NAP Reference Architecture

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

13.06.2025

# 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 leveraging Physical View of respective type.



Figure: NAP Communication View - Metadata Directory



Figure: NAP Communication View - Data Platform

## Interfaces

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

### Content Consumer Data Access

*Date Modified: 13.06.2025 18:22:37, GUID: {46EF7C20-D17A-4964-9EEC-CFC8A2161BB1}*

**Identification:** CC-DMM; Content Consumer - Data Management Module

**Type**: User interface

**Description**: This interface is used by the Content Consumer to retrieve Content Providers data stored or proxied via NAP. User selects data he/she has access to in the web interface and downloads them to his/her workstation. The Interface shall be a web-based application that any authorised NAP CC could access. It should support all common web browsing tools / devices. It should have an access authorisation mechanism and a graphical interface which at least support the local language.

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

=== Communications Requirements ===

Data size and interval and maximum delay varies by the type of the data, **see Machine Data Provision Interface**.

For Content Consumer access it is expected that this is mostly used for static data, other data are just sampled by the CC and then a subscription is set up via machine interface. To maximize efficiency data should be compressed (gzip).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| PDF | FDFs | Data type | Max Bytes / message | Max Delay (sec) | Message Interval (sec) | Security level |
| Data to Content Consumer | fnap.cc-data\_request | Request + credentials | 1 kB | 100 ms | On request 5 min | Medium |
| tnap.cc-data\_response | Response + data | 1 kB + up to 2GB | 5 minutes | 6 months | Low |
| Minimum data rate for link | | 33 MB/sec \* 5a = 166 MB/sec | | |  | Medium |
| Minimum Inter message gap | | 300 Seconds | | |  |

*a Multiple users must be expected to access NAP at the same time, for this the communication requirement analysis employ a safety value of 5, that multiplies computed maximum data rate for a link.*

### Content Consumer Management

*Date Modified: 13.06.2025 18:33:05, GUID: {572A0DDD-F3CD-426f-B920-5E8E986DFC0C}*

**Identification:** CC-UMM; Content Consumer - User Management Module

**Type**: User interface

**Description:** This interface enables content consumer to access NAP to change and modify account details including potential machine accounts. The Content Consumer registration is voluntary and at minimum NAP metadata shall be accessible without user registration. The Interface is a web-based application which is supposed to be a part of the NAP web page. The authorised person should be able to access this application through all possible browsers / devices and the graphical interface should at least support the local language.

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

=== Communications Requirements ===

Data size may vary based on what is the content consumer provides for the registration, if these are some documents then the size could be up to 1 MB. Message intervals hint the resolution date of the request and max delay the time of the system to confirm that the request has been received.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| PDF | FDFs | Data type | Max Bytes / message | Max Delay (sec) | Message Interval (sec) | Security level |
| Content Consumer Authorization and Registration | fnap.cc-registration\_request | Request + data + (credentials) | 1 kB + up to 1 MB | 30 s | On request | Medium |
| tnap.cc-registration\_response | Response | 1 kB + | 60 s | 1 day | Medium |
| Minimum data rate for link | | 1/30 MB/sec \* 3a = 0,1 MB/sec | | |  | Medium |
| Minimum Inter message gap | | Not relevant | | |  |

*a Multiple users must be expected to access NAP at the same time, for this the communication requirement analysis employ a safety value of 3, that multiplies computed maximum data rate for a link.*

### Content Consumer Metadata Access

*Date Modified: 13.06.2025 18:33:52, GUID: {ECF5445C-50A8-4ca3-8C86-50DB480DBD8C}*

**Identification**: CC-mdMM; Content Consumer - Metadata Management Module

**Type**: User interface

**Description:** This interface is used by content consumer to search the NAP for data and metadata. User selects data he/she has access to in the web interface and downloads them to his/her workstation. The Interface shall be a web-based application that any NAP CC could access. It should support all common web browsing tools / devices. It should have a graphical interface which at least support the local language and should support metadata standard mobilityDCAT-AP

