



PJ.15-01 TRL6

HotspotDefinitionAnd ProposedSolution Service Description Document

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COSER

PJ15-01 SUB-REGIONAL DCB COMMON SERVICES

This High-Level Architecture Description is part of a project that has received funding from the SESAR Joint Undertaking under grant agreement No 734160 under European Union's Horizon 2020 research and innovation programme.



Abstract

This document provides the description of the HotspotDefinitionAndProposedSolution Service that supports the provision of the Sub-Regional Demand Capacity Balancing (DCB) Common Service for TRL-6 maturity phase.



Table of Contents

| | |
|--|-----------|
| Abstract | 4 |
| 1 Executive Summary | 7 |
| 2 Introduction | 8 |
| 2.1 Purpose of the document | 8 |
| 2.2 Intended readership | 8 |
| 2.3 Inputs from other projects | 8 |
| 2.4 Structure of the document | 8 |
| 2.5 Glossary of basic concepts | 9 |
| 2.6 Acronyms and Terminology | 11 |
| 3 Scope of the Service Description | 13 |
| 3.1 Sub-Regional DCB Common Service | 13 |
| 5 References and Applicable documents | 20 |
| Appendix A | 21 |
| A.1 Service Identification | 21 |
| A.2 Information Exchange Requirements | 21 |
| A.3 Service Overview | 21 |
| A.4 Service interface specifications | 24 |
| A.5 Payload Data Diagrams | 33 |
| A.6 Payload Elements | 36 |
| A.7 Service dynamic behaviour | 49 |

List of Tables

| | |
|--|----|
| Table 1: Glossary of basic concepts..... | 10 |
| Table 2: Acronyms and Terminology..... | 12 |
| Table 3: Service identification (I)..... | 21 |
| Table 4: Service Identification (II)..... | 21 |
| Table 5: Service Taxonomy..... | 21 |
| Table 6: Quality of Service for HotspotDefinitionAndProposedSolution service in TRL-6..... | 22 |
| Table 7: EATMA Capability supported by Service | 23 |
| Table 8: Description of the Service..... | 23 |



| | |
|--|----|
| Table 9: Service Interface description | 24 |
| Table 10: Operations of the “HotspotDefinitionAndProposedSolutionConsumer” Interface | 25 |
| Table 11: “publishHotspotDefinition” operation parameters..... | 25 |
| Table 12: “publishSectorConfigurationProposal” operation parameters | 26 |
| Table 14 Table 13: “publishSectorConfigurationProposal” operation | 27 |
| Table 14: “publishReroutingProposal” operation parameter | 27 |
| Table 15: “publishLevelCappingProposal” operation parameter | 28 |
| Table 16: Operations of the “HotspotDefinitionAndProposedSolutionProvider” Interface | 29 |
| Table 17: “subscribeToHotspotDefinitionAndProposedSolution” operation parameters..... | 30 |
| Table 18: “unsubscribeFromHotspotDefinitionAndProposedSolution” operation parameters | 31 |
| Table 19: “publishAcceptRejectCounterProposal” operation parameters | 32 |
| Table 20: Service Payload description..... | 41 |
| Table 21: Payload Data Types description | 48 |
| List of Figures | |
| Figure 1: Service to Service Interface mapping..... | 23 |
| Figure 2: “HotspotDefinitionAndProposedSolutionConsumer” Interface Exchange diagram | 24 |
| Figure 3: “publishHotspotDefinition” Operation Exchange diagram | 25 |
| Figure 4: “publishSectorConfigurationProposal” Operation Exchange diagram | 26 |
| Figure 5: “publishReroutingProposal” Operation Exchange diagram | 27 |
| Figure 6: “publishLevelCappingProposal” Operation Exchange diagram | 28 |
| Figure 7: “HotspotDefinitionAndProposedSolutionProvider” Interface Exchange diagram..... | 29 |
| Figure 8: “subscribeToHotspotDefinitionAndProposedSolution” Operation Exchange diagram | 30 |
| Figure 9: “unsubscribeFromHotspotDefinitionAndProposedSolution” Operation Exchange diagram | 31 |
| Figure 10: “publishAcceptRejectCounterProposal” Operation Exchange diagram..... | 32 |
| Figure 11: Interface Parameter Definition – Hotspot | 33 |
| Figure 12: Interface Parameter Definition – Solution | 34 |
| Figure 13: Interface Parameter Definition – Subscription | 35 |
| Figure 14: Service Dynamic Behavior diagram..... | 50 |

1 Executive Summary

The Sub-Regional Demand Capacity Balancing (DCB) aims to contribute to a better usage of the airspace at sub-regional level, through enhanced planning and consequently more appropriate tactical intervention in support of AU and AO operations. In addition to the expected benefits in airspace capacity and fuel efficiency areas, an improvement in cost efficiency for the concerning stakeholders is also foreseen¹. The Sub-regional Demand Capacity Balancing (DCB) Common Service aims to enable Sub-Regional Demand Capacity Balancing (DCB) by reducing cost through the provision of a common service.

In TRL2 and TRL-4, PJ.15-01 described the scenarios where this Common Service could be provided, from a business perspective. The Business Model that captures these scenarios has been updated for the TRL-6 phase [2].

In line with this, this document has been updated as well to reflect the changes in Hotspot Definition and Proposal Service description from TRL-4 to TRL-6. The main changes can be observed in the System layer, where the architecture description provides an overview of the three services that have been identified and described in TRL-6. These three services have also been prototyped and used in two distinct technical validation exercises.

Please notice that although two different scenarios were identified in PJ.15-01 TRL-6 Sub-Regional DCB Business Model [2], it was decided that only one architecture description would be sufficient for them. The rationale is that the main difference between the two scenarios is the business value proposed to the consumers of the Common Service, however this difference has no impact on the architectural changes introduced by the provision of Common Service, in terms of who are the actors and what information/data is being exchanged between them.

Following the Architecture steering principles provided by PJ.19, existing architecture elements have been reused wherever possible. The identification and definition of new elements has been done only where deemed strictly necessary.

¹ Note that Demand Capacity Balancing concept is generated through Network Services solutions and the benefits associated with these solutions are Punctuality, Delay Reduction, Fuel Efficiency, etc. Sub-Regional DCB Common Service is focused on providing DCB services at a reduced cost, therefore cost efficiency is the benefit measured.

2 Introduction

2.1 Purpose of the document

This document describes the Hotspot Definition and Proposal Service for the Sub-Regional Demand and Capacity Balancing (DCB) Common Service. It follows the architecting approach defined in the Common Services Foundation Method [1] from SESAR 1 and uses the Business Model [2] previously produced in PJ.15-01 to provide the definition of operational, service and system architectures for the Sub-Regional DCB Common Service.

2.2 Intended readership

The intended audience for this document is the SESAR Joint Undertaking, the members 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 contributions having dependencies with the Solution such as PJ.09.

Other transversal projects, such as PJ.19, and tasks within the SESAR 2020 Programme may also have an interest.

The document also provides inputs for future work in PJ.15-01 regarding the service definition activities.

2.3 Inputs from other projects

The basic notions of the Sub-Regional DCB Common Service are described by PJ.15-01 in its TRL-6 Business Model document [2], including the potential customers of the service, the value propositions and the information flows needed between the stakeholders.

The concept of the DCB operations, although not always focused on the specificities of the Sub-Regional dimension, were widely developed in SESAR 1 Programme, mainly by WP07 and WP13.

In SESAR2020, the fundamentals of the Sub-Regional DCB are described in the SESAR2020 CONOPS [3], specifically based on the “Flow Manager” role. In addition, the DCB and NM concepts will further evolve in PJ.09.

The reference architecture, including its individual elements, are from the EATMA Repository, which is maintained by using the MEGA modelling tool [4] and can be accessed via the European ATM Portal [5].

2.4 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 PJ.15 Solutions would provide the SDD(s) as independent deliverable(s), by producing one SDD per service. Specifically, two 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 1 provides an executive summary.
- Section 2 introduces the document, by providing an explanation of the scope and purpose.
- Section 3 introduced the Service Description
- Section A.1 describes the Service Identification.
- Section A.2 describes the Information Exchange Requirements.
- Section A.3 gives an overview of the service functionality.
- Section A.4 describes the Service Interface Specifications.
- Sections A.5 and A.6 depict the payload exchanged through the service.
- Section A.7 describes the dynamic behavior of the service.

2.5 Glossary of basic concepts

| Term | Definition | Source |
|-------------------------------|---|--|
| 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. | PJ19: EATMA Guidance Material and Report (2017) [15] |
| Capability Configuration | A Capability Configuration is a combination of Roles and Technical Systems configured to provide a Capability derived from operational and/or business need(s) of a stakeholder type. | PJ19: EATMA Guidance Material and Report (2017) [15] |
| 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 |
| Demand and Capacity Balancing | Assessment and balancing of demand and capacity at network and airport level to provide the NOP/AOP for the day of operation. | EATMA V12 – ATM Capability Model |
| Flow Manager | The Flow Manager is a role performed at sub-regional level which contributes to the Network Management Function. | SESAR2020 Concept of Operations Edition 2017 |
| Node | A logical entity that performs activities. | PJ19: EATMA Guidance Material and Report (2017) [15] |

| | | |
|--|--|--|
| | Note: nodes are specified independently of any physical realisation. | |
| Operational Node Interaction Description (NOV-2) | Defines the nodes and describe information exchanges and (services between nodes). Mapping capability and nodes. In EATMA it is a high-level communication material. | PJ19: EATMA Guidance Material and Report (2017) [15] |
| 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. | PJ19: EATMA Guidance Material and Report (2017) [15] |
| 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 instance | Service which has been implemented in accordance with its specification in the service catalogue (during the SESAR Development Phase, the service definitions are available in the ISRM) by a service provider (by itself or contracted to a third party). | SESAR B.04.03 – Working method on service |
| Service Provider | An organisation supplying services to one or more internal or external consumers. | SESAR B.04.05 – D02 |
| Service taxonomy | The service taxonomy describes the categorisation of services provided between ATM stakeholders. It is used to organise 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. | PJ19: EATMA Guidance Material and Report (2017) [15] |
| System Interface Description (NSV-1) | Links together the Operational View and the System View by depicting which systems and system connections realize which information exchanges. It is based on the definition of Capability Configurations and describes the assets, both technical and human which are required in order to provide capability. | PJ19: EATMA Guidance Material and Report (2017) [15] |

