NAP Reference Architecture

This report defines one of the Views of the NAP Reference Architecture

10.02.2025

# NAP Communication View

The **Communications View** is a perspective that focuses on the interaction and data exchange between different components of the system. It outlines the communication protocols, data formats, and interfaces used for data transmission between different system elements.

The Communications View is elaborated with respect of minimum functionality of two NAP types: **Metadata Directory** and **Data Platform.**

Those types are presented via TWO diagrams, each describing Physical View of respective type.



Figure: NAP Communication View - Metadata Directory



Figure: NAP Communication View - Data Platform

## Selected terms and definitions

**Sub-systems**: High-level units that may include multiple Modules, but can also have none if simple. Each geographic location has its own Sub-system.

**Modules**: Computer programs within Sub-systems that perform ITS functions and communicate via ITS interfaces. They can be replicated wholly or partly across locations.

**Physical Data Flows**: Communication channels in ITS, either Internal (linking Sub-systems/Modules) or External (connecting to Terminators/Actors). They're based on a pre-checked Functional View.

**ITS Interface**: Facilitates information exchange between systems, defined by a protocol and data model, and utilized by ITS applications.

**Terminators**: External entities not modelled within the FRAME Architecture, such as different vehicle types or traveller roles

**Specification:** detailed, precise description of the requirements, design, behaviour, or characteristics of a system, component, or process. Specifications are used to ensure that everyone involved in a project understands what is expected and to provide a basis for verifying that the final product meets the required standards.

**Metadata directory:** The data portal that contains descriptions of the data and services important for their identification, assessment, and subscription by consumer, i.e., metadata. It provides facilities to authenticate data provider and functionality to insert a metadata records. The NAP provides search and discovery services of the hosted records to end users and via machine readable content to other portals. The NAP is not directly involved in the data exchange between data providers and data consumers.

**Data platform**: The data portal that contains descriptions of the data and services important for their identification, assessment, and subscription by consumer, i.e., metadata, together with the data and/or services themselves. It provides facilities to authenticate data provider, and optionally, data consumer and functionality to insert a data and metadata records to NAP internal database. The NAP provides search and discovery services of the hosted records to end users and via machine readable content to other portals and distribution interfaces for data dissemination. The NAP is an intermediary between data provider and consumer, the data however remain in the ownership of the data provider.

**EA GUID** Enterprise Architect unique identifier, uniquely identifying the object within the model.

## Interfaces

This chapter defines Interfaces for **both NAP types**, Metadata Directory and Data Platform.

### Content Consumer - Data Management Module

*Date Modified: 10.02.2025 15:23:04, GUID: {46EF7C20-D17A-4964-9EEC-CFC8A2161BB1}*

**Type**: User interface

**Short description**: This interface is used by the Content Consumer to retrieve information from the NAP where data publishers store their data.

**Contextual Use**: Format, size and structure depends on data type, publication format and terms of use.

**Related Documents**: <https://napcore.eu/activity-wg2-interoperability-and-level-of-service-of-naps/>

=== Communications Requirements ===

As a guideline for minimum expectation the following values can be used

**Data type**:

* static data (Raw data, binary,)

**max bytes per message**

* up to 1GBytes per request

**maximum delay [s]**

* system response time below 100ms (independent from user internet connection)
* delay for submitting request: 0.5s

**message interval**

* On occurrence

**security level**

* level high (authorization by the system, encrypted data transfer on system side)

### Content Consumer - Metadata Management Module

*Date Modified: 10.02.2025 15:25:29, GUID: {ECF5445C-50A8-4ca3-8C86-50DB480DBD8C}*

**Type**: Use interface

**Short description**: This interface is used for the interaction of the content consumer and metadata management module.

**Contextual Use**: MobilityDCAT-AP is a formal metadata specification for mobility data portals as an extension of DCAT-AP. A metadata specification (as any data specification) contains a model with definitions of the syntax and semantics for various data elements, and on how these data elements relate to each other. This way, mobilityDCAT-AP provides precise and unambiguous metadata designations for any mobility-related data offerings, facilitating harmonised, platform-independent metadata descriptions in both human-readable and machine-readable formats.

