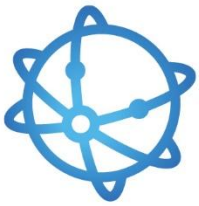

Peppol

The future is open

Service Metadata Locator (SML)

Status: Published - Version: 1.3.0
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OpenPeppol AISBL
Rond-point Schuman 6, box 5
1040 Brussels Belgium

info@peppol.eu
www.peppol.org

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Statement of originality

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Statement of copyright

Revision History

Version	Date	Description of changes	Author
1.0.0	2010-02-15	First version (pending EC approval)	Mike Edwards, NITA/IBM
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1.2.0	2021-05-13	Updated the references Improved layout Linking external XSD and WSDLs in the Appendix Updated rules for migration key Changed the service name from “ManageParticipant*” to “ManageBusiness*” to reflect the current situation	Philip Helger, OpenPeppol OO
1.3.0	2025-02-06	Removed Appendix A: XML Schema (non-normative) Removed Appendix B: WSDLs (non-normative) Updated Peppol references Updated reference URLs Added reference to OASIS BDX Location 1.0 Switching from CNAME to U-NAPTR DNS records Removed the CNAME Wildcard option as this is unused and not relevant with current use of iso6523-actorid-upis	Philip Helger, OpenPeppol OO

Contributors

Organisations

DIFI (Direktoratet for forvaltning og IKT), Norway, www.difi.no

NITA (IT- og Telestyrelsen), Denmark, www.itst.dk

BRZ (Bundesrechenzentrum), Austria, www.brz.gv.at

Consip, Italy

OpenPeppol

Persons

Bergthór Skúlason, NITA

Carl-Markus Piswanger, BRZ

Christian Uldall Pedersen, NITA/Accenture

Dennis Jensen Søgaard, NITA/Accenture

Gert Sylvest, NITA/Avanade

Hans Guldager Knudsen, NITA/Lenio

Jens Jakob Andersen, NITA

Joakim Recht, NITA/Trifork

Kenneth Bengtsson, NITA/Alfa1lab

Klaus Vilstrup Pedersen, DIFI

Mike Edwards, NITA/IBM (editor)

Mikkel Hippe Brun, NITA

Paul Fremantle, NITA/WSO2

Philip Helger, OpenPeppol Operating Office

Thomas Gundel, NITA/IT Crew

1 Introduction

1.1 Objective

This document defines the profiles for the discovery and management interfaces for the Peppol Network Service Metadata Locator (SML) service.

The SML service exposes three interfaces:

- Service Metadata discovery interface
  This is the lookup interface which enables senders to discover service metadata about specific target participants
- Manage participant identifiers interface
  This is the interface for Service Metadata Publishers (SMP) for managing the metadata relating to specific participant identifiers that they make available.
- Manage service metadata interface
  This is the interface for SMP for managing the metadata about their services, e.g. binding, interface profile and key information.

This document describes the physical bindings of the logical interfaces in section 3.1.

1.2 Scope

This specification relates to the Technical Transport Layer of the Peppol Network. It provides transport for electronic documents as specified in the Peppol BIS.

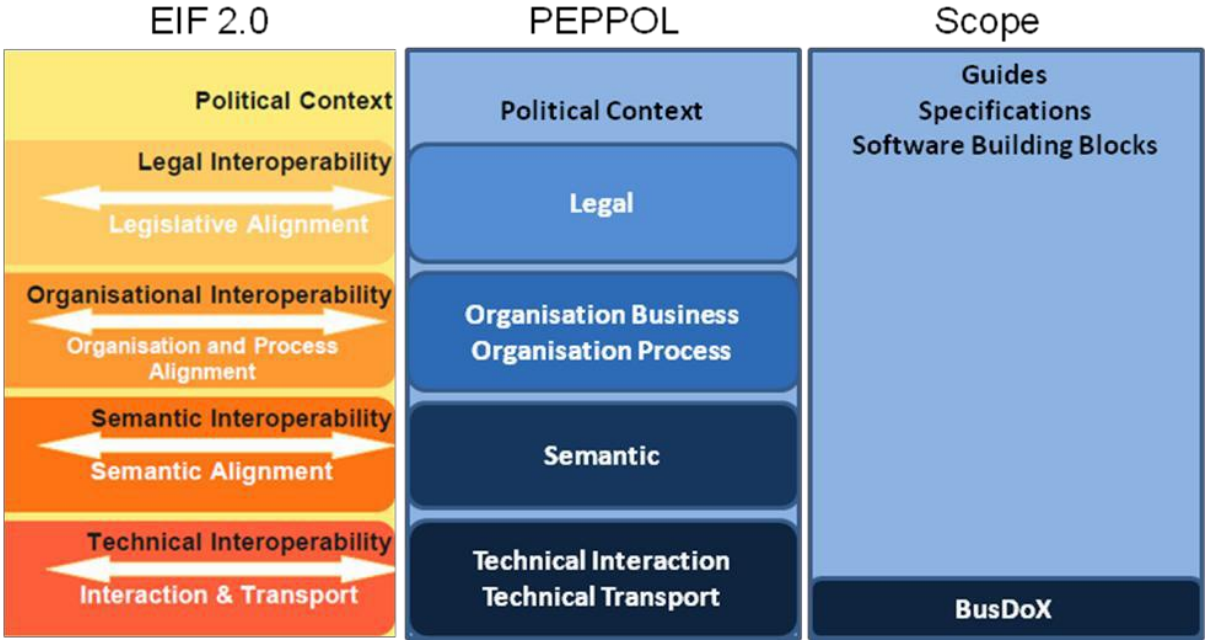


Figure 1: Peppol Interoperability

1.3 Goals and non-goals

The goal of this document is to describe the interface and transport bindings of the Service Metadata Locator (SML) service. It does not consider its implementation or internal data formats, user management and other procedures related to the operation of this service.