Table 1: Glossary of basic concepts

2.6 Acronyms and Terminology

| Term | Definition |
|-------|---|
| ACC | Area Control Centre |
| AMAN | Arrival Manager (Controller Support Tool) |
| ANSP | Air Navigation Service Provider |
| AO | Airport Operator |
| AOP | Airport Operation Plan |
| ATFCM | Air Traffic Flow and Capacity Management |
| ATM | Air Traffic Management |
| ATS | Air Traffic Services |
| AU | Airspace Users |
| CC | Capability Configuration |
| CDM | Collaborative Decision Making |
| DCB | Demand and Capacity Balancing |
| DPI | Departure Planning Information |
| EATMA | European ATM Architecture |
| EOBT | Estimated Off-Block Time |
| ER | En-Route |
| FAB | Functional Airspace Block |
| FM | Flow Manager |
| KPI | Key Performance Indicator |
| MEP | Message Exchange Pattern |
| NAF | NATO Architecture Framework |
| NM | Network Manager |
| NOP | Network Operations Plan |
| NOV | NAF Operational View |
| NSV | NAF System View |
| PJ | Project |
| QoS | Quality of Service |
| SDD | Service Description Document |
| SESAR | Single European Sky ATM Research Programme |
| SID | Standard Instrument Departure |
| SJU | SESAR Joint Undertaking (Agency of the European Commission) |
| SLA | Service level Agreement |



| | |
|------|---|
| STAM | Short Term ATFCM Measures |
| STAR | Standard Terminal Arrival Route |
| SUA | Special Use Area |
| TRL | Technology Readiness Level |
| TTA | Target Time of Arrival |
| TWR | Tower (Capability Configuration in EATMA) |

Table 2: Acronyms and Terminology

3 Scope of the Service Description

The main objective of the HotspotDefinitionAndProposalSolution Service description is to describe the main architecture elements and their relationships across the different architecture layers of the Sub-Regional DCB Common Service. This description starts with the business and operational needs, and goes down to the system resources that will need to collaborate with each other to meet these needs, supported by the services that enable the actual exchange of data.

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.

3.1 Sub-Regional DCB Common Service

Although the complete definition and the underlying principles of the Sub-Regional DCB Common Service can be found in the Business Model [2], some extracts are provided below to better understand the scope of this document.

Sub-regional activity takes management responsibility for the airspace for a number of geographically adjacent ACCs whilst presenting a single operational interface to the regional actor; representing the local actors, including Airports, within this airspace.

The objective of developing Sub-Regional DCB as a common service is to provide optimised operation of a highly integrated part of the network by working closely with the units to balance demand against the available capacity of the different stakeholders.

It is expected that Sub-regional DCB can be applied within a multi-ACC or multi-ANSP environment and facilitate an improved usage of the airspace at sub-regional level and facilitate tactical interventions when necessary, ensuring that any potential disruptions could be correctly managed.

3.1.1 Sub-Regional DCB Common Service Scenarios

In the Business Model, two potential scenarios have been identified as candidates for deployment:

- New Sub-Regional DCB Common Service. In this scenario an ANSP that does not provide or participate in any Sub-Region wish to do so in a multi-ACC environment.
- Refreshment of legacy Sub-Regional DCB Service. In this scenario an ANSP who was already part of a Sub-Region intends to migrate to a SESAR compliant service due to cost efficiency purposes.

4 Security Requirements

This section describes the Security Requirements. The security requirements are generated through analysis performed in the PJ15-01 Sub-Regional DCB TRL4 Security Assessment Reports [17][18][19].

Note that there are no Functional Security Requirements identified for the HotspotDefinitionAndProposedSolution service.

| | |
|-------------|--|
| Identifier | IER-15.01-SECR-101 |
| Title | Background Verification Checks. |
| Requirement | Background verification checks on all staff shall be carried out in accordance with relevant laws, regulation, and ethics. The checks shall be proportional to the roles and responsibilities. |
| Status | <In Progress> |
| Rationale | ISO 27001 Control Set Requirement |
| Category | <Security> |

[REQ Trace]

| Relationship | Linked Element Type | Identifier |
|----------------|---------------------|------------|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.15.01 |

| | |
|-------------|---|
| Identifier | IER-15.01-SECR-102 |
| Title | Staff Awareness Training |
| Requirement | Staff shall receive appropriate awareness training and regular updates in organisational policies and procedures, as relevant for their job function. |
| Status | <Validated> |
| Rationale | ISO 27001 Control Set Requirement |
| Category | <Security> |

[REQ Trace]



| Relationship | Linked Element Type | Identifier |
|----------------|---------------------|------------|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.15.01 |

| | |
|-------------|---|
| Identifier | IER-15.01-SECR-103 |
| Title | Formal Exchange Policies |
| Requirement | Formal exchange policies, procedures, and controls shall be in place to protect the exchange of ATM services and information through the use of all types of communication facilities |
| Status | <In Progress> |
| Rationale | ISO 27001 Control Set Requirement |
| Category | <Security> |

[REQ Trace]

| Relationship | Linked Element Type | Identifier |
|----------------|---------------------|------------|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.15.01 |

| | |
|-------------|--|
| Identifier | IER-15.01-SECR-104 |
| Title | ATM Networks Management and control |
| Requirement | ATM Networks shall be adequately managed and controlled, in order to be protected from threats, and to maintain security for the ATM systems and applications using the network, including information in transit. |
| Status | <In Progress> |
| Rationale | ISO 27001 Control Set Requirement |
| Category | <Security> |

[REQ Trace]

| Relationship | Linked Element Type | Identifier |
|----------------|---------------------|------------|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.15.01 |

| | |
|-------------|---|
| Identifier | IER-15.01-SECR-105 |
| Title | Information Storage and Exchange Confidentiality and Criticality |
| Requirement | Information storage and exchange means shall be defined according to information confidentiality/criticality level. |
| Status | <In Progress> |
| Rationale | ISO 27001 Control Set Requirement |
| Category | <Security> |

[REQ Trace]

| Relationship | Linked Element Type | Identifier |
|----------------|---------------------|------------|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.15.01 |

| | |
|-------------|---|
| Identifier | IER-15.01-SECR-106 |
| Title | ATM Security Perimeters and Sensitive Areas |
| Requirement | Security perimeters shall be used to protect ATM sensitive areas and ATM processing facilities. |
| Status | <In Progress> |
| Rationale | ISO 27001 Control Set Requirement |
| Category | <Security> |

[REQ Trace]

| Relationship | Linked Element Type | Identifier |
|----------------|---------------------|------------|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.15.01 |

| | |
|-------------|--|
| Identifier | IER-15.01-SECR-107 |
| Title | ATM Secure Areas Access Controls |
| Requirement | ATM secure areas shall be protected by appropriate entry controls which allow access only to authorized personnel and which detect unauthorized access |
| Status | <In Progress> |
| Rationale | ISO 27001 Control Set Requirement |
| Category | <Security> |

[REQ Trace]

| Relationship | Linked Element Type | Identifier |
|----------------|---------------------|------------|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.15.01 |

| | |
|-------------|---|
| Identifier | IER-15.01-SECR-108 |
| Title | ATM Cabling Protection |
| Requirement | ATM cabling shall be protected from deliberate damage, eavesdropping or interference. |
| Status | <In Progress> |
| Rationale | ISO 27001 Control Set Requirement |
| Category | <Security> |

[REQ Trace]

| Relationship | Linked Element Type | Identifier |
|----------------|---------------------|------------|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.15.01 |

| | |
|-------------|---|
| Identifier | IER-15.01-SECR-109 |
| Title | ATM Equipment Maintenance |
| Requirement | ATM equipment shall be maintained and serviced to ensure their availability and integrity |



| | |
|-----------|-----------------------------------|
| Status | <In Progress> |
| Rationale | ISO 27001 Control Set Requirement |
| Category | <Security> |

[REQ Trace]

| Relationship | Linked Element Type | Identifier |
|----------------|---------------------|------------|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.15.01 |

| | |
|-------------|---|
| Identifier | IER-15.01-SECR-110 |
| Title | Detection, prevention, and recovery controls |
| Requirement | Detection, prevention, and recovery controls to protect ATM software against malicious code and appropriate user awareness procedures shall be implemented. |
| Status | <In Progress> |
| Rationale | ISO 27001 Control Set Requirement |
| Category | <Security> |

[REQ Trace]

| Relationship | Linked Element Type | Identifier |
|----------------|---------------------|------------|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.15.01 |

| | |
|-------------|---|
| Identifier | IER-15.01-SECR-111 |
| Title | Access Control Policies |
| Requirement | An access control policy shall be established, documented, and reviewed based on business and security requirements for access. |
| Status | <In Progress> |
| Rationale | ISO 27001 Control Set Requirement |
| Category | <Security> |

[REQ Trace]

| Relationship | Linked Element Type | Identifier |
|----------------|---------------------|------------|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.15.01 |

| | |
|-------------|--|
| Identifier | IER-15.01-SECR-112 |
| Title | Protection of authentication information or devices |
| Requirement | User shall be required to follow good security practices in the protection of authentication information or devices. |
| Status | <In Progress> |
| Rationale | ISO 27001 Control Set Requirement |
| Category | <Security> |

[REQ Trace]

| Relationship | Linked Element Type | Identifier |
|----------------|---------------------|------------|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.15.01 |

| | |
|-------------|--|
| Identifier | IER-15.01-SECR-113 |
| Title | Access Control Lists |
| Requirement | To have control about the ACCs that request information to a provider using an Access Control Lists. |
| Status | <In Progress> |
| Rationale | ISO 27001 Control Set Requirement |
| Category | <Security> |

[REQ Trace]

| Relationship | Linked Element Type | Identifier |
|----------------|---------------------|------------|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.15.01 |

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Appendix A

A.1 Service Identification

| | |
|-------------------------------|--------------------------------------|
| Name of the Service | HotspotDefinitionAndProposedSolution |
| Identifier | CvohgzAXQfXN |
| Version | EATMA Draft |
| Architect(s) | XU Junchen |
| Last Modification Date | 01/03/2019 |

Table 3: Service identification (I)

| | |
|------------|------------|
| IOC | |
| FOC | 12/31/2029 |

Table 4: Service Identification (II)

A.2 Information Exchange Requirements

Information Exchange requirements have been incorporated within the 15-01 High Level Architecture Description [8]. The information requirements have been developed from the NOV-2 (Operational Node Context Diagram) Sub-regional DCB Common Service – New Service Scenario detailed in the 15-01 High Level Architecture Description [8].