**Related Documents**:---

=== Communications Requirements ===

As a guideline for minimum expectation the following values can be used

**Data type**:

* Raw data

**max bytes per message**

* up to 500 kBytes per request

**maximum delay [s]**

* system response time below 100ms (independent from user internet connection)
* delay for submitting request: 0.5s

**message interval**

* On occurrence

**security level**

* level high (authorization by the system, encrypted data transfer on system side)

### Content Consumer - Support Module

*Date Modified: 10.02.2025 15:25:23, GUID: {9D010BE5-6592-4e26-86F6-6D16140A0A39}*

**Type**: Use interface

**Short description**: This interface is used for handling support requests from the Content Consumer.

**Contextual Use**: It is assumed that a NAP shall at minimum provide downloadable support information in the local language. This condition is indicated by a value equal to 1. The value of this KPI is increased by 1, when such information is also available in the English language, when additional support can be provided via contact form and/or e-mail, and, finally, when additional support can be provided directly via telephone.

**Related Documents**:---

=== Communications Requirements ===

As a guideline for minimum expectation the following values can be used

**Data type**:

* Raw data

**max bytes per message**

* up to 500 kBytes per request

**maximum delay [s]**

* system response time below 100ms (independent from user internet connection)
* delay for submitting request: 0.5s

**message interval**

* On occurrence

**security level**

* level high (authorization by the system, encrypted data transfer on system side)

### Content Consumer - User Management Module

*Date Modified: 10.02.2025 15:25:06, GUID: {572A0DDD-F3CD-426f-B920-5E8E986DFC0C}*

**Type**: Use interface

**Short description**: This interface is used for the interaction of the user management and metadata repository.

**Contextual Use**: It is assumed that the NAP shall have a registration procedure for advanced content consumer. The registration can differ in Member States. The trust of the registered person should be guaranteed and should follow international standards. To enable machine to machine meta data harvesting a registration of such a interface and credentials is needed.

**Related Documents**: https://napcore.eu/activity-wg2-interoperability-and-level-of-service-of-naps/

=== Communications Requirements ===

As a guideline for minimum expectation the following values can be used

**Data type**:

* Raw data

**max bytes per message**

* up to 500 kBytes for meta data

**maximum delay [s]**

* system response time below 100ms (independent from user internet connection)

**message interval**

* one second - assumption that 1 system request metadata

**security level**

* level TODO

### Content Provider - Data Management Module

*Date Modified: 10.02.2025 15:25:00, GUID: {C03CF47C-96E7-4733-B905-CB836A908BB7}*

**Type**: User interface

**Short description**: This interface is used to provide data to the NAP by content provider.

**Contextual Use**: !!todo

**Related Documents**: https://napcore.eu/activity-wg2-interoperability-and-level-of-service-of-naps/

=== Communications Requirements ===

As a guideline for minimum expectation the following values can be used

**Data type**:

* static data (Raw data, binary,...)

**max bytes per message**

* up to 1 GBytes for attached files (hard to define a minimum)

**maximum delay [s]**

* system response time below 100ms (independent from user internet connection)
* delay for uploading attached files: 10s per MB

**message interval**

* one minute - assumption that two data provider are putting data in parallel at the same time; depends on client numbers

**security level**

* level high (authorization by the system, encrypted data transfer on system side)

### Content Provider - Metadata Management Module

*Date Modified: 10.02.2025 15:24:55, GUID: {DAA1010E-3FD1-49b7-AC66-2080DB101A8E}*

**Type**: User interface

**Short description**: This interface is used to provide metadata to the NAP by the content provider.

**Contextual Use**: todo!!

Allows content providers to submit, update, and manage metadata records within the NAP, ensuring data discoverability and interoperability. Metadata must follow established standards like MobilityDCAT-AP and undergo authentication and validation before storage. The module supports both manual and automated metadata ingestion, enabling seamless synchronization with external platforms while allowing providers to manage access rights and compliance with NAP publication requirements.