1.4 Terminology

The keywords "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119 [RFC2119].

1.4.1 Notational conventions

Pseudo-schemas are provided for each component, before the description of the component. They use BNF-style conventions for attributes and elements: `?` denotes optionality (i.e. zero or one occurrences), `*` denotes zero or more occurrences, `+` one or more occurrences, `[` and `]` are used to form groups, and `|` represents choice. Attributes are conventionally assigned a value which corresponds to their type, as defined in the normative schema. Elements with simple content are conventionally assigned a value which corresponds to the type of their content, as defined in the normative schema. Pseudo schemas do not include extension points for brevity.

```
<!-- sample pseudo-schema -->
<defined_element
    required_attribute_of_type_string="xs:string"
    optional_attribute_of_type_int="xs:int"? >
  <required_element />
  <optional_element />?
  <one_or_more_of_these_elements />+
  [ <choice_1 /> | <choice_2 /> ]*
</defined_element>
```

1.4.2 Normative references

[BDEN-SMP] “Peppol Service Metadata Publishing (SMP) 1.3.0”, https://docs.peppol.eu/edelivery/

[XML-DSIG] “XML Signature Syntax and Processing (Second Edition)”, https://www.w3.org/TR/xmldsig-core/

[RFC-2119] “Key words for use in RFCs to Indicate Requirement Levels”, https://datatracker.ietf.org/doc/html/rfc2119

[RFC3986] “Uniform Resource Identifier (URI): Generic Syntax”, https://datatracker.ietf.org/doc/html/rfc3986

[RFC4848] "Domain-Based Application Service Location Using URIs and the Dynamic Delegation Discovery Service (DDDS)", https://datatracker.ietf.org/doc/html/rfc4848
[PFUOI4] "Peppol Policy for use of Identifiers 4.4.0", https://docs.peppol.eu/edelivery/
[BDXL1] "Business Document Metadata Service Location Version 1.0", https://docs.oasis-open.org/bdxr/BDX-Location/v1.0/BDX-Location-v1.0.html

1.4.3 Non-normative references

[WSDL-2.0] "Web Services Description Language (WSDL) Version 2.0 Part 1: Core Language", https://www.w3.org/TR/wsdl20/
[WS-I BP] "WS-I Basic Profile Version 1.1", http://www.ws-i.org/deliverables/basic1.1.html
[WS-I BSP] "WS-I Basic Security Profile Version 1.0", http://www.ws-i.org/Profiles/BasicSecurityProfile-1.0.html
[DNS-1034] "Domain Names - Concepts and Facilities", https://datatracker.ietf.org/doc/html/rfc1034
[DNS-1035] "Domain Names - Implementation and Specification", https://datatracker.ietf.org/doc/html/rfc1035
[SHA256] "US Secure Hash Algorithms (SHA and SHA-based HMAC and HKDF)", https://datatracker.ietf.org/doc/html/rfc6234

1.5 Namespaces

The following table lists XML namespaces that are used in this document. The choice of any namespace prefix is arbitrary and not semantically significant.

Prefix	Namespace URI
ids	http://busdox.org/transport/identifiers/1.0/
lrs	http://busdox.org/serviceMetadata/locator/1.0/
soap	http://schemas.xmlsoap.org/wsdl/soap/
wsdl	http://schemas.xmlsoap.org/wsdl/
xs	http://www.w3.org/2001/XMLSchema

2 The Service Discovery Process

The interfaces of the Service Metadata Locator (SML) service and the Service Metadata Publisher (SMP) service cover both sender-side lookup and metadata management performed by SMPs. The following interfaces are mandated for these services:

- SML:
  - Discovery interface for senders
  - Management interface for SMPs
- SMP:
  - Discovery interface for senders

This specification only covers the interfaces for the SML.

The SML service specification is based on the use of DNS (Domain Name System) lookups to find the address of the Service Metadata for a given participant ID [DNS-1034] [DNS-1035]. This approach has the advantage that it does not need a single central server to run the Discovery interface, with its associated single point of failure. Instead, the already distributed and highly redundant infrastructure which supports DNS is used. The SML service itself thus plays the role of providing controlled access to the creation and update of entries in the DNS.

2.1 Discovery flow

For a sender, the first step in the Discovery process is to establish the location of the SMP relating to the particular Participant Identifier to which the sender wants to transmit a message. Each participant identifier is registered with one and only one SMP.

1. The sender constructs the domain name for the SMP for a given recipient participant identifier using a standard format, as follows:

```
<hash over recipientID>.<schemeID>.<SML domain>
```

2. The sender performs a DNS U-NAPTR record lookup with the domain name created in the previous step and extracts the base URL for the effective SMP query (incl. the URL scheme).

3. The sender constructs the address for the SMP for a given recipient participant identifier using a standard format, as follows:

```
<smpBaseUrlFromNaptrLookup>/<recipientID>/services/<documentType>
```

The sender uses this URL in an HTTP GET operation which returns the metadata relating to that recipient and the specific document type (for details, see the SMP specification [BDEN-SMP]). The sender can obtain the information necessary to transmit

a message containing that document type to that recipient from the returned metadata. This sequence is shown in Figure 2.

Note that the sender is required to know 2 pieces of information about the recipient - the recipient's participant ID and the ID of the Scheme of the participant ID (i.e. the format or type of the participant ID). This provides for flexibility in the types of participant identifier that can be used in the system. Since in general a participant ID may not have a format that is acceptable in an HTTP URL, the ID is hashed into a string as described in section 3.1.1 Format of Participant Identifiers.