A.3 Service Overview

A.3.1 Service Taxonomy

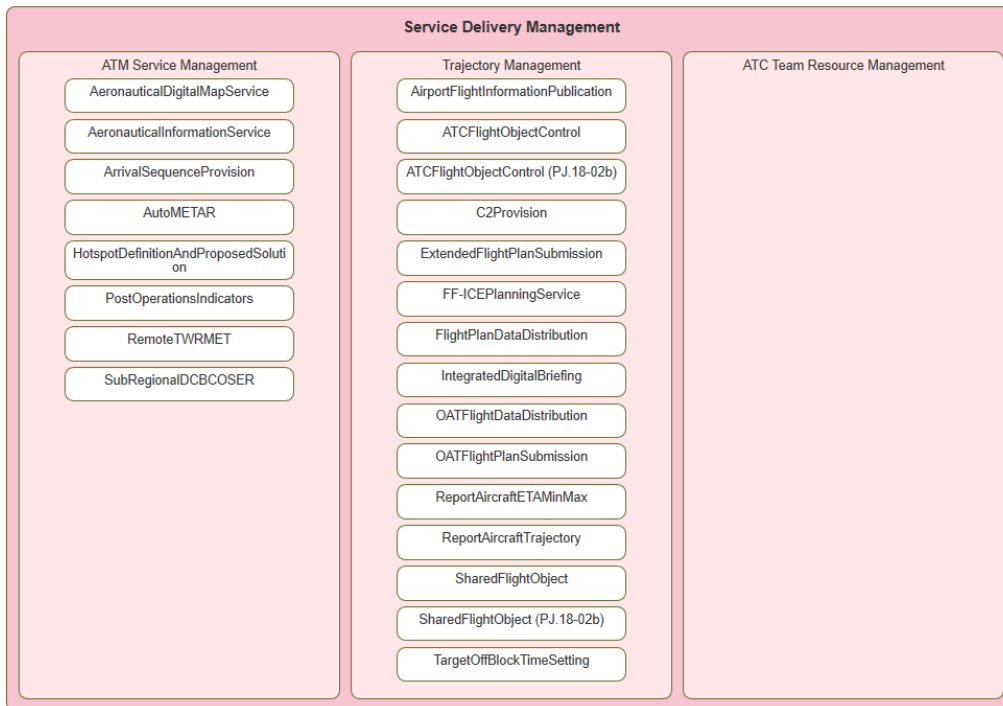


Table 5: Service Taxonomy



A.3.2 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 TRL-6, 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 6 provides the list of the indicators defined in PJ.15-01 for TRL-6 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 reach 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 | Less 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 | Less than or equal to 30 seconds |

Table 6: Quality of Service for HotspotDefinitionAndProposedSolution service in TRL-6

A.3.3 Service Functions and Capabilities

Table 7 shows that the “HotspotDefinitionAndProposedSolution” service is supporting the “Sub-Regional DCB Common Service Provision” Capability in the EATMA V12 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 [Capability Model](#).

| Supported Capability | Parent Capability | Level 1 Capability |
|-----------------------------------|--|-------------------------------|
| Air Traffic Complexity Management | | |
| | Demand and Capacity Balancing (airspace) | |
| | | Demand and Capacity Balancing |

| | | |
|--|------------------------|-----------------------------|
| Sub-regional DCB Common Service Management | | |
| | ATM Service Management | |
| | | Service Delivery Management |

Table 7: EATMA Capability supported by Service

A.3.4 Service Interfaces

Table 8 provides the description of the HotspotDefinitionAndProposedSolution Service.

| Service Name | Description |
|--------------------------------------|--|
| HotspotDefinitionAndProposedSolution | Based on demand forecast provided by Regional NM and the local capacity plans, this service identifies hotspots for a number of Units (which constitute a Sub-Region) and distributes them via a Publish/Subscribe pattern. At later stage, the service will propose measures of three different types (Sector Configuration, Re-routing and Level Capping) to solve the hotspots. The timeframe for identification of Hotspots is D-1 to time of operation. Demand vs capacity is continually and where demand exceeds capacity then the user has the ability to create a hotspot. Creation of hotspots is asynchronous and user driven. Local capacity plans are created through the Long/Medium and Short Term planning process. these initially generated plans are used and refined in the D-1 to time of operation time frame. |

Table 8: Description of the Service

The HotspotDefinitionAndProposedSolution service has two service interfaces, as shown in Figure 1 below.

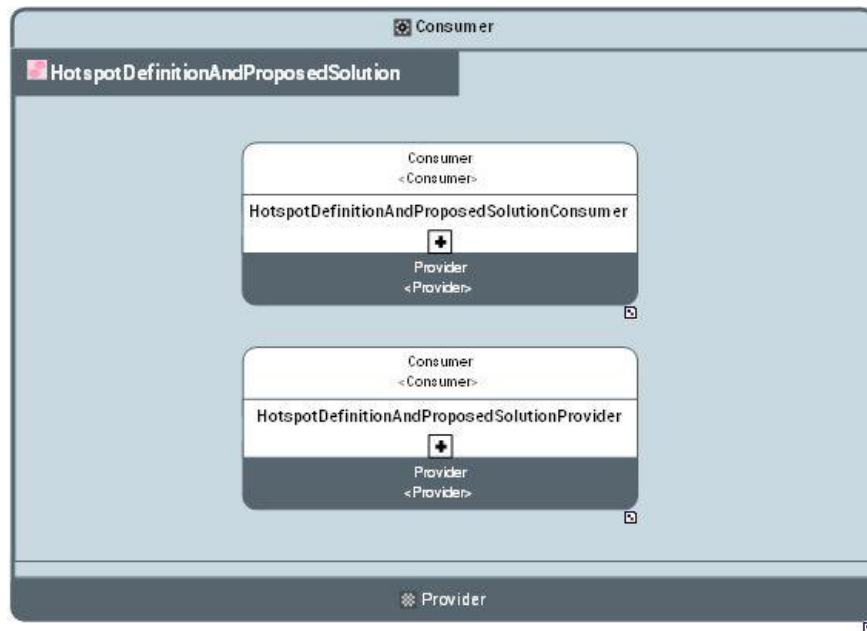


Figure 1: Service to Service Interface mapping



Table 9 below summarizes the interfaces of the HotspotDefinitionAndProposedSolution Service, along with their description. These are further specified in the next section.

| Service Interface Definition | Description |
|---|---|
| HotspotDefinitionAndProposedSolutionConsumer | This interface is the consuming interface to receive the list of hotspots and the proposed solutions distributed by the service provider. |
| HotspotDefinitionAndProposedSolutionPublisher | This interface is the providing interface to receive a subscription or an unsubscription for the service from the consumer. |

Table 9: Service Interface description

A.4 Service interface specifications

A.4.1 HotspotDefinitionAndProposedSolutionConsumer

This interface is the consuming interface to receive the list of hotspots identified by the provider and the different solutions proposed by the provider to resolve the hotspots, as illustrated in Figure 2.

The interface design is using a standard Publish/Subscribe Message Exchange Pattern (MEP).



Figure 2: “HotspotDefinitionAndProposedSolutionConsumer” Interface Exchange diagram

This interface owns four Service Operations, as shown in Table 10 below. The next sub-sections will further specify the operations.

| Service Operation | Invoker participant | Input parameter | Invoked participant | Return |
|------------------------------------|---------------------|-----------------------------|---------------------|--------|
| publishHotspotDefinition | <Provider> | HotspotList | <Consumer> | - |
| publishSectorConfigurationProposal | <Provider> | SectorConfigurationProposal | <Consumer> | - |
| publishReroutingProposal | <Provider> | ReroutingProposal | <Consumer> | - |
| publishLevelCappingProposal | <Provider> | LevelCappingProposal | <Consumer> | - |

Table 10: Operations of the “HotspotDefinitionAndProposedSolutionConsumer” Interface

B.4.1.1 Operation publishHotspotDefinition

Operation on the provider side to distribute the list of hotspots that have been identified by the service provider, according to the filtering criteria provided by the consumer when subscribing.

The sequence of the exchanges needed to complete this operation is illustrated in Figure 3, while Table 11 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.

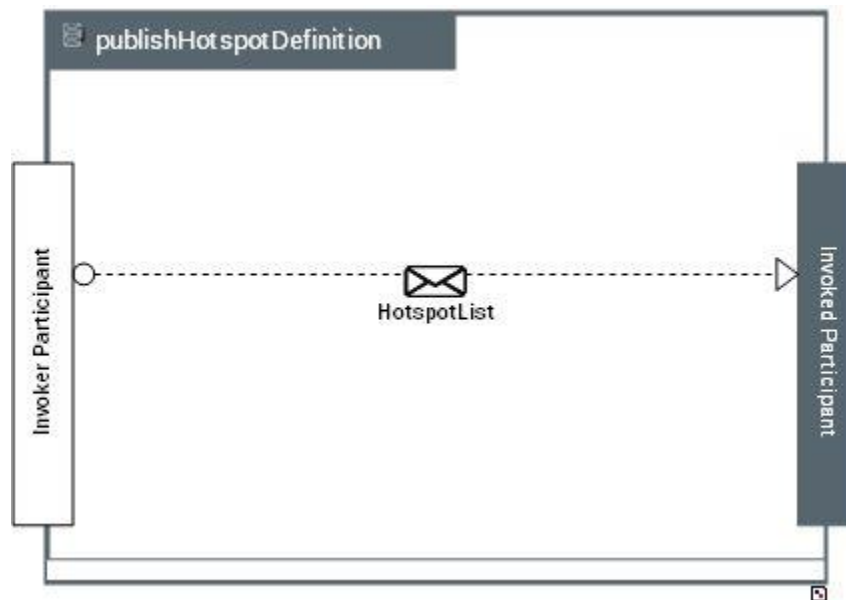


Figure 3: “publishHotspotDefinition” Operation Exchange diagram

| Input | Service Payload | CLDM Data Entity |
|-------|-----------------|------------------|
| | HotspotList | HotspotList |

Table 11: “publishHotspotDefinition” operation parameters

B.4.1.2 Operation publishSectorConfigurationProposal

Operation on the provider side to distribute proposal for sector configuration in order to resolve hotspots that have been previously identified and published.

The sequence of the exchanges needed to complete this operation is illustrated in Figure 4, while Table 12 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.

