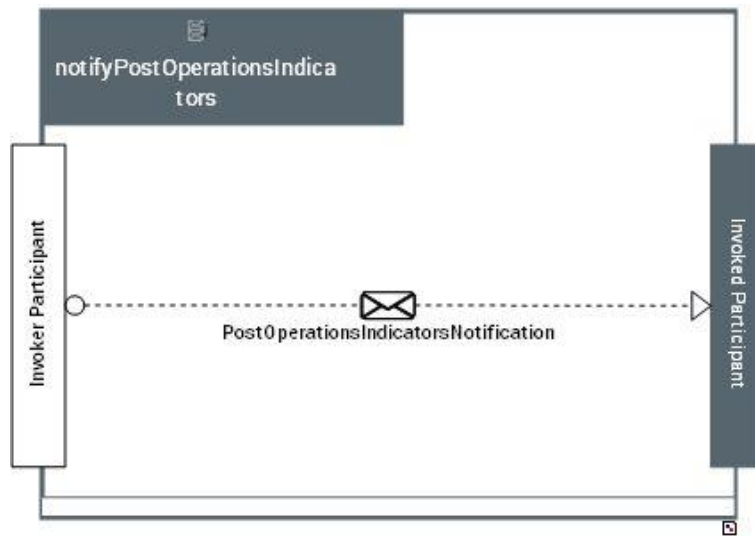


Figure 3: “notifyPostOperationsIndicators” Operation Exchange diagram

Input	Service Payload	Data Entity
	PostOperationsIndicatorsNotification	PostOperationsIndicatorsNotification

Table 10: “notifyPostOperationsIndicators” operation parameters

A.5.2 PostOperationsIndicatorsRetrieval

This interface allows the consumer to retrieve post-operation indicators for an ATC Unit or an Airport, for a specific date in the past. The service provider processes the request and returns the corresponding data. This is illustrated in Figure 4.

The interface design is using a standard Request/reply MEP.

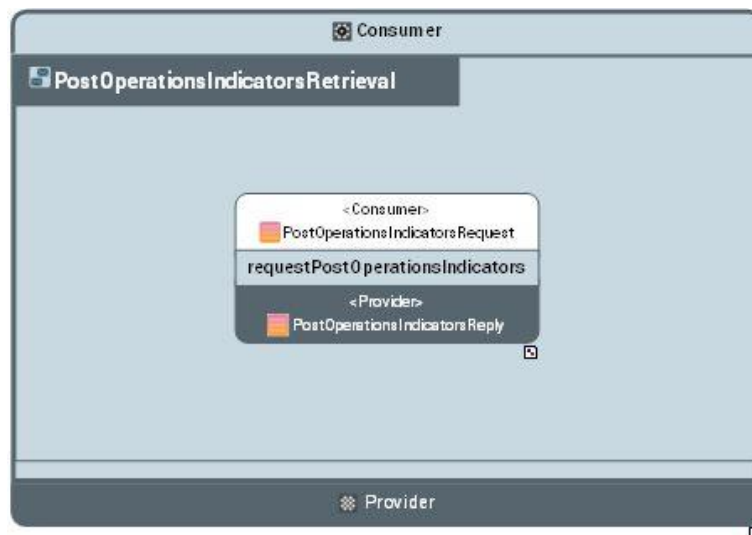


Figure 4: “PostOperationsIndicatorsRetrieval” Interface Exchange diagram

This interface owns one Service Operation, as shown in Table 11 below. The next sub-section will further specify the operation.

Service Operation	Invoker participant	Input parameter	Invoked participant	Return
requestPostOperationsIndicators	<Consumer>	PostOperationsIndicatorsRequest	<Provider>	PostOperationsIndicatorsReply

Table 11: Operations of the “PostOperationsIndicatorsRetrieval” Interface

A.5.2.1 Operation requestPostOperationsIndicators

The sequence of the exchanges needed to complete this operation is illustrated in Figure 5, while Table 12 captures the input and return payloads. For this operation, the service consumer (<Consumer> in Figure 4) is the invoker participant and the service provider (<Provider> in Figure 4) is the invoked participant.

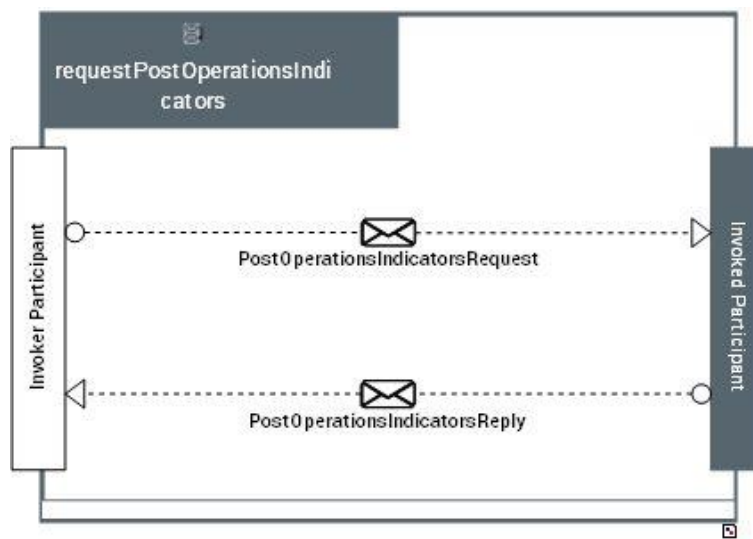


Figure 5: “requestPostOperationsIndicators” Operation Exchange diagram

Input	Service Payload	CLDM Data Entity
	PostOperationsIndicatorsRequest	PostOperationsIndicatorsRequest
Return	Service Payload	CLDM Data Entity
	PostOperationsIndicatorsReply	PostOperationsIndicatorsReply

Table 12: “requestPostOperationsIndicators” operation parameters

A.6 Payload Data Diagrams

This section shows the data diagrams of the entities that are used as payload of the service. They constitute the actual content that are exchanged between the provider and the consumer of the service when invoking the respective operations.