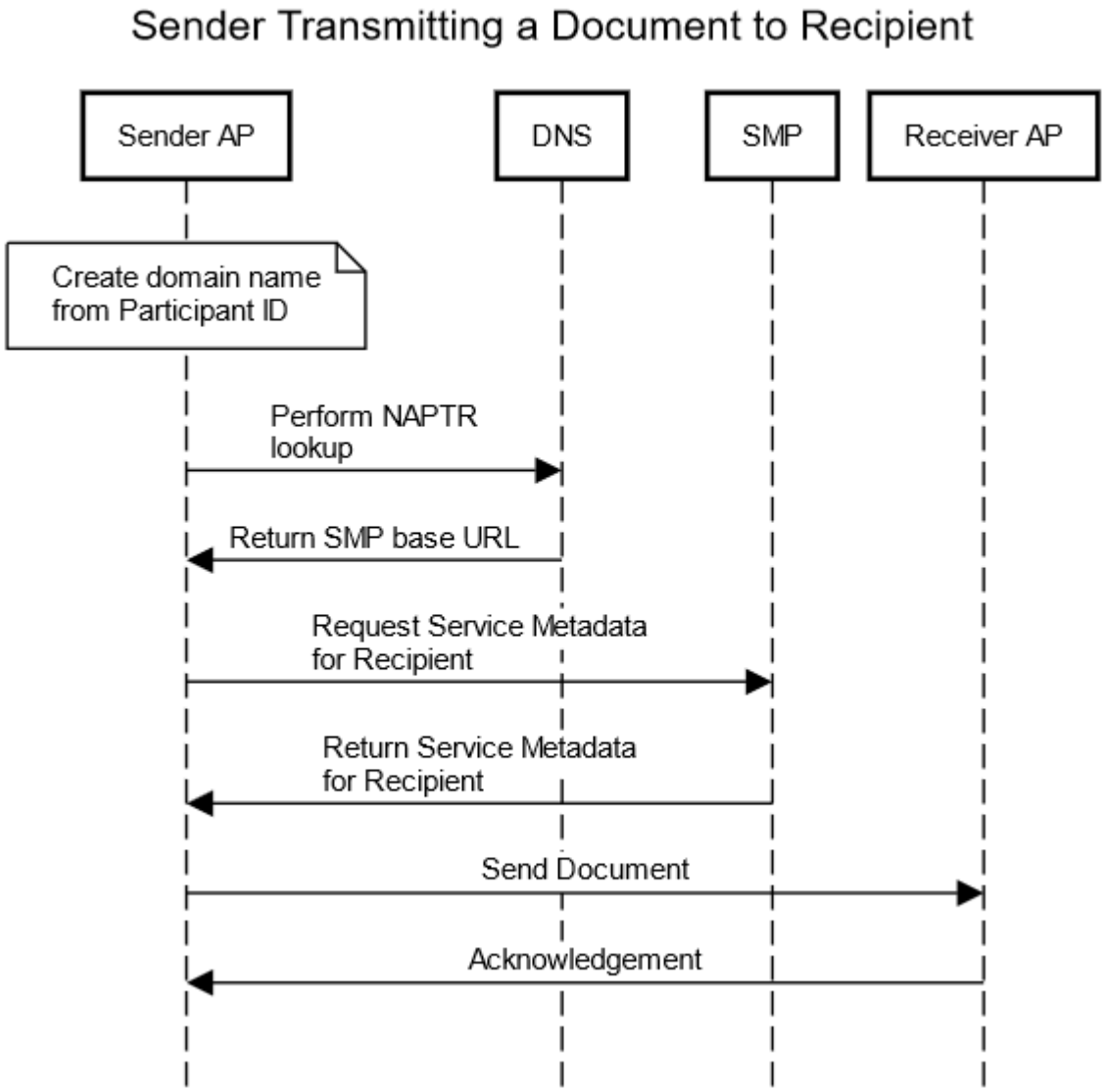


Figure 2: Sequence Diagram for Sender transmitting Document to Recipient

The underlying design of the Discovery process is based on the use of Domain Name System (DNS) U-NAPTR records (see [BDXL1]) which correspond to the Domain Name

in the format given above, namely that there is a U-NAPTR record for the domain name `<hash over recipientID>.<schemeID>.<SML domain>`. Furthermore, that U-NAPTR record points at the SMP which holds the metadata about that recipient.

2.1.1 U-NAPTR Resource Records

The NAPTR service name MUST be `Meta:SMP`. Other service names MUST NOT be used in relation to this specification. Note that the service field is case-insensitive, according to [RFC4848].

URI values stored in BDXL U-NAPTR records MUST

- use only the “https” URL scheme
- NOT use username and/or password in the domain authority section
    - Example restricted SMP URLs are:
        - `https://user@pw:smp.example.org`
- NOT include query or fragment parts, in addition to the domain authority and path parts
    - Example restricted SMP URLs are:
        - `https://smp.example.org/smp?param=value`
        - `https://smp.example.org/smp#anchor`

Valid intended URLs according to these rules are e.g.