**Related Documents**: https://napcore.eu/activity-wg2-interoperability-and-level-of-service-of-naps/

=== Communications Requirements ===

As a guideline for minimum expectation the following values can be used

**Data type**:

* Raw data

**max bytes per message**

* up to 500 kBytes for meta data
* up to 10 MBytes for attached files

**maximum delay [s]**

* system response time below 100ms (independent from user internet connection)
* delay for uploading meta data: 0.5s
* delay for uploading attached files: 10s

**message interval**

* one minute - assumption that two data provider are putting data in parallel at the same time; depends on client numbers

**security level**

* level high (authorization by the system, encrypted data transfer on system side)

### Content Provider - Support Module

*Date Modified: 10.02.2025 15:24:49, GUID: {2B49F77B-92D8-4494-B75B-7482740303ED}*

**Type**: Use interface

**Short description**: This interface enables the exchange between the content provider and the NAP support.

**Contextual Use**: It is assumed that a NAP shall at minimum provide downloadable support information in the local language. This condition is indicated by a value equal to 1. The value of this KPI is increased by 1, when such information is also available in the English language, when additional support can be provided via contact form and/or e-mail, and, finally, when additional support can be provided directly via telephone.

**Related Documents**: https://napcore.eu/activity-wg2-interoperability-and-level-of-service-of-naps/

=== Communications Requirements ===

As a guideline for minimum expectation the following values can be used

**Data type**:

* Raw data

**max bytes per message**

* up to 500 kBytes per request

**maximum delay [s]**

* system response time below 100ms (independent from user internet connection)
* delay for submitting request: 0.5s

**message interval**

* On occurrence

**security level**

* level high (authorization by the system, encrypted data transfer on system side)

### Content Provider - User Management Module

*Date Modified: 10.02.2025 15:24:45, GUID: {D137DB55-A2D0-4a62-9A98-6144AC1C5404}*

**Type**: User interface

**Short description**: This interface provides the content provider access to the user management.

**Contextual Use**: It is assumed that the NAP shall have a registration procedure for metadata provider. The registration can differ in Member States. The trust of the registered person should be guaranteed and should follow international standards. To enable machine to machine meta data harvesting a registration of such a interface and credentials is needed.

**Related Documents**: https://napcore.eu/activity-wg2-interoperability-and-level-of-service-of-naps/

=== Communications Requirements ===

As a guideline for minimum expectation the following values can be used

**Data type**:

* Raw data

**max bytes per message**

* up to 500 kBytes per request

**maximum delay [s]**

* system response time below 100ms (independent from user internet connection)
* delay for submitting request: 0.5s

**message interval**

* On occurrence

**security level**

* level high (authorization by the system, encrypted data transfer on system side)

### Data Provision System - Data Management Module

*Date Modified: 10.02.2025 15:27:18, GUID: {EBF272EF-DE4F-4939-83C4-C3924574983A}*

**Type**: Programming Interface

**Short description**: Automatic provision of data vie machine to machine interface

**Contextual Use**: The receive or harvest data via machine-to-machine interface aims to harvest existing data in a machine-readable format via request on a broad level from other data platforms or from a single data source.

Prerequisite is the support of the data exchange on both sites via machine-to-machine interface. The interface needs to be registered by the data publisher.

Size, frequency, data format, exchange limitations or general specifications are based on the data publication.