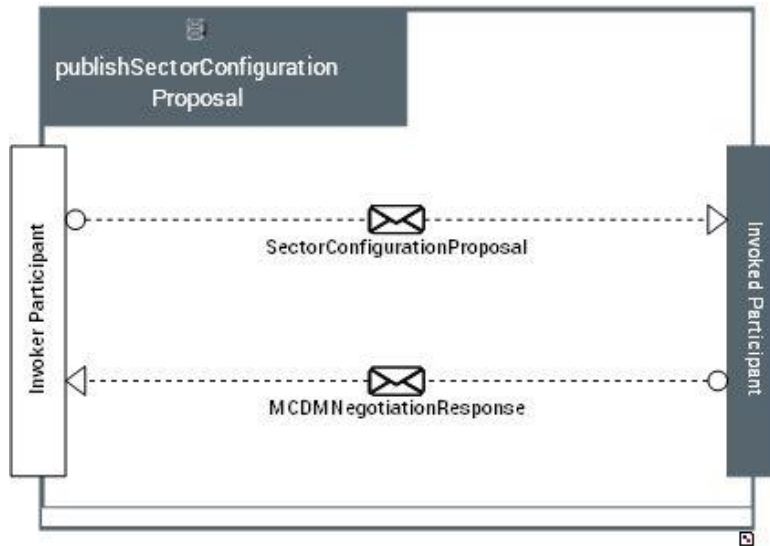


Figure 4: “publishSectorConfigurationProposal” Operation Exchange diagram

| Input | Service Payload | CLDM Data Entity |
|--------|-----------------------------|-----------------------------|
| | SectorConfigurationProposal | SectorConfigurationProposal |
| Return | Service Payload | CLDM Data Entity |
| | MCDMnegotiationResponse | MCDMresponseData |

Table 12: “publishSectorConfigurationProposal” operation parameters

B.4.1.3 Operation publishReroutingProposal

Operation on the provider side to distribute proposal for flight re-routing in order to resolve hotspots that have been previously identified and published.

The sequence of the exchanges needed to complete this operation is illustrated in Figure 5, while

| Input | Service Payload | CLDM Data Entity |
|--------|-------------------------|-------------------|
| | ReroutingProposal | ReroutingProposal |
| Return | Service Payload | CLDM Data Entity |
| | MCDMNegotiationResponse | MCDMResponseData |

Table 14 Table 13: “publishSectorConfigurationProposal” operation

Table 14 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.

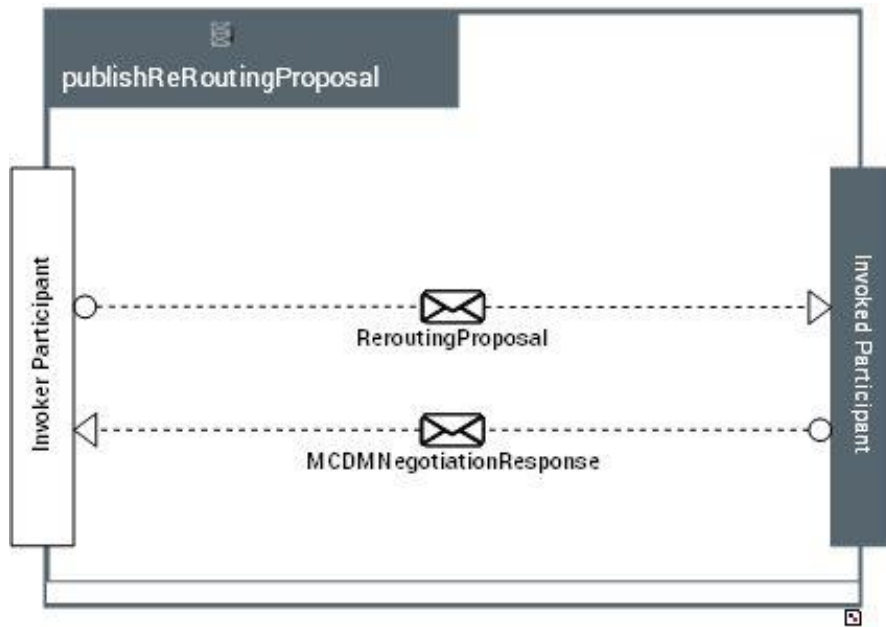


Figure 5: “publishReroutingProposal” Operation Exchange diagram

| Input | Service Payload | CLDM Data Entity |
|--------|-------------------------|-------------------|
| | ReroutingProposal | ReroutingProposal |
| Return | Service Payload | CLDM Data Entity |
| | MCDMNegotiationResponse | MCDMResponseData |

Table 14: “publishReroutingProposal” operation parameter

B.4.1.4 Operation publishLevelCappingProposal

Operation on the provider side to distribute proposal for level capping in order to resolve hotspots that have been previously identified and published.

The sequence of the exchanges needed to complete this operation is illustrated in Figure 6, while Table 15 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.

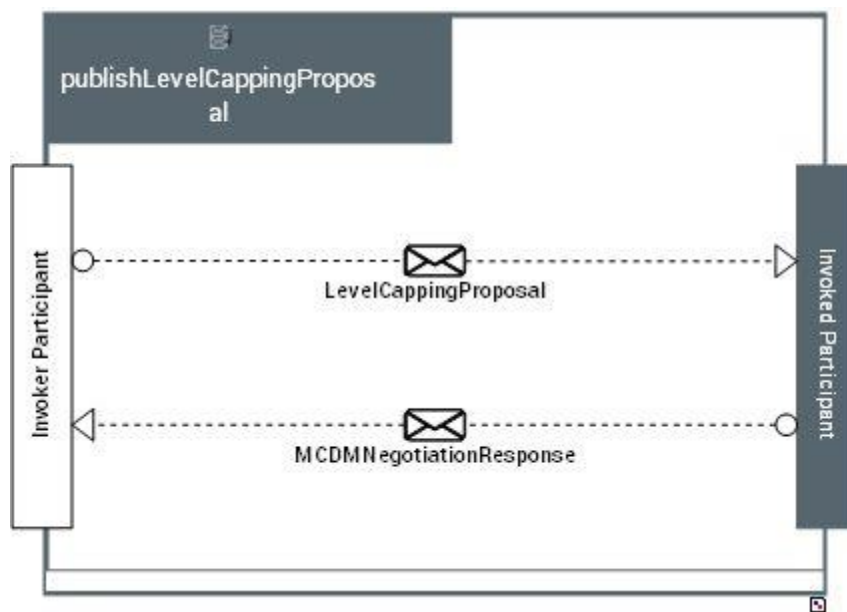


Figure 6: “publishLevelCappingProposal” Operation Exchange diagram

| Input | Service Payload | CLDM Data Entity |
|--------|-------------------------|----------------------|
| | LevelCappingProposal | LevelCappingProposal |
| Return | Service Payload | CLDM Data Entity |
| | MCDMNegotiationResponse | MCDMResponseData |

Table 15: “publishLevelCappingProposal” operation parameter

A.4.2 HotspotDefinitionAndProposedSolutionProvider

This interface is the providing interface to receive a subscription or an unsubscription request for sub-regional capacity data from the consumer, as illustrated in Figure 7.

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

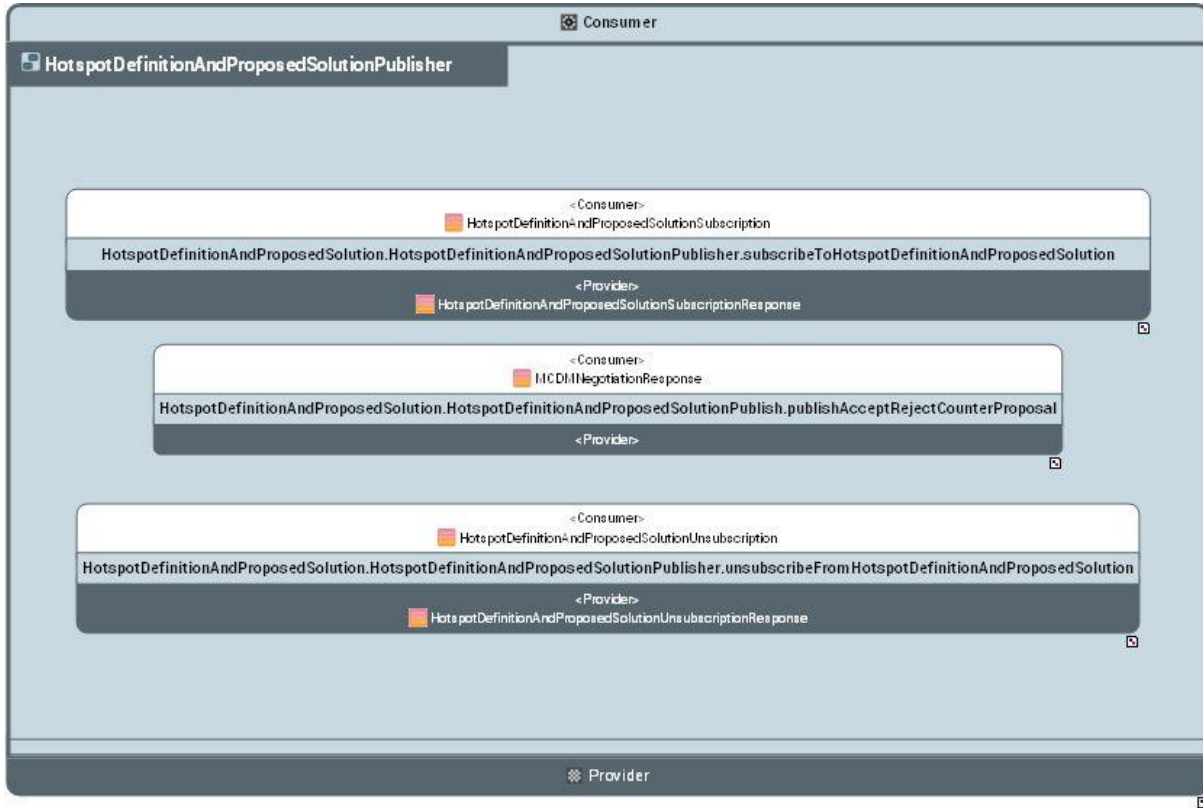


Figure 7: “HotspotDefinitionAndProposedSolutionProvider” Interface Exchange diagram

This interface owns two Service Operations, as shown in Table 16 below. The next sub-section will further specify the operations.

| Service Operation | Invoker participant | Input parameter | Invoked participant | Return |
|---|---------------------|--|---------------------|--|
| subscribeToHotspotDefinitionAndProposedSolution | <Consumer> | HotspotDefinitionAndProposedSolutionSubscription | <Provider> | HotspotDefinitionAndProposedSolutionSubscriptionResponse |
| PublishAcceptRejectCounterProposal | <Consumer> | MCDMNegotiationResponse | <Provider> | - |
| unsubscribeFromHotspotDefinitionAndProposedSolution | <Consumer> | HotspotDefinitionAndProposedSolutionUnsubscription | <Provider> | HotspotDefinitionAndProposedSolutionUnsubscriptionResponse |

Table 16: Operations of the “HotspotDefinitionAndProposedSolutionProvider” Interface

B.4.2.1 Operation subscribeToHotspotDefinitionAndProposedSolution

Operation for the consumer to realise the subscription.