- `https://smp.example.org`
- `https://smp.example.org/`
- `https://server.example.org/smp`
- `https://server.very.complex.example.org/path/to/my/smp`

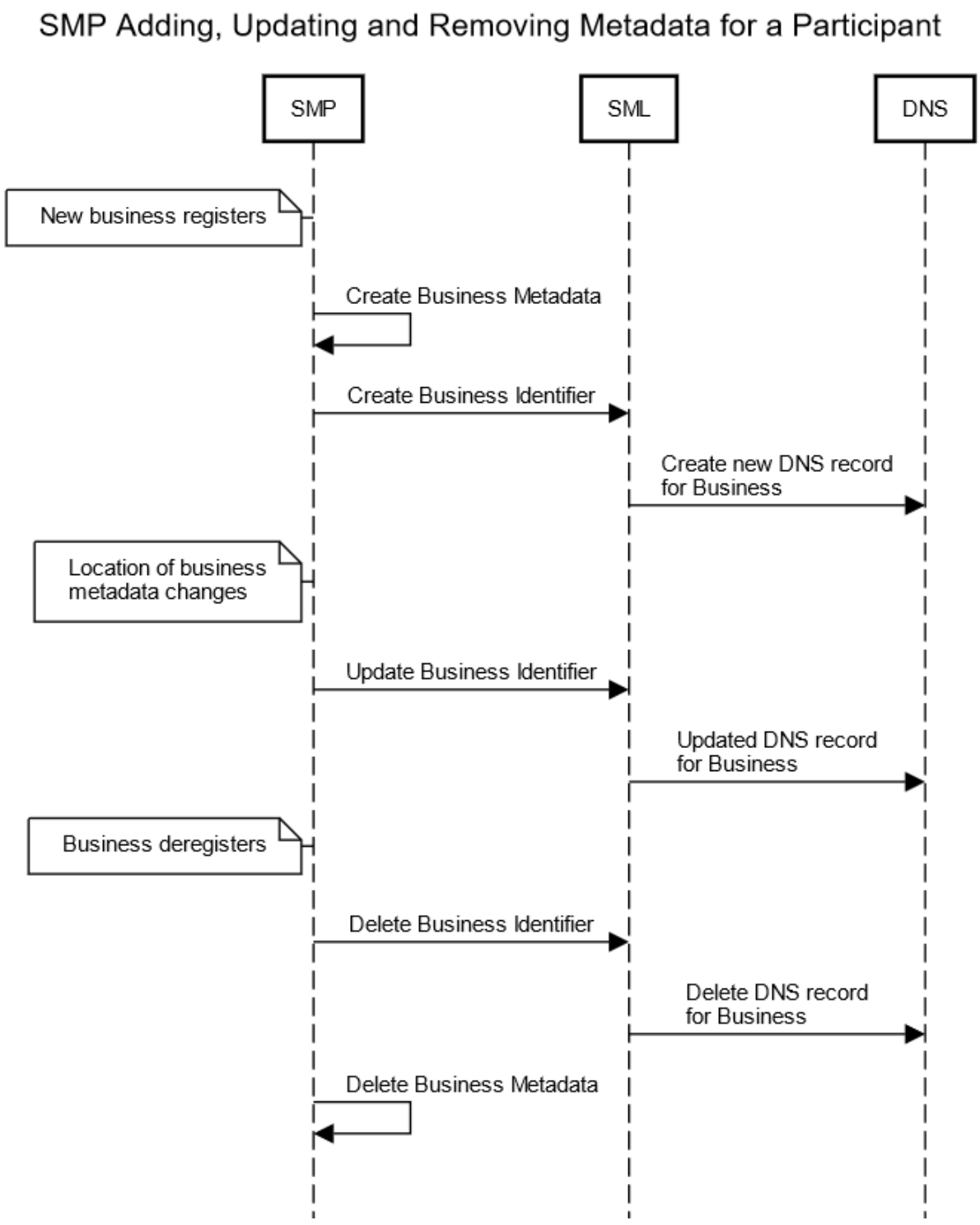
Note that URI scheme and host name are case insensitive. All other URI components MUST be treated as case sensitive (see [RFC3986]).

Note when querying NAPTR records for a Participant, more than one record with different service names may be returned for other purposes than locating the SMP (see [BDXL1]).

2.2 Flows Relating to Service Metadata Publishers

The management of the DNS U-NAPTR records for a given participant identifier is performed through the Management interface of the SML. The management interface is primarily for use by the SMP which controls the service metadata for a given participant

identifier. Note that the DNS U-NAPTR records are **not** manipulated directly by the SMP but are manipulated by the SML service following requests made to its Management interface. The basic process steps for the SMP to manipulate the metadata relating to a given participant are shown in Figure 3.



162

163 *Figure 3: Sequence Diagram for SMP Adding, Updating and Removing Metadata for a Participant*

164 Each SMP is required to register the address of its server with the SML. Only once this
165 has been done can information relating to specific Participant Identifiers be presented to

the SML. The address for the metadata for a given participant is tied to the address of the SMP with which the participant is registered. For this purpose, the SMP uses the ManageServiceMetadata interface with flows as shown in Figure 4.