**Related Documents**: ---

=== Communications Requirements ===

Data size may vary based on what is requested, usually only few catalogue records is requested at a time also hierarchically optimised, which accounts to 10 kB to 500 kB per request.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| PDF | FDFs | Data type | Max Bytes / message | Max Delay (sec) | Message Interval (sec) | Security level |
| Metadata to Content Consumer | fnap.cc-metadata\_search\_request | Request + credentials | 1 kB | 100 ms | On request 5 min | Medium |
| tnap.cc-metadata\_search\_result | Response + metadata | 1 kB + up to 500 kB | 500 ms | 1 day | Low |
| Minimum data rate for link | | 1 MB/sec \* 5a = 5 MB/sec | | |  | Medium |
| Minimum Inter message gap | | 300 Seconds | | |  |

*a Multiple users must be expected to access NAP at the same time, for this the communication requirement analysis employ a safety value of 5, that multiplies computed maximum data rate for a link.*

### Content Consumer Support

*Date Modified: 13.06.2025 18:34:03, GUID: {9D010BE5-6592-4e26-86F6-6D16140A0A39}*

**Identification:** CC-SM;Content Consumer - Support Module

**Type**: User interface

**Description:** This interface enables information exchange between the content consumer and the NAP support and handles the support requests. Users post a question which is responded to in an organised manner. The Interface shall be a web-based application that any authorised NAP CC could access. It should support all common web browsing tools / devices. It should have an access authorisation mechanism and a graphical interface which at least support the local language.

**Related Documents**: ---

=== Communications Requirements ===

Data size may vary based on what is requested, and how is the request phrased, e.g. the request might contain images or data that are passed to the NAP Operator. Message intervals hint the resolution date and max delay the time of the system to confirm that the request has been received.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| PDF | FDFs | Data type | Max Bytes / message | Max Delay (sec) | Message Interval (sec) | Security level |
| Support of Content Consumer | fnap.cc-support\_request | Request + data + credentials | 1 kB + up to 10 MB | 30 s | On request | Medium |
| tnap.cc-support\_response | Response | 1 kB + | 60 s | 5 days | Low |
| Minimum data rate for link | | 1/3 MB/sec \* 3a = 1 MB/sec | | |  | Medium |
| Minimum Inter message gap | | Not relevant | | |  |

*a Multiple users must be expected to access NAP at the same time, for this the communication requirement analysis employ a safety value of 3, that multiplies computed maximum data rate for a link.*

### Content Provider Data Provision

*Date Modified: 13.06.2025 17:59:01, GUID: {C03CF47C-96E7-4733-B905-CB836A908BB7}*

**Identification:** CP-DMM; Content Provider - Data Management Module

**Type**: User interface

**Description**: This interface is used by the Content Provider to provide data to be stored in the NAP. User selects data he/she wants to store (associated with a catalogue record entry) and via web interface uploads to the NAP. The Interface shall be a web-based application that any authorised NAP CP could access. It should support all common web browsing tools / devices. It shall have an access authorisation mechanism and a graphical interface which at least support the local language.

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

=== Communications Requirements ===

Data size may vary based on what is the content provider intends to upload to the NAP. It is assumed that this is performed by the Content Provider only static data (see Machine Data Provision Interface), Other types of data will be uploaded by the system or be only proxied by NAP. Therefor data may vary from several MBs (small static parking) to several GBs in case of large network files.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| PDF | FDFs | Data type | Max Bytes / message | Max Delay (sec) | Message Interval (sec) | Security level |
| Data from Content Provider | fnap.cp-data\_&\_authorisation\_credentials | Request + data + (credentials) | 1 kB + up to 2 GB | 5 minutes | 6 months | Medium |
| tnap.cp-data\_upload\_result\_report | Response | 1 kB | 100 ms | - | Medium |
| Minimum data rate for link | | 6 MB/sec \* 1b = 6 MB/sec | | |  | Medium |
| Minimum Inter message gap | | Not relevant | | |  |