The sequence of the exchanges needed to complete this operation is illustrated in Figure 8, while Table 17 captures the input and return payloads. For this operation, the service consumer (<Consumer> in Figure 7) is the invoker participant and the service provider (<Provider> in Figure 7) is the invoked participant.

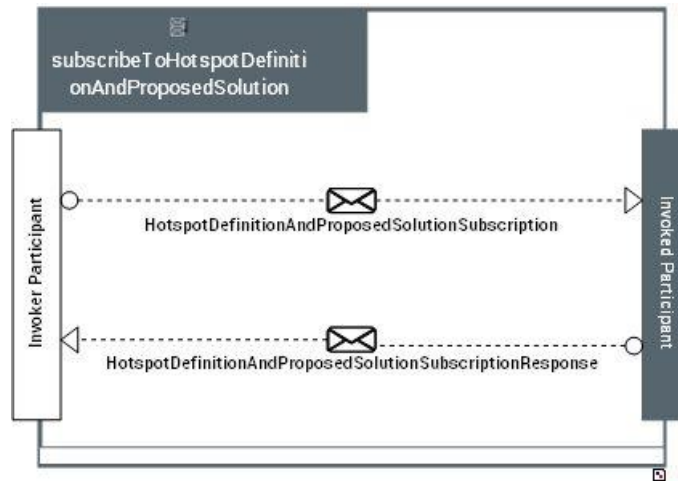


Figure 8: “subscribeToHotspotDefinitionAndProposedSolution” Operation Exchange diagram

| Input | Service Payload | Data Entity |
|--------|--|--|
| | HotspotDefinitionAndProposedSolutionSubscription | HotspotDefinitionAndProposedSolutionSubscription |
| Return | Service Payload | Data Entity |
| | HotspotDefinitionAndProposedSolutionSubscriptionResponse | HotspotDefinitionAndProposedSolutionSubscriptionResponse |

Table 17: “subscribeToHotspotDefinitionAndProposedSolution” operation parameters

B.4.2.2 Operation unsubscribeFromHotspotDefinitionAndProposedSolution

Operation for the consumer to realise the un-subscription.

The sequence of the exchanges needed to complete this operation is illustrated in Figure 9, while Table 18 captures the input and return payloads. For this operation, the service consumer (<Consumer> in Figure 7) is the invoker participant and the service provider (<Provider> in Figure 7) is the invoked participant.

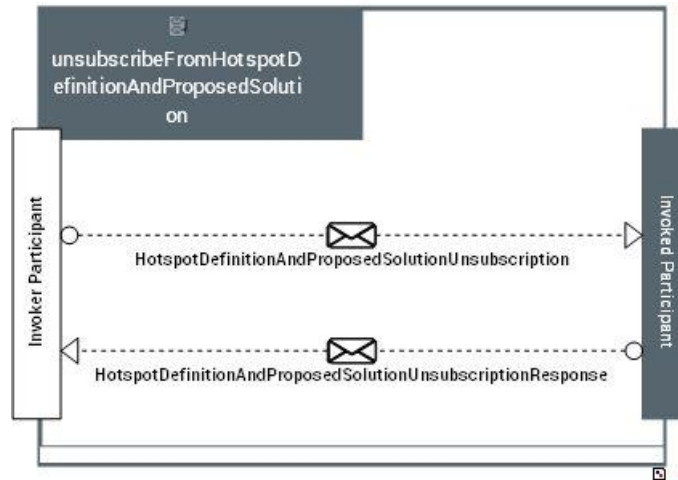


Figure 9: “unsubscribeFromHotspotDefinitionAndProposedSolution” Operation Exchange diagram

| Input | Service Payload | CLDM Data Entity |
|--------|--|--|
| | HotspotDefinitionAndProposedSolutionUnsubscription | HotspotDefinitionAndProposedSolutionUnsubscription |
| Return | Service Payload | CLDM Data Entity |
| | HotspotDefinitionAndProposedSolutionUnsubscriptionResponse | HotspotDefinitionAndProposedSolutionUnsubscriptionResponse |

Table 18: “unsubscribeFromHotspotDefinitionAndProposedSolution” operation parameters

B.4.2.3 Operation PublishAcceptRejectCounterProposal

Operation on the provider side to distribute the Acceptance/Rejection/Counter Proposal as a part of Collaborative Decision Making (CDM) in order to resolve hotspots that have been previously identified and published.

The sequence of the exchanges needed to complete this operation is illustrated in Figure 10, while Table 19 captures the input and return payloads. For this operation, the service consumer (<Consumer> in Figure 7) is the invoker participant and the service provider (<Provider> in Figure 7) is the invoked participant.

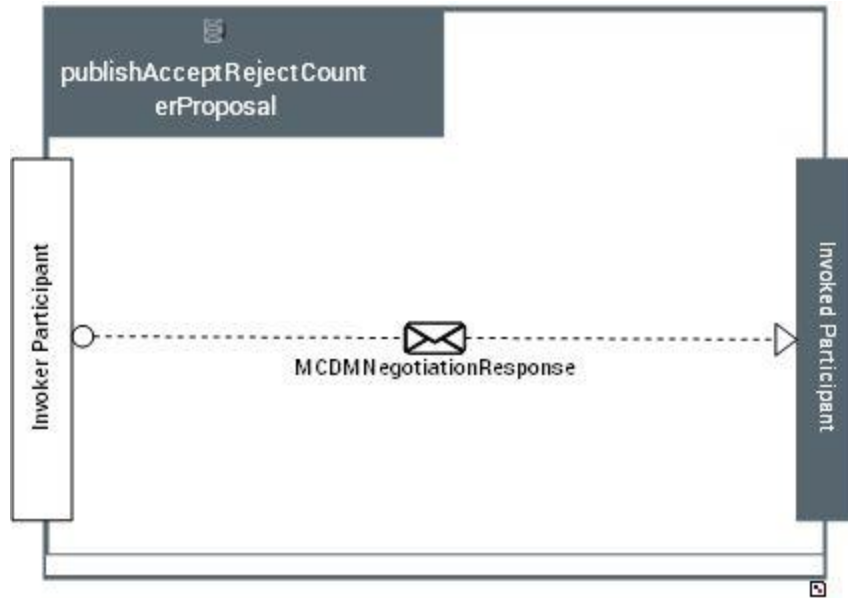


Figure 10: “publishAcceptRejectCounterProposal” Operation Exchange diagram

| Input | Service Payload | CLDM Data Entity |
|-------|-------------------------|------------------|
| | MCDMnegotiationResponse | MCDMresponseData |

Table 19: “publishAcceptRejectCounterProposal” operation parameters



A.5 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 operations.

A.5.1 NSOV-2 HotspotDefinitionAndProposedSolution Interface Parameter Definition Hotspot

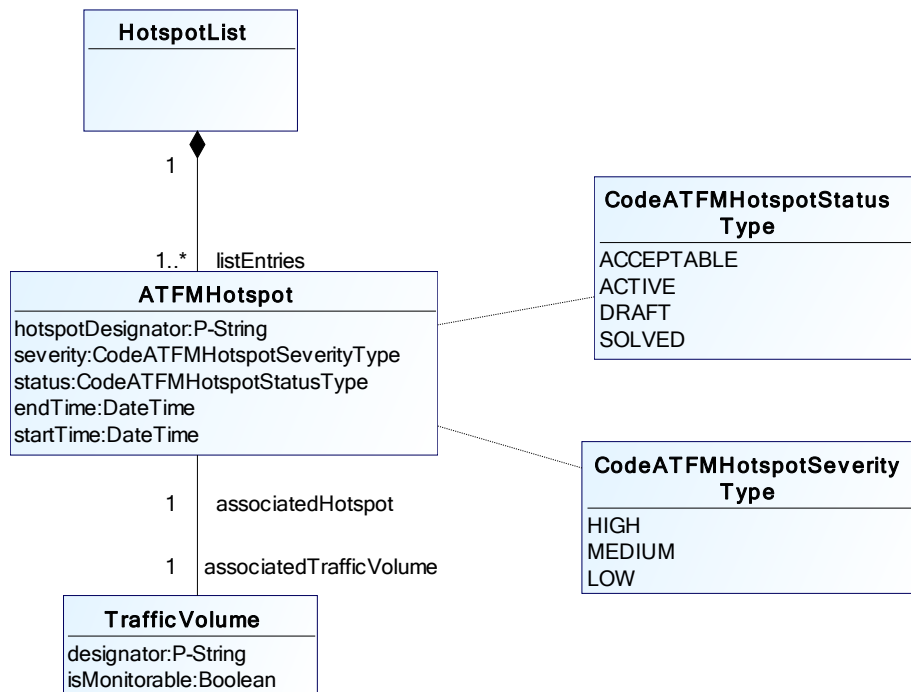


Figure 11: Interface Parameter Definition – Hotspot

A.5.2 NSOV-2 HotspotDefinitionAndProposedSolution Interface Parameter Definition Solution