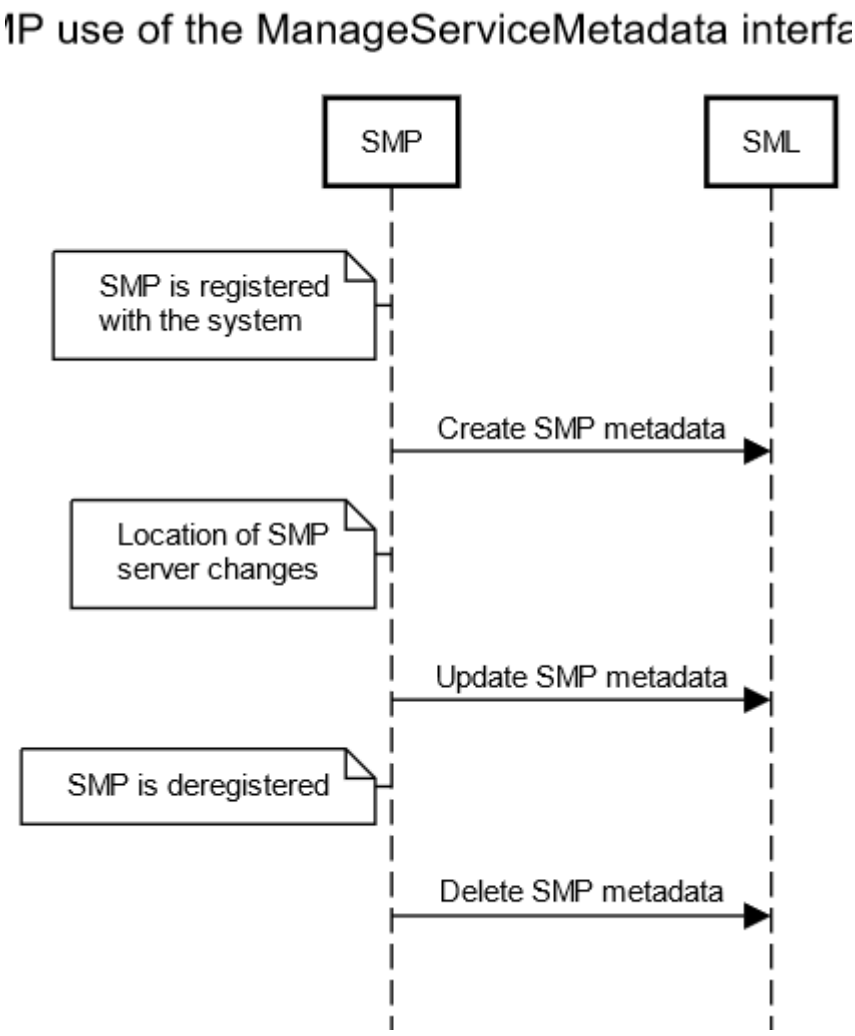


Figure 4: SMP use of the ManageServiceMetadata

Another set of steps relating to SMPs and the SML relates to the migration of the metadata about a participant from one SMP to another SMP (for example, the participant decides to change suppliers for this function). There are interfaces to the SML to support migrations of this kind, which imply following a sequence of steps along the lines shown in Figure 5.

In this sequence, the original SMP receives a request from a participant to migrate its metadata to a new SMP (a step that is done out-of-band: there are no interfaces defined in these specifications for this). The original SMP generates a “Migration Key” and invokes the `PrepareToMigrate` operation of the SML and then passes the Migration

Key to the new SMP (the key passing is an out-of-band step not defined in these specifications). When the new SMP has created the relevant metadata for the participant, it signals that it is taking over by invoking the `Migrate` operation of the SML, which then causes the DNS record(s) for that participant ID to be updated to point at the new SMP. Once this switch is complete, the original SMP can remove the metadata which it holds for the participant.

The following rules apply to the Migration Key

- MUST have at least 8 characters and not more than 24 characters
- MUST contain at least 2 lower case characters (a-z)
- MUST contain at least 2 upper case characters (A-Z)
- MUST contain at least 2 digits (0-9)
- MUST contain at least 2 characters from this set: “@” (ASCII code 64), “#” (35), “$” (36), “%” (37), “(“ (40), “)” (41), “[“ (91), “]” (93), “{“ (123), “}” (125), “*” (42), “^” (94), “-“ (45), “!” (33), “~” (126), “|” (124), “+” (43) and “=” (61)
- MUST NOT contain whitespace characters