A.6.1 NSOV-2 PostOperationsIndicators Interface Parameter Definition

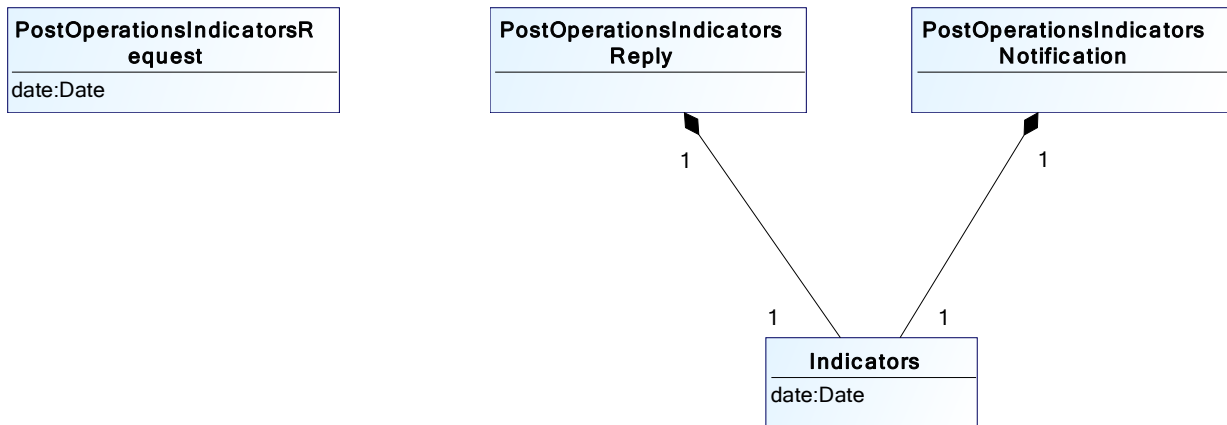


Figure 6: Interface Parameter Definition

A.7 Payload Elements

This section provides the description of each data entity and their attributes, in line with the diagrams shown in section A.6.

The payload description provided in Table 13 has the following structure:

Class					
Class 1		Definition of Class 1			
Attributes					
	Attribute 1	Type	Definition of Attribute 1	Mandatory? (Yes/No)	Cardinality

	Attribute n	Type	Definition of Attribute 2	Mandatory? (Yes/No)	Cardinality

Class					
PostOperationsIndicatorsNotification		This message contains the performance indicators that are provided on a daily basis.			
Class					
PostOperationsIndicatorsReply		This message contains the performance indicators requested by the consumer, for a specific date in the past.			
Class					
PostOperationsIndicatorsRequest		This message requests the retrieval of performance indicators for a specific date in the past.			
	date	Date	Specifies the date for which the performance indicators have been requested.	Yes	1

Table 13: Service Payload description

A.7.1 Payload Data Types

This section lists the data types of the payload described in the previous section.

Name	Description	Type	Value
Date		P-Date	

Table 14: Service Data Types description

A.8 Service dynamic behaviour

This section describes the dynamic aspects of the interactions around the PostOperationsIndicators service, by depicting the nominal sequence of the service operations that occur between the provider and the consumer for each of the service interfaces.

A.8.1 Service Interface PostOperationsIndicatorsNotification

An overview of the interactions concerning this interface is shown in Figure 7 below, in the form of a sequence diagram.



Figure 7: Service Dynamic Behaviour diagram - PostOperationsIndicatorsNotification

A brief description of the sequence is provided below:

- 1.1 The service provider notifies the consumer about the performance indicators, on a daily basis, the day after the day of operation. The “PostOperationsIndicatorsNotification” message is distributed to the service consumer.

A.8.2 Service Interface PostOperationsIndicatorsRetrieval

An overview of the interactions concerning this interface is shown in Figure 8 below, in the form of a sequence diagram.



Figure 8: Service Dynamic Behaviour diagram - PostOperationsIndicatorsRetrieval

A brief description of the sequence is provided below:

- 1.1 At any time, the service consumer can send a “PostOperationsIndicatorsRequest” in order to retrieve the performance indicators for a specific date in the past.
- 1.2 Upon reception of a “PostOperationsIndicatorsRequest”, the service provider returns an “PostOperationsIndicatorsReply” with the requested information.

A.9 Reference documents

- [1] SESAR2020 PJ15 D2.1.060 Sub-Regional DCB TRL6 Business Model, Edition 00.02.01
- [2] SESAR2020 PJ15 D2.1.110 Sub-Regional DCB TRL6 High-Level Architecture Description, Edition 00.02.01
- [3] SESAR2020 PJ15 D2.1.040 Technical Validation Plan for the Sub-Regional DCB Common Service (TRL6), Edition 00.02.01
- [4] SESAR2020 PJ19 D3.2 Service Portfolio 2017, Edition 00.01.00
- [5] EATMA V12 Draft