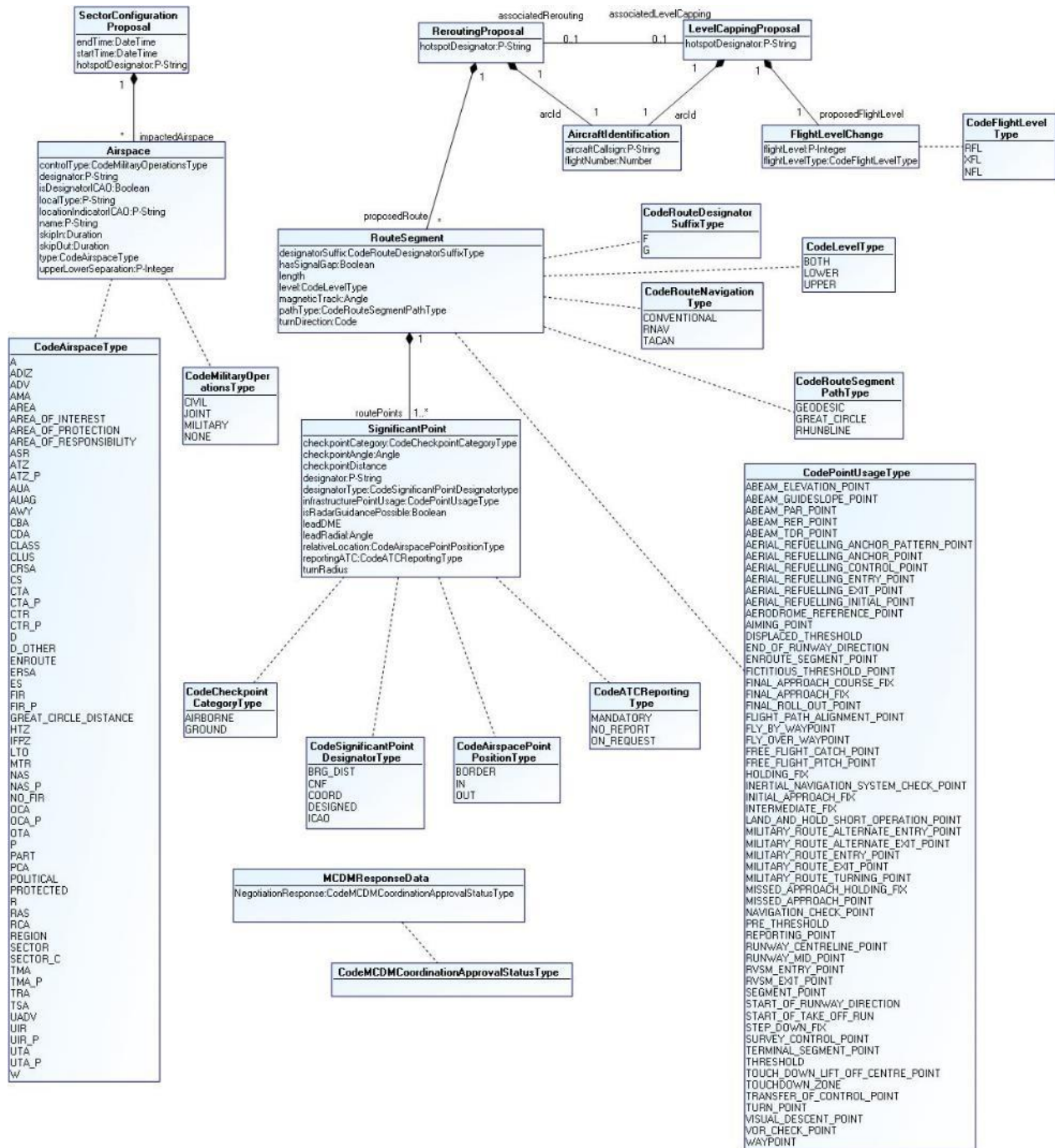


Figure 12: Interface Parameter Definition – Solution



A.5.3 NSOV-2 HotspotDefinitionAndProposedSolution Interface Parameter Definition Subscription

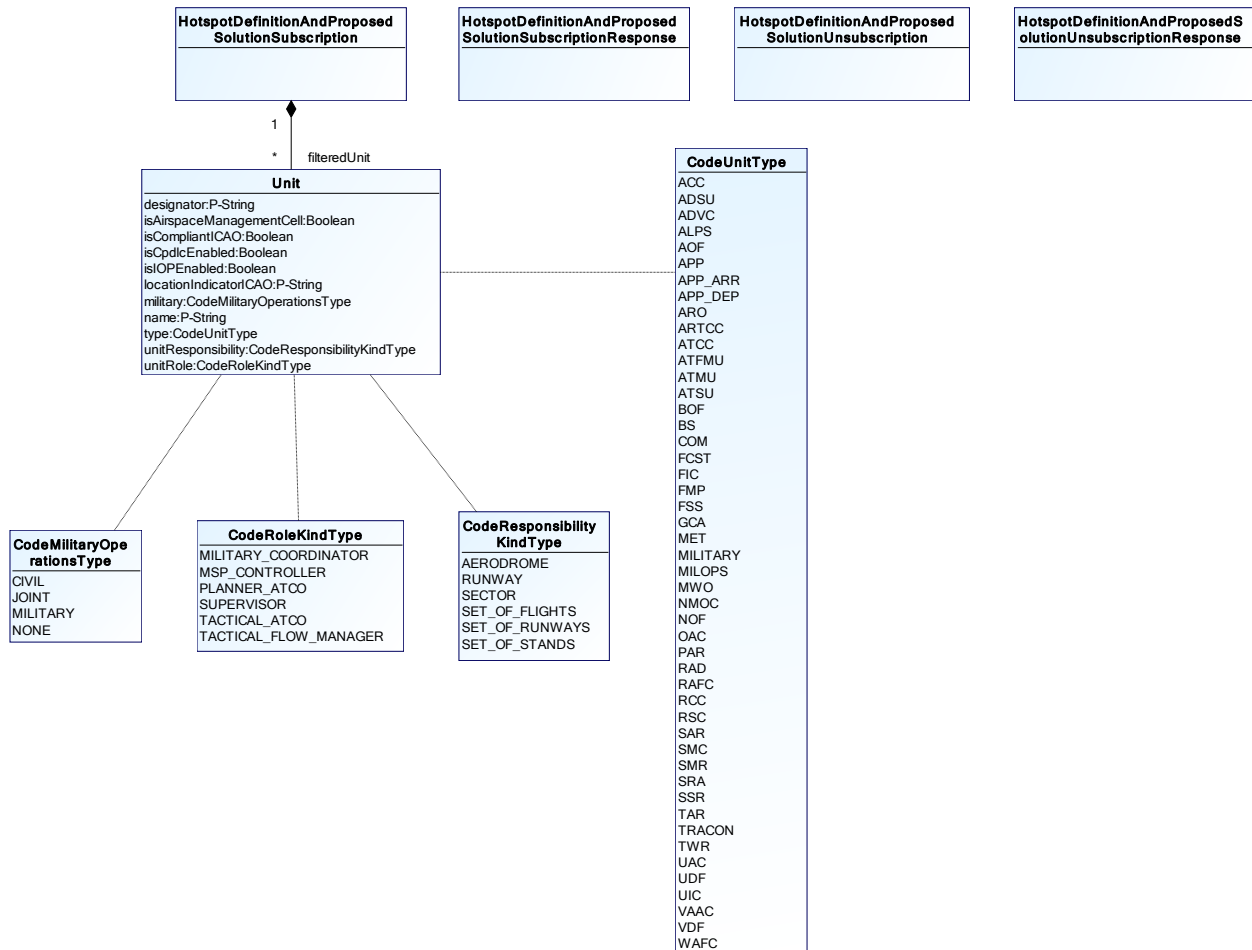


Figure 13: Interface Parameter Definition – Subscription

A.6 Payload Elements

This section provides the description of each data entity and their attributes, in line with the diagrams shown in section A.5.

The payload description provided in Table 20 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 | | | | | |
|-------------------------------|------------------------------|---|---|-----|--|
| AircraftIdentification | | A group of letters, figures or a combination thereof which is either identical to, or the coded equivalent of, the aircraft call sign to be used in air-ground communications, and which is used to identify the aircraft in ground-ground air traffic services communications. | | | |
| | aircraftCallsign | P-String | A group of alphanumeric characters used to identify an aircraft in air-ground communication. | Yes | |
| | flightNumber | Number | The flight identification number. | Yes | |
| Class | | | | | |
| Airspace | | A defined three dimensional region of space relevant to air traffic. | | | |
| | controlType | CodeMilitaryOperationsType | The primary organization type in terms of civil or military, providing air traffic services within a designated airspace. | No | |
| | designator | P-String | A published sequence of characters allowing the identification of the airspace. | Yes | |
| | isDesignatorICAO | Boolean | An indicator of whether an airspace designator is recorded in ICAO Doc. 7910 'Location Indicators'. | No | |
| | localType | P-String | A type designator used locally inside a State or a Region for a particular airspace sub-category. | No | |
| | locationIndicatorICAO | P-String | A four-letter code group formulated in accordance with rules prescribed by ICAO and assigned to the airspace. | No | |

| | | | | |
|---|--------------------------------|---|---|-----|
| | name | P-String | The name given to an airspace by a responsible authority. | No |
| | skipIn | Duration | The minimum duration of an entry event in an Airspace before to leave the same Airspace, to be considered as a real entry event. | No |
| | skipOut | Duration | The minimum duration of an exit event out an Airspace before to re-enter in the same Airspace, to be considered as a real exit event. | No |
| | type | CodeAirspaceType | An indicator of the general structure or characteristics of a particular airspace. | No |
| | upperLowerSeparation | P-Integer | A flight level that indicates the division of airspace between lower and upper airspace. | No |
| Class | | | | |
| ATFMHotspot | | A time period on a traffic volume indicating that there is too much traffic according to occupancy counts or complexity analysis for a specific occupancy traffic count duration. | | |
| | hotspotDesignator | P-String | A sequence of alphanumeric characters that uniquely identifies a hotspot, as generated by the system. | Yes |
| | severity | CodeATFMHotspotSeverityType | The severity qualification of the ATFM hotspot. | Yes |
| | status | CodeATFMHotspotStatusType | Status of the ATFM hotspot. | Yes |
| | endTime | DateTime | End time of a hotspot. | Yes |
| | startTime | DateTime | Start time of a hotspot. | Yes |
| | associatedTrafficVolume | TrafficVolume | | 1 |
| Class | | | | |
| FlightLevelChange | | A change of Flight Level during the execution of the flight. | | |
| | flightLevel | P-Integer | The new flight level when the flight level change is completed. | Yes |
| | flightLevelType | CodeFlightLevelType | Type of flight level. | Yes |
| Class | | | | |
| HotspotDefinitionAndProposedSolutionSubscription | | Subscription Request. | | |
| | filteredUnit | Unit | | * |
| Class | | | | |
| HotspotDefinitionAndProposedSolutionSubscriptionResponse | | Subscription Response | | |
| Class | | | | |