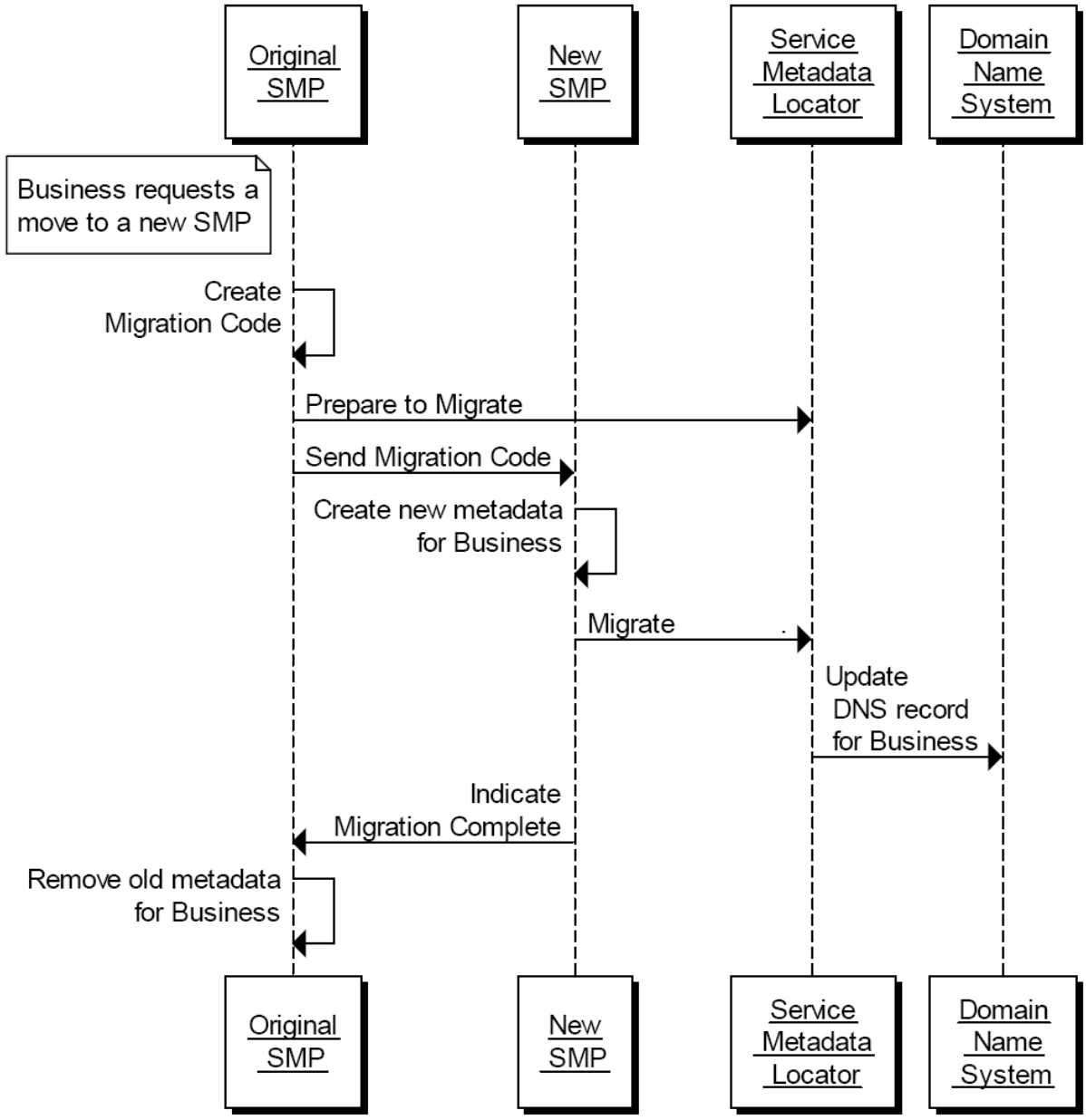


Figure 5: Steps in Migrating Metadata for a Participant from one SMP to a new SMP

3 Interfaces and Data Model

This section outlines the service interfaces and the related data model.

3.1 Service Metadata Locator Service, logical interface

The SML Service interface is divided into 2 logical parts:

- Manage participant identifiers interface
  This is the interface for SMPs for managing the registered participant identifiers they expose.
- Manage service metadata interface
  This is the interface for SMPs for managing the metadata about their metadata publishing service, e.g. binding, interface profile and key information.

3.1.1 Format of Participant Identifiers

The Peppol Network functions by means of logical addresses for the metadata of services offered by a participant, of the forms

```
<hash over recipientID>.<schemeID>.<SML domain>
```

and after DNS resolution in the form

```
https://<smpBaseUrlFromNaptrLookup>/<recipientID>/services/<documentType>
```

Peppol is flexible regarding the use of any one of a wide range of schemes for the format of participant identifiers, represented by the `schemeID`. However, when using this form of HTTP Web address, which is resolved through the DNS system, the format of the `recipientID` and the `schemeID` is constrained by the requirements of the DNS system. This means that both the `recipientID` and the `schemeID` must be strings which use the ASCII alphanumeric characters only and which have to start with an alphanumeric character.

Peppol allocates `schemeIDs` to conform to this requirement. However, there is no guarantee that the participant IDs will conform to this requirement for any given scheme (remembering that in many cases the participant ID scheme will be a pre-existing scheme with its own format rules that might violate the requirements of a DNS name). Therefore, a hash of the lowercased participant ID is always used, using the SHA-256 hash algorithm (see [SHA256]). The obtained digest is Base32 encoded and any eventually trailing `=` characters MUST be removed. See POLICY 7 of the [PFUOI4] for details.

An example participant ID is `0010:5798000000001`, for which the SHA-256 hash is `XUKHFQABQZIKI3YKVR2FHR4SNFA3PF5VPQ6K4TONV3LMVSY5ARVQ`.

3.1.2 ManageBusinessIdentifier interface

The ManageBusinessIdentifier interface allows SMPs to manage the information in the SML Service relating to individual participant identifiers for which they hold metadata.

This interface requires authentication of the SMP. The identity of the SMP derived from the authentication process identifies the SMP associated with the Participant Identifier(s) which are managed via this interface.

The ManageBusinessIdentifier interface has the following operations:

- Create
- CreateList
- Delete
- DeleteList
- PrepareToMigrate
- Migrate
- List

3.1.2.1 Create()

Creates an entry in the SML Service for information relating to a specific participant identifier. Regardless of the number of services a recipient exposes, only one record corresponding to the participant identifier is created in the SML Service by the SMP which exposes the services for that participant.

- `Input CreateParticipantIdentifier: ServiceMetadataPublisherServiceForParticipantType`
  contains the Participant Identifier for a given participant and the identifier of the SMP which holds its data
- `Fault: notFoundFault`
  returned if the identifier of the SMP could not be found
- `Fault: unauthorizedFault`
  returned if the caller is not authorized to invoke the `Create` operation
- `Fault: badRequestFault`
  returned if the supplied `CreateParticipantIdentifier` does not contain consistent data
- `Fault: internalErrorFault`
  returned if the SML service is unable to process the request for any reason

3.1.2.2 CreateList()

Creates a set of entries in the SML Service for information relating to a list of participant identifiers. Regardless of the number of services a recipient exposes, only one record

corresponding to each participant identifier is created in the SML Service by the SMP which exposes the services for that participant.

- `Input CreateList: ParticipantIdentifierPage`
  contains the list of Participant Identifiers for the participants which are added to the SML Service. The `NextPageIdentifier` element is absent.
- `Fault: notFoundFault`
  returned if the identifier of the SMP could not be found
- `Fault: unauthorizedFault`
  returned if the caller is not authorized to invoke the `CreateList` operation
- `Fault: badRequestFault`
  returned if the supplied `CreateList` does not contain consistent data
- `Fault: internalErrorFault`
  returned if the SML service is unable to process the request for any reason

3.1.2.3 Delete()

Deletes the information that the SML Service holds for a specific Participant Identifier.