*b It is not assumed that multiple providers will be uploading their data to NAP at the same time, for this the communication requirement analysis employ a safety value of 1, that multiplies computed maximum data rate for a link.*

### Content Provider Management

*Date Modified: 13.06.2025 18:36:05, GUID: {D137DB55-A2D0-4a62-9A98-6144AC1C5404}*

**Identification:** CP - UMM; Content Provider – User Management Module

**Type**: User interface

**Description:** This interface enables content provider to access NAP to change and modify account details including potential machine accounts. It is assumed that the NAP shall have a registration procedure for metadata provider. The registration can differ in Member States. The authenticity of the registered content provider shall be guaranteed and shall follow international standards. The Interface is a web-based application which is supposed to be a part of the NAP web page. The authorised person should be able to access this application through all possible browsers / devices and the graphical interface should at least support the local language.

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

=== Communications Requirements ===

Data size may vary based on what is the content provider provides for the registration, if these are some documents then the size could be up to 1 MB. Message intervals hint the resolution date of the request and max delay the time of the system to confirm that the request has been received.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| PDF | FDFs | Data type | Max Bytes / message | Max Delay (sec) | Message Interval (sec) | Security level |
| User Management of Content Provider | fnap.cp-registration\_request | Request + data + (credentials) | 1 kB + up to 1 MB | 30 s | On request | Medium |
| tnap.cp-registration\_response | Response | 1 kB + | 60 s | 1 day | Medium |
| Minimum data rate for link | | 1/30 MB/sec \* 3a = 0,1 MB/sec | | |  | Medium |
| Minimum Inter message gap | | Not relevant | | |  |

*a Multiple users must be expected to access NAP at the same time, for this the communication requirement analysis employ a safety value of 3, that multiplies computed maximum data rate for a link.*

### Content Provider Metadata Provision

*Date Modified: 13.06.2025 17:41:08, GUID: {DAA1010E-3FD1-49b7-AC66-2080DB101A8E}*

**Identification:** CP-mdMM; Content Provider - Metadata Management Module

**Type**: User interface

**Description:** This interface enables Content Provider to insert, modify, delete metadata into NAP. The Interface shall be a web-based application that any authorised NAP CP could access. NAP returns success codes or information about error. It should support all common web browsing tools / devices. It shall have an access authorisation mechanism and a graphical interface which at least support the local language. Data adheres to mobilityDCAT-AP standard.

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

=== Communications Requirements ===

Metadata size may vary based on what is the content provider intends to upload to the NAP just texts are 100 kB, but images, samples, schema and documentation could be several MBs.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| PDF | FDFs | Data type | Max Bytes / message | Max Delay (sec) | Message Interval (sec) | Security level |
| Metadata from Content Provider | fnap.cp-metadata\_& \_authorisation\_credentials | Request + metadata + credentials | 1 kB + up to 10 MB | 10 seconds | 1 month | Medium |
| tnap.cp-metadata\_&\_success\_report | Response | 1 kB | 100 ms | - | Medium |
| Minimum data rate for link | | 1 MB/sec \* 1b = 1 MB/sec | | |  | Medium |
| Minimum Inter message gap | | Not relevant | | |  |

*b It is not assumed that multiple providers will be uploading their metadata to NAP at the same time, for this the communication requirement analysis employ a safety value of 1, that multiplies computed maximum data rate for a link.*

### Content Provider Support

*Date Modified: 13.06.2025 18:36:54, GUID: {2B49F77B-92D8-4494-B75B-7482740303ED}*

**Identification:** CP - SM; Content Provider - Support Module

**Type**: User interface

**Description:** This interface enables information exchange between the content provider and the NAP support and handles the support requests. Users post a question which is responded to in an organised manner. The Interface shall be a web-based application that any authorised NAP CP could access. It should support all common web browsing tools / devices. It should have an access authorisation mechanism and a graphical interface which at least support the local language.