| | | | | |
|---|---|--|---|------|
| HotspotDefinitionAndProposedSolutionUnsubscription | | Unsubscription Request. | | |
| Class | | | | |
| HotspotDefinitionAndProposedSolutionUnsubscriptionResponse | | Unsubscription Response. | | |
| Class | | | | |
| HotspotList | | | | |
| | listEntries | ATFMHotspot | | 1..* |
| Class | | | | |
| LevelCappingProposal | | An ATFM measure which requires an aircraft operator to file an alternate flight level in order to resolve ATC capacity problems and minimise delays. | | |
| | hotspotDesignator | P-String | A sequence of alphanumeric characters that uniquely identifies a hotspot, as generated by the system. | Yes |
| | arclId | AircraftIdentification | | 1 |
| | associatedRerouting | ReroutingProposal | | 0..1 |
| | proposedFlightLevel | FlightLevelChange | | 1 |
| Class | | | | |
| MCDMResponseData | | | | |
| | NegotiationResponse:CodeMCDMCoordinationApprovalStatusType | P-String | | Yes |
| Class | | | | |
| ReroutingProposal | | A tactical rerouting proposal by the ATFM. | | |
| | hotspotDesignator | P-String | A sequence of alphanumeric characters that uniquely identifies a hotspot, as generated by the system. | Yes |
| | arclId | AircraftIdentification | | 1 |
| | associatedLevelCapping | LevelCappingProposal | | 0..1 |
| | proposedRoute | RouteSegment | | * |
| Class | | | | |
| RouteSegment | | A route or portion of route usually flown without an intermediate stop. | | |
| | designatorSuffix | CodeRouteDesignatorSuffixType | A suffix for the route designator defined in accordance with ICAO Annex 11. | No |
| | hasSignalGap | Boolean | Indication of a signal gap in the segment. | No |
| | length | | The length of the path. | No |
| | level | CodeLevelType | A code indicating if the route segment is in the upper airspace, the lower airspace or both. | No |

| | | | | |
|------------------------------------|---------------------------------|--|--|------|
| | magneticTrack | Angle | The initial magnetic track. | No |
| | pathType | CodeRouteSegment PathType | The type of segment path. | No |
| | turnDirection | Code | The turn direction, if any, at the end of the segment in order to continue on to the next segment of the same route. | No |
| | routePoints | SignificantPoint | | 1..* |
| Class | | | | |
| SectorConfigurationProposal | | | | |
| | endTime | DateTime | End time of a sector configuration. | Yes |
| | startTime | DateTime | Start time of a sector configuration. | Yes |
| | hotspotDesignator | P-String | A sequence of alphanumeric characters that uniquely identifies a hotspot, as generated by the system. | Yes |
| | impactedAirspace | Airspace | | * |
| Class | | | | |
| SignificantPoint | | A specified geographical location used in defining an ATS route or the flight path of an aircraft and for other navigation and ATS purposes. | | |
| | checkpointCategory | CodeCheckpointCategoryType | Indicates the position of the checkpoint; airborne or ground. | No |
| | checkpointAngle | Angle | The indication of a bearing (at a given point) by the measurement of the angle between the checkpoint and the navaid equipment (VOR). | No |
| | checkpointDistance | | The value of the distance from the checkpoint to the navaid. | No |
| | designator | P-String | The coded identifier of the significant point. | No |
| | designatorType | CodeSignificantPointDesignatorType | The rules by which the significant point designator has been created. | No |
| | infrastructurePointUsage | CodePointUsageType | The usage of a point when describing the Airspace or Base Infrastructure. | No |
| | isRadarGuidancePossible | Boolean | An indicator whether radar guidance is possible for reaching this point. | No |
| | leadDME | | The lead DME , like the lead Radial, provides information for aircraft with single receiving equipment to change the receiver to the localizer or other facility providing the course guidance and to ensure the aircraft is within the clearance coverage area of LOC | No |

| | | | | |
|----------------------|---------------------------------|---|---|-----|
| | | | facilities before changing frequency or accepting on-course indication. | |
| | leadRadial | Angle | The lead radial provides information for aircraft with single receiving equipment to change the receiver to the localizer or other facility providing the course guidance and to ensure the aircraft is within the clearance coverage area of LOC facilities before changing frequency or accepting on-course indication. | No |
| | relativeLocation | CodeAirspacePointPositionType | A code indicating the location of a significant point in relation to airspace. | No |
| | reportingATC | CodeATCReportingType | An indicator of the type of position report required by an ATC Unit. | No |
| | turnRadius | | The recommended turn radius when continuing on the previous segment of the route (start point) or when continuing on the next segment of the route (end point). | No |
| Class | | | | |
| TrafficVolume | | A set of conditions used to identify the flights over an airspace, point, aerodrome or set of aerodromes so that they can be monitored or regulated within the tactical/pre-tactical Air Traffic Flow and Capacity Management (ATFCM) system. | | |
| | designator | P-String | Designator of the traffic volume as defined by the Network Manager. | Yes |
| | isMonitorable | Boolean | Indicates whether the Traffic Volume shall be monitored (i.e. when the sector is active in a sector configuration). | No |
| | associatedHotspot | ATFMHotspot | | 1 |
| Class | | | | |
| Unit | | A generic term referring to all types of entities providing all types of ATM related services. | | |
| | designator | P-String | A distinguishing label, term, abbreviation or acronym used to identify the Unit. | No |
| | isAirspaceManagementCell | Boolean | A distinguishing label, term, abbreviation or acronym used to identify the Unit. | No |
| | isCompliantICAO | Boolean | An indicator that the Unit is setup according to the International Civil Aviation Organisation (ICAO) Standards and Recommended Practices (SARPS). | No |

| | | | | |
|--|------------------------------|----------------------------|--|----|
| | isCpdlcEnabled | Boolean | Indication whether CPDLC facility is enabled. | No |
| | isIOPEnabled | Boolean | Indication whether the unit is IOP-enabled. | No |
| | locationIndicatorICAO | P-String | A four-letter code group formulated in accordance with rules prescribed by ICAO and assigned to the ATS unit. | No |
| | military | CodeMilitaryOperationsType | An indicator of the operational nature of the unit. | No |
| | name | P-String | The full textual name of a unit, established according to the rules specified by International Civil Aviation Organisation (ICAO), and specifically in the official language of the country, transposed into the Latin Alphabet where necessary. | No |
| | type | CodeUnitType | An indicator of the type of unit, usually related to the standard type of services provided by it. | No |
| | unitResponsibility | CodeResponsibilityKindType | The responsibility of the unit. | No |
| | unitRole | CodeRoleKindType | The role played by the unit. | No |

Table 20: Service Payload description

A.6.1 Payload Data Types

Payload data types are described in

| Name | Description | Len | Dec | Type | Value |
|-------------------------------|--|-----|-----|-------------|---|
| Angle | | | | | |
| Boolean | | | | | |
| Code | | 7 | | P-Character | |
| CodeAirspacePointPositionType | A code indicating the location of a significant point in relation to airspace. | | | | BORDER IN OUT |
| CodeAirspaceType | A coded list of values that indicates a type of airspace. | | | | A ADIZ ADV AMA AREA AREA_OF_INTEREST AREA_OF_PROTECTION AREA_OF_RESPONSIBILITY |

| | | | | | |
|--|--|--|--|--|--|
| | | | | | ASR ATZ ATZ_P AUA AUAG AWY CBA CDA CLASS CLUS CRSA CS CTA CTA_P CTR CTR_P D D_OTHER ENROUTE ERSA ES FIR FIR_P GREAT_CIRCLE_DISTANCE HTZ IFPZ LTO MTR NAS NAS_P NO_FIR OCA OCA_P OTA P PART PCA POLITICAL PROTECTED R RAS RCA REGION SECTOR SECTOR_C TMA TMA_P TRA TSA UADV UIR UIR_P UTA UTA_P W |
|--|--|--|--|--|--|

| | | | | | |
|-------------------------------|--|--|--|--|--|
| CodeATCReportingType | A code indicating the type of position report required by an ATC Unit. Eg.: compulsory or on request. | | | | MANDATORY NO_REPORT ON_REQUEST |
| CodeATFMHotspotSeverityType | A code indicating the severity of an ATFM hotspot. | | | | HIGH LOW MEDIUM |
| CodeATFMHotspotStatusType | A code indicating the status of an ATFM hotspot. | | | | ACCEPTABLE ACTIVE DRAFT SOLVED |
| CodeCheckpointCategoryType | The position of the checkpoint; airborne or ground. | | | | AIRBORNE GROUND |
| CodeFlightLevelType | A code indicating the type of a flight level. | | | | NFL RFL XFL |
| CodeLevelType | A code indicating the level: upper airspace, lower airspace or both. | | | | BOTH LOWER UPPER |
| CodeMilitaryOperationsType | A code indicating in terms of civil or military, the type of operations. | | | | CIVIL JOINT MILITARY NONE |
| CodePointUsageType | A code describing the usage of a point within ATM context. | | | | |
| CodeResponsibilityKindType | The kind of responsibilities that can be available in an ATSU. | | | | AERODROME RUNWAY SECTOR SET_OF_FLIGHTS SET_OF_RUNWAYS SET_OF_STANDS |
| CodeRoleKindType | The kind of roles that can be available in an ATSU. | | | | MILITARY_COORDINATOR MSP_CONTROLLER PLANNER_ATCO SUPERVISOR TACTICAL_ATCO TACTICAL_FLOW_MANAGER |
| CodeRouteDesignatorSuffixType | A suffix for the route designator. | | | | F G |

| | | | | | |
|-------------------------------------|---|--|--|--|--|
| CodeRouteSegmentPathType | A code indicating the type of segment path. | | | | GEODESIC GREAT_CIRCLE RHUMBLINE |
| CodeSignificantPointDesignator type | A code indicating a specific type of significant point, in direct relation with the designator allocated to that point. | | | | BRG_DIST CNF COORD DESIGNED ICAO |
| CodeUnitType | A unit providing particular ATS services. | | | | ACC ADSU ADVC ALPS AOF APP APP_ARR APP_DEP ARO ARTCC ATCC ATFMU ATMU ATSU BOF BS COM FCST FIC FMP FSS GCA MET MILITARY MILOPS MWO NMOC NOF OAC PAR RAD RAFC RCC RSC SAR SMC SMR SRA SSR TAR TRACON TWR UAC UDF UIC VAAC |

| | | | | | |
|-----------|--|--|--|------------|-------------|
| | | | | | VDF WAFC |
| DateTime | | | | P-Datetime | |
| Duration | | | | P-Numeric | |
| Number | | | | P-Numeric | |
| P-Integer | | | | | |
| P-String | | | | | |