- `Input DeleteParticipantIdentifier: ServiceMetadataPublisherServiceForParticipantType`
  contains the Participant Identifier for a given participant and the identifier of the SMP that publishes its metadata
- `Fault: notFoundFault`
  returned if the participant identifier or the identifier of the SMP could not be found
- `Fault: unauthorizedFault`
  returned if the caller is not authorized to invoke the `Delete` operation
- `Fault: badRequestFault`
  returned if the supplied `DeleteParticipantIdentifier` does not contain consistent data
- `Fault: internalErrorFault`
  returned if the SML service is unable to process the request for any reason

3.1.2.4 DeleteList()

Deletes the information that the SML Service holds for a list of Participant Identifiers.

- `Input DeleteList: ParticipantIdentifier`
  contains the list of Participant Identifiers for the participants which are removed from the SML Service. The `NextPageIdentifier` element is absent.
- `Fault: notFoundFault`
  returned if one or more participant identifiers or the identifier of the SMP could not be found
- `Fault: unauthorizedFault`
  returned if the caller is not authorized to invoke the `DeleteList` operation
- `Fault: badRequestFault`
  returned if the supplied `DeleteList` does not contain consistent data
- `Fault: internalErrorFault`
  returned if the SML service is unable to process the request for any reason

3.1.2.5 PrepareToMigrate()

Prepares a Participant Identifier for migration to another SMP. This operation is called by the SMP which currently publishes the metadata for the Participant Identifier. The SMP supplies a Migration Code which is used to control the migration process. The Migration Code must be passed (out of band) to the SMP which is taking over the publishing of the metadata for the Participant Identifier and which MUST be used on the invocation of the `Migrate()` operation.

This operation can only be invoked by the SMP which currently publishes the metadata for the specified Participant Identifier.

- `Input PrepareMigrationRecord: MigrationRecordType`
  contains the Migration Key and the Participant Identifier which is about to be migrated from one SMP to another.
- `Fault: notFoundFault`
  returned if the participant identifier or the identifier of the SMP could not be found
- `Fault: unauthorizedFault`
  returned if the caller is not authorized to invoke the `PrepareToMigrate` operation
- `Fault: badRequestFault`
  returned if the supplied `PrepateMigrationRecord` does not contain consistent data
- `Fault: internalErrorFault`
  returned if the SML service is unable to process the request for any reason

3.1.2.6 Migrate()

Migrates a Participant Identifier already held by the SML Service to target a new SMP. This operation is called by the SMP which is taking over the publishing for the Participant Identifier. The operation requires the new SMP to provide a migration code which was originally obtained from the old SMP.

The `PrepareToMigrate()` operation MUST have been previously invoked for the supplied Participant Identifier, using the same `MigrationCode`, otherwise the `Migrate()` operation fails.

Following the successful invocation of this operation, the lookup of the metadata for the service endpoints relating to a particular Participant Identifier will resolve (via DNS) to the new SMP.

- `Input CompleteMigrationRecord: MigrationRecordType`
  contains the Migration Key and the Participant Identifier which is to be migrated from one SMP to another.
- `Fault: notFoundFault`
  returned if the migration key or the identifier of the SMP could not be found
- `Fault: unauthorizedFault`
  returned if the caller is not authorized to invoke the `Migrate` operation
- `Fault: badRequestFault`
  returned if the supplied `CompleteMigrationRecord` does not contain consistent data
- `Fault: internalErrorFault`
  returned if the SML service is unable to process the request for any reason

3.1.2.7 List()

`List()` is used to retrieve a list of all participant identifiers associated with a single SMP, for synchronization purposes. Since this list may be large, it is returned as pages of data, with each page being linked from the previous page.

- `Input Page: PageRequest`
  contains a `PageRequest` containing the `ServiceMetadataPublisherID` of the SMP and (if required) an identifier representing the next page of data to retrieve. If the `NextPageIdentifier` is absent, the first page is returned.
- `Output: ParticipantIdentifierPage`
  a page of Participant Identifier entries associated with the SMP, also containing a `<Page/>` element containing the identifier that represents the next page, if any.

- `Fault: notFoundFault`
  returned if the next page or the identifier of the SMP could not be found
- `Fault: unauthorizedFault`
  returned if the caller is not authorized to invoke the `List` operation
- `Fault: badRequestFault`
  returned if the supplied `NextPage` does not contain consistent data
- `Fault: internalErrorFault`
  returned if the SML service is unable to process the request for any reason

Note that the underlying data may be updated between one invocation of `List()` and a subsequent invocation of `List()`, so that a set of retrieved pages of participant identifiers may not represent a consistent set of data.

3.1.3 ManageServiceMetadata interface

The ManageServiceMetadata interface allows SMPs to manage the metadata held in the SML Service about their SMP services, e.g. binding, interface profile and key information.

This interface requires authentication of the user. The identity of the user derived from the authentication process identifies the SMP associated with the service metadata which is managed via this interface.

The ManageServiceMetadata interface has the following operations:

- Create
- Read
- Update
- Delete

3.1.3.1 Create()

Establishes a SMP metadata record, containing the metadata about the SMP, as outlined in the `ServiceMetadataPublisherService` data type.

- `Input CreateServiceMetadataPublisherService: ServiceMetadataPublisherService`
  contains the SMP information, which includes the logical and physical addresses for the SMP (Domain name and IP address). It is assumed that the `ServiceMetadataPublisherID` has been assigned to the calling user out-of-bands.

- `Fault: unauthorizedFault`
  returned if the caller is not authorized to invoke the `Create` operation
- `Fault: badRequestFault`
  returned if the supplied `CreateServiceMetadataPublisherService` does not contain consistent data
- `Fault: internalErrorFault`
  returned if the SML service is unable to process the request for any reason

3.1.3.2 Read()

Retrieves the SMP record for the SMP.