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

=== Communications Requirements ===

Data size may vary based on what is requested, and how is the request phrased, e.g. the request might contain images or data that are passed to the NAP Operator. Message intervals hint the resolution date and max delay the time of the system to confirm that the request has been received.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| PDF | FDFs | Data type | Max Bytes / message | Max Delay (sec) | Message Interval (sec) | Security level |
| Support of Content Provider | fnap.cp-support\_request | Request + data + credentials | 1 kB + up to 10 MB | 30 s | On request | Medium |
| tnap.cp-support\_response | Response | 1 kB + | 60 s | 5 days | Low |
| Minimum data rate for link | | 1/3 MB/sec \* 3a = 1 MB/sec | | |  | Medium |
| Minimum Inter message gap | | Not relevant | | |  |

*a Multiple users must be expected to access NAP at the same time, for this the communication requirement analysis employ a safety value of 3, that multiplies computed maximum data rate for a link.*

### Machine Data Access

*Date Modified: 13.06.2025 18:08:30, GUID: {B5381D32-D813-436f-8E09-B87BD10B5F64}*

**Identification:** DRS - DMM; Data Requesting System - Data Management Module

**Type**: Programming Interface

**Description:** This interface is used for the retrieval of the data stored at or proxied via NAP by automated system of Content Consumer. To allow for basic service provision and as a protection from denial-of-service attacks and to identify data requesting system this interface shall require authorization. The API shall provide data retrieval functionality as web-based user-oriented UI. The authorization is envisaged via machine account preregistration by content consumer.

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

=== Communications Requirements ===

Data size and interval and maximum delay varies by the type of the data, **see Machine Data Provision Interface**.

Usually, use of this interface is expected all data types, requesting in periodical time new data. For data requesting interface several other considerations must be made to maximize efficiency: data compression (gzip), conditional data request, data request limiting, cashing data, etc. This interface assumes PULL access.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| PDF | FDFs | Data type | Max Bytes / message | Max Delay (sec) | Message Interval (sec) | Security level |
| Data to Data Requesting System | fnap.drs-data\_request | Request + credentials | 1 kB | 100 ms | On request 5 min | Medium |
| tnap.drs-data\_response | Response + static data | 1 kB + up to 2GB | 5 minutes | 6 months | Medium |
| Response + semi-static data | 1 kB + up to 500 kB | 5 minutes | 1 day | Medium |
| Response + dynamic data | 1 kB + up to 500 kB | 3 minutes | 5 minutes | Medium |
| Response + status data | 1 kB + up to 1GB | 30 sec | 5 minutes | Medium |
| Minimum data rate for link | | 33 MB/sec \* 5a = 166 MB/sec | | |  | Medium |
| Minimum Inter message gap | | 300 Seconds | | |  |

*a Multiple users must be expected to access NAP at the same time, for this the communication requirement analysis employ a safety value of 5 (that many users simultaneously download the most resource intensive data), that multiplies computed maximum data rate for a link.*

### Machine Data Provision

*Date Modified: 13.06.2025 18:01:18, GUID: {EBF272EF-DE4F-4939-83C4-C3924574983A}*

**Identification:** DPS - DMM; Data Provision System - Data Management Module

**Type**: Programming Interface

**Description:** This interface is used for the automatic upload of the data to be stored at the NAP by system of Content Provider. To allow for basic security and to identify data requesting system this interface shall require authorization. The API shall provide data insert, modify and delete functionality as web-based user-oriented UI. The authorization is envisaged via machine account preregistration by content provider.

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

=== Communications Requirements ===

Data size and interval and maximum delay varies by the type of the data:

* static data: small parking static data (500 kB/semester) to detailed road trajectory and attributes (2+ GB/semester)
* semi-static data: road closures and traffic measures (500 kB/day)
* dynamic data: incidents accidents, event data (500 kB/5 minutes)
* status data: small area with parking sensors (200 kB/5 minutes) to travel time data for whole network (1 GB/5minutes)