**Related Documents**: https://napcore.eu/activity-wg2-interoperability-and-level-of-service-of-naps/

=== Communications Requirements ===

As a guideline for minimum expectation the following values can be used

**Data type**:

* Raw data: static, semi-static and dynamic

**max bytes per message**

* static: up to 1 GBytes for data
* semi-static: 10 MByte for incremental updates of data
* dynamic: 1 MByte for dynamic status data

**maximum delay [s]**

* static: system response time below 100ms (independent from user internet connection)
* semi-static: system response time below 10ms (independent from user internet connection)
* dynamic: system response time below 10ms (independent from user internet connection)

**message interval**

* static: one second - assumption that 1 system request
* semi-static: half second - assumption on purpose system request
* dynamic: millisecond - assumption of continuous system request

**security level**

* level high (authorization by the system, encrypted data transfer on system side)

### Data Requesting System - Data Management Module

*Date Modified: 10.02.2025 15:27:12, GUID: {B5381D32-D813-436f-8E09-B87BD10B5F64}*

**Type**: Programming Interface

**Short description**: This interface is used by machine-to-machine interfaces to retrieve information from the NAP where data publishers store their data.

**Contextual Use**: Prerequisite is the support of data requesting and harvesting.

The machine-to-machine interface needs to be registered by registered data consumer.

Format, size and structure depend on data type, publication format and terms of use.

**Related Documents**: https://napcore.eu/activity-wg2-interoperability-and-level-of-service-of-naps/

=== Communications Requirements ===

As a guideline for minimum expectation the following values can be used

**Data type**:

* Raw: static, semi-static and dynamic

**max bytes per message**

* static: up to 1 GBytes for data
* semi-static: 10 MByte for incremental updates of data
* dynamic: 1 MByte for dynamic status data

**maximum delay [s]**

* static: system response time below 100ms (independent from user internet connection)
* semi-static: system response time below 10ms (independent from user internet connection)
* dynamic: system response time below 10ms (independent from user internet connection)

**message interval**

* static: one second - assumption that 1 system request
* semi-static: half second - assumption on purpose system request
* dynamic: millisecond - assumption of continuous system request

**security level**

* level high: authorization by the system, encrypted data transfer on system side

### Metadata Provision System - Metadata Management Module

*Date Modified: 10.02.2025 15:26:55, GUID: {70F2112F-B845-4d29-AECD-17CD9D7B4B7D}*

**Type**: Programming Interface

**Short description**: Automatic provision of metadata via machine-to-machine interface

**Contextual Use**: The receive or harvest metadata via machine-to-machine interface aims to harvest existing compatible metadata in a machine-readable format via manual or automatic request.

On a broad level from other data platforms or from a single metadata entry.

Prerequisite is the support of the metadata exchange on both sites.

**Related Documents**: https://napcore.eu/activity-wg2-interoperability-and-level-of-service-of-naps/

=== Communications Requirements ===

As a guideline for minimum expectation the following values can be used

**Data type**:

* Raw data

**max bytes per message**

* up to 500 kBytes for meta data

**maximum delay [s]**

* system response time below 100ms (independent from user internet connection)

**message interval**

* one second - assumption that 1 system request metadata

**security level**

* level TODO

### Metadata Requesting System - Metadata Management Module

*Date Modified: 10.02.2025 15:26:49, GUID: {373128AD-1078-42bc-A0B2-F5E56522B7B8}*

**Type**: Programming Interface

**Short description**: This interface is used for the interaction of the Metadata Requesting System and metadata management module.

**Contextual Use**: MobilityDCAT-AP is a formal metadata specification for mobility data portals as an extension of DCAT-AP. A metadata specification (as any data specification) contains a model with definitions of the syntax and semantics for various data elements, and on how these data elements relate to each other. This way, mobilityDCAT-AP provides precise and unambiguous metadata designations for any mobility-related data offerings, facilitating harmonised, platform-independent metadata descriptions in both human-readable and machine-readable formats.

**Related Documents**: https://napcore.eu/activity-wg2-interoperability-and-level-of-service-of-naps/

=== Communications Requirements ===

As a guideline for minimum expectation the following values can be used

**Data type**:

* Raw data

**max bytes per message**

* up to 500 kBytes per request

**maximum delay [s]**

* system response time below 100ms (independent from user internet connection)
* delay for submitting request: 0.5s

**message interval**

* On occurrence

**security level**

* level high: authorization by the system, encrypted data transfer on system side

## Specifications

Specifications and requirements affecting the implementation of the ITS Service and depicted on the diagram are described in a Specifications document.