Table 21

| Name | Description | Len | Dec | Type | Value |
|-----------------------------------|--|-----|-----|-------------|---|
| Angle | | | | | |
| Boolean | | | | | |
| Code | | 7 | | P-Character | |
| CodeAirspacePo intPositionType | A code indicating the location of a significant point in relation to airspace. | | | | BORDER IN OUT |
| CodeAirspaceTy pe | A coded list of values that indicates a type of airspace. | | | | A ADIZ ADV AMA AREA AREA_OF_INTEREST AREA_OF_PROTECTION AREA_OF_RESPONSIBILITY ASR ATZ ATZ_P AUA AUAG AWY CBA CDA CLASS CLUS CRSA CS CTA CTA_P CTR CTR_P D D_OTHER ENROUTE ERSA ES FIR |

| | | | | | |
|-----------------------------|--|--|--|--|--|
| | | | | | FIR_P GREAT_CIRCLE_DISTANCE HTZ IFPZ LTO MTR NAS NAS_P NO_FIR OCA OCA_P OTA P PART PCA POLITICAL PROTECTED R RAS RCA REGION SECTOR SECTOR_C TMA TMA_P TRA TSA UADV UIR UIR_P UTA UTA_P W |
| CodeATCReportingType | A code indicating the type of position report required by an ATC Unit. Eg.: compulsory or on request. | | | | MANDATORY NO_REPORT ON_REQUEST |
| CodeATFMHotspotSeverityType | A code indicating the severity of an ATFM hotspot. | | | | HIGH LOW MEDIUM |
| CodeATFMHotspotStatusType | A code indicating the status of an ATFM hotspot. | | | | ACCEPTABLE ACTIVE DRAFT SOLVED |
| CodeCheckpointCategoryType | The position of the checkpoint; airborne or ground. | | | | AIRBORNE GROUND |
| CodeFlightLevelType | A code indicating the type of a flight level. | | | | NFL RFL |

| | | | | | |
|------------------------------------|---|--|--|--|--|
| | | | | | XFL |
| CodeLevelType | A code indicating the level: upper airspace, lower airspace or both. | | | | BOTH LOWER UPPER |
| CodeMilitaryOperationsType | A code indicating in terms of civil or military, the type of operations. | | | | CIVIL JOINT MILITARY NONE |
| CodePointUsageType | A code describing the usage of a point within ATM context. | | | | |
| CodeResponsibilityKindType | The kind of responsibilities that can be available in an ATSU. | | | | AERODROME RUNWAY SECTOR SET_OF_FLIGHTS SET_OF_RUNWAYS SET_OF_STANDS |
| CodeRoleKindType | The kind of roles that can be available in an ATSU. | | | | MILITARY_COORDINATOR MSP_CONTROLLER PLANNER_ATCO SUPERVISOR TACTICAL_ATCO TACTICAL_FLOW_MANAGER |
| CodeRouteDesignatorSuffixType | A suffix for the route designator. | | | | F G |
| CodeRouteSegmentPathType | A code indicating the type of segment path. | | | | GEODESIC GREAT_CIRCLE RHUMBLINE |
| CodeSignificantPointDesignatorType | A code indicating a specific type of significant point, in direct relation with the designator allocated to that point. | | | | BRG_DIST CNF COORD DESIGNED ICAO |
| CodeUnitType | A unit providing particular ATS services. | | | | ACC ADSU ADVC ALPS AOF APP APP_ARR APP_DEP ARO ARTCC |

| | | | | | |
|-----------|--|--|--|------------|--|
| | | | | | ATCC ATFMU ATMU ATSU BOF BS COM FCST FIC FMP FSS GCA MET MILITARY MILOPS MWO NMOC NOF OAC PAR RAD RAFC RCC RSC SAR SMC SMR SRA SSR TAR TRACON TWR UAC UDF UIC VAAC VDF WAFC |
| DateTime | | | | P-Datetime | |
| Duration | | | | P-Numeric | |
| Number | | | | P-Numeric | |
| P-Integer | | | | | |
| P-String | | | | | |

Table 21: Payload Data Types description

A.7 Service dynamic behaviour

This section describes the dynamic aspects of the interactions around the HotspotDefinitionAndProposedSolution service, by depicting the nominal sequence of the service operations that occur between the provider and the consumer. An overview of this is shown in Figure 14 below, in the form of a sequence diagram.

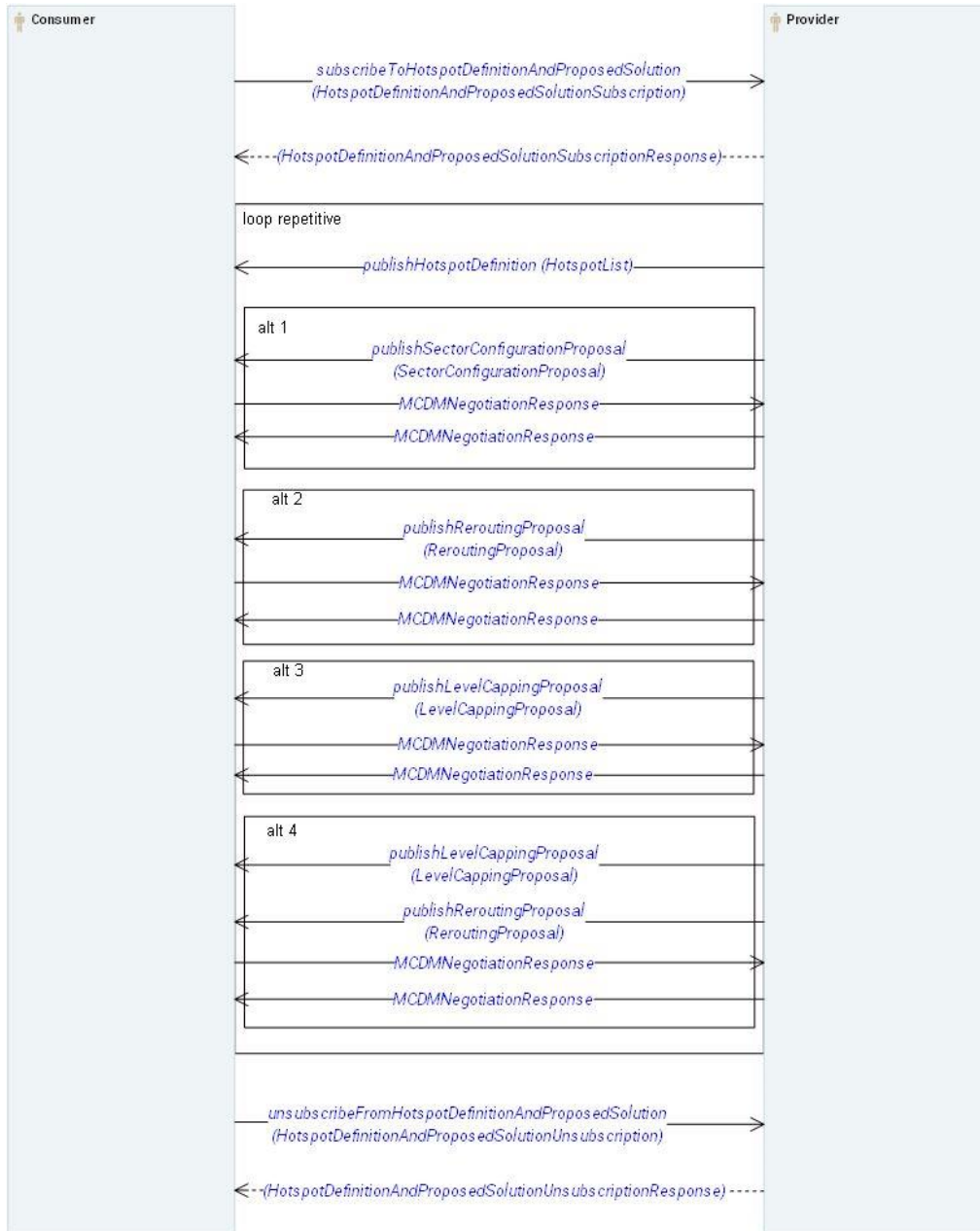


Figure 14: Service Dynamic Behavior diagram

A brief description of the sequence is provided below:

- 1.1 The service consumer sends a “HotspotDefinitionAndProposedSolutionSubscription” message to the provider in order to subscribe to the service and be able to receive the hotspots identified by the service and, at a later stage, the proposed solutions that aim to resolve them.

When subscribing, the consumer has the possibility to specify for which ATSU he is interested in receiving the information.

1.2 Upon reception of a “HotspotDefinitionAndProposedSolutionSubscription” message, the service provider returns a “HotspotDefinitionAndProposedSolutionSubscriptionResponse” message.

2.1 The service provider notifies the consumers about the existence of hotspot(s), once it/they have been identified. The “HotspotList” message is distributed to all subscribed consumers.

The distribution of the “HotspotList” messages is interrupted whenever the service consumer unsubscribes from the service.

2.2 Once the hotspot(s) have been identified and published, the service provider distributes a proposal to resolve them. There are up to four alternative options:

2.2.1 The solution is based on a sector configuration proposal. The service provider distributes a “SectorConfigurationProposal” message to the subscribed consumers.

2.2.2 The solution is based on a rerouting proposal. The service provider distributes a “ReroutingProposal” message to the subscribed consumers. Each message contains the proposed solution for a specific flight.

2.2.3 The solution is based on a level capping proposal. The service provider distributes a “LevelCappingProposal” message to the subscribed consumers. Each message contains the proposed solution for a specific flight.

2.2.4 The solution is based on a rerouting proposal, together with a level capping proposal. The service provider distributes “ReroutingProposal” and “LevelCappingProposal” messages to the subscribed consumers. Both messages contain the proposed solutions for the same flight.

2.3 For each proposal, SectorConfigurationProposal, ReroutingProposal, LevelCappingProposal, the consumer has the ability to respond with an Accept, Reject or Counter Proposal message, this is to facilitate CDM and enables resolution of the hotspot. Similarly, the provider has the ability to Accept, Reject or Counter-propose.

The distribution of these solution proposal messages is interrupted whenever the service consumer unsubscribes from the service.

3.1 At any time, the service consumer can send a “HotspotDefinitionAndProposedSolutionUnsubscription” message in order to unsubscribe from the service and stops receiving both the publication of hotspots and the related proposed solutions.

3.2 Upon reception of a “HotspotDefinitionAndProposedSolutionUnsubscription” message, the service provider returns a “HotspotDefinitionAndProposedSolutionUnsubscriptionResponse” message.