Usually, use of this interface is expected for semi static, dynamic and status data, it could be to difficult to set up a machine for uploading static data twice a year.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| PDF | FDFs | Data type | Max Bytes / message | Max Delay (sec) | Message Interval (sec) | Security level |
| Data from Data Provision System | tnap.dps-data\_upload \_result\_report | response + credentials | 1 kB | 100 ms | On request 5 min | Medium |
| fnap.dps-data\_&\_ authorisation\_ credentials | Request + static data | 1 kB + up to 2GB | 5 minutes | 6 months | Medium |
| Request + semi-static data | 1 kB + up to 500 kB | 5 minutes | 1 day | Medium |
| Request + dynamic data | 1 kB + up to 500 kB | 3 minutes | 5 minutes | Medium |
| Request + status data | 1 kB + up to 1GB | 30 sec | 5 minutes | Medium |
| Minimum data rate for link | | 33 MB/sec \* 2a = 99 MB/sec | | |  | Medium |
| Minimum Inter message gap | | 300 Seconds | | |  |

*a Multiple users must be expected to access NAP at the same time, for this the communication requirement analysis employ a safety value of 2 (not really expected at the content provision side), that multiplies computed maximum data rate for a link.*

### Machine Metadata Access

*Date Modified: 13.06.2025 18:17:28, GUID: {373128AD-1078-42bc-A0B2-F5E56522B7B8}*

**Identification:** mdRS – mdMM; Metadata Requesting System - Metadata Management Module

**Type**: Programming Interface

**Description:** This interface is used for the retrieval of the metadata stored at NAP by automated system of Content Consumer. To allow for basic service provision and as a protection from denial of service attacks this interface may require authorization. The API shall provide similar search and retrieve functionality as web-based user-oriented UI. This interface shall support metadata exchange as specified by mobilityDCAT-AP.

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

=== Communications Requirements ===

Data size may vary based on what is requested, if the catalogue record only then it is up to 100 kB, depending on textual directly transferred content of the record, up to 10s of MBs if whole site catalogue is returned.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| PDF | FDFs | Data type | Max Bytes / message | Max Delay (sec) | Message Interval (sec) | Security level |
| Metadata to Requesting System | fnap.mdrs-metadata\_request | Request + credentials | 1 kB | 100 ms | On request 5 min | Medium |
| tnap.mdrs-metadata\_response | Response + metadata | 1 kB + up to 10 MB | 500 ms | 1 day | Low |
| Minimum data rate for link | | 1 MB/sec \* 3a = 3 MB/sec | | |  | Medium |
| Minimum Inter message gap | | 300 Seconds | | |  |

*a Multiple users must be expected to access NAP at the same time, for this the communication requirement analysis employ a safety value of 3, that multiplies computed maximum data rate for a link.*

### Machine Metadata Provision

*Date Modified: 13.06.2025 18:13:32, GUID: {70F2112F-B845-4d29-AECD-17CD9D7B4B7D}*

**Identification:** mdPS - mdMM; Metadata Provision System - Metadata Management Module

**Type**: Programming Interface

**Description:** This interface is used by content consumer system to automatically insert, modify or delete metadata at NAP. The interface must allow authorised access. The Interface shall be an API based application that any compatible system could access. It should support metadata standard mobilityDCAT-AP

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

=== Communications Requirements ===

Metadata size may vary based on what is the content provider intends to upload to the NAP just texts are 100 kB, but images, samples, schema and documentation could be several MBs.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| PDF | FDFs | Data type | Max Bytes / message | Max Delay (sec) | Message Interval (sec) | Security level |
| Metadata from Metadata Provision System | ps\_metadata & data source | Request + metadata + credentials | 1 kB + up to 10 MB | 1 second | 1 month | Medium |
| ps\_metadata & success report | Response | 1 kB | 100 ms | - | Low |
| Minimum data rate for link | | 10 MB/sec \* 1b = 10 MB/sec | | |  | Medium |
| Minimum Inter message gap | | Not relevant | | |  |

*b It is not assumed that multiple providers will be uploading their metadata to NAP at the same time, for this the communication requirement analysis employ a safety value of 1, that multiplies computed maximum data rate for a link.*

## Specifications

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