- `Input ReadServiceMetadataPublisherService: ServiceMetadataPublisherID`
  the unique ID of the SMP for which the record is required
- `Output: ServiceMetadataPublisherService`
  the SMP record, in the form of a `ServiceMetadataPublisherService` data type
- `Fault: notFoundFault`
  returned if the identifier of the SMP could not be found
- `Fault: unauthorizedFault`
  returned if the caller is not authorized to invoke the `Read` operation
- `Fault: badRequestFault`
  returned if the supplied parameter does not contain consistent data
- `Fault: internalErrorFault`
  returned if the SML service is unable to process the request for any reason

3.1.3.3 Update()

Updates the SMP record for the SMP

- `Input UpdateServiceMetadataPublisheServicer: ServiceMetadataPublisherService`
  contains the service metadata for the SMP, which includes the logical and physical addresses for the SMP (Domain name and IP address)
- `Fault: notFoundFault`
  returned if the identifier of the SMP could not be found

- `Fault: unauthorizedFault`
  returned if the caller is not authorized to invoke the `Update` operation
- `Fault: badRequestFault`
  returned if the supplied `UpdateServiceMetadataPublisheServicer` does not contain consistent data
- `Fault: internalErrorFault`
  returned if the SML service is unable to process the request for any reason

3.1.3.4 Delete()

Deletes the SMP record for the SMP

- `Input DeleteServiceMetadataPublisherService: ServiceMetadataPublisherID`
  the unique ID of the SMP to delete
- `Fault: notFoundFault`
  returned if the identifier of the SMP could not be found
- `Fault: unauthorizedFault`
  returned if the caller is not authorized to invoke the `Delete` operation
- `Fault: badRequestFault`
  returned if the supplied `DeleteServiceMetadataPublisherService` does not contain consistent data
- `Fault: internalErrorFault`
  returned if the SML service is unable to process the request for any reason

3.1.4 Fault Descriptions

3.1.4.1 SMP Not Found Fault

[action]	http://busdox.org/2010/02/locator/fault
Code	Sender
Subcode	notFoundFault
Reason	The identifier of the SMP supplied could not be found by the SML
Detail	As detailed by the SML

3.1.4.2 Unauthorized Fault

[action]	http://busdox.org/2010/02/locator/fault
Code	Sender
Subcode	unauthorizedFault
Reason	The caller is not authorized to perform the operation requested
Detail	As detailed by the SML

3.1.4.3 Bad Request Fault

[action]	http://busdox.org/2010/02/locator/fault
Code	Sender
Subcode	badRequestFault
Reason	The operation request was incorrect in some way
Detail	As detailed by the SML

3.1.4.4 Internal Error Fault

[action]	http://busdox.org/2010/02/locator/fault
Code	Sender
Subcode	internalErrorFault
Reason	The SML encountered an error while processing the request
Detail	As detailed by the SML

3.2 Service Metadata Locator - data model

The data model for the SML involves the following data types:

- ServiceMetadataPublisher
- RecipientParticipantIdentifier

- ParticipantIdentifierPage
- MigrationRecord

Each of these data types is described in detail in the following subsections.

3.2.1 ServiceMetadataPublisherService datatype

Represents an SMP Service.

```
<ServiceMetadataPublisherService>
  <PublisherEndpoint>
    <EndpointAddress/>
  </PublisherEndpoint>
  <ServiceMetadataPublisherID/>
</ServiceMetadataPublisherService>
```

`ServiceMetadataPublisherService` has the following sub-elements:

- `PublisherEndpoint (1..1) : PublisherEndpointType`
  the technical endpoint address of the SMP, which can be used to query information about particular participant identifiers. ServiceEndpointList is a type defined in the ServiceMetadataPublishingTypes Schema. The `PublisherEndpoint` element may be a domain name or an IP address of the SMP.
- `ServiceMetadataPublisherID (1..1) : xs:string`
  holds the Unique Identifier of the SMP. When creating a `ServiceMetadataPublisherService` record, it is assumed that the publisher ID has been obtained out of band.

3.2.2 ServiceMetadataPublisherServiceForParticipant datatype

Represents an SMP Service containing information about a particular Participant Identifier.

```
<ServiceMetadataPublisherServiceForParticipant>
  <ServiceMetadataPublisherID/>
  <ids:ParticipantIdentifier/>
</ServiceMetadataPublisherServiceForParticipant>
```

ServiceMetadataPublisherService has the following subelements:

- `ServiceMetadataPublisherID (1..1) : xs:string`
  holds the Unique Identifier of the SMP.
- `ParticipantIdentifier (1..1) : ids:ParticipantIdentifierType`
  the Participant Identifier which has its services registered in the SMP. See the “ParticipantIdentifier” section on the format.

3.2.3 ParticipantIdentifier datatype

Represents a Participant Identifier which has its service metadata held by a specific SMP.

```
<ids:ParticipantIdentifier scheme="xs:string">
  xs:string
</ids:ParticipantIdentifier>
```

ParticipantIdentifier has the following sub elements:

- `ParticipantIdentifier (1..1): xs:string`
  the participant identifier
- `@scheme (1..1): xs:string`
  the format scheme of the participant identifier

3.2.4 ParticipantIdentifier format

For a description of the ParticipantIdentifier format, see the "Peppol Policy for use of Identifier" document [PFUOI4].

3.2.5 ParticipantIdentifierPage datatype

Represents a page of `ParticipantIdentifiers` for which data is held by the SML Service.

```
<ParticipantIdentifierPage>
  <ServiceMetadataPublisherID/>
  <ParticipantIdentifier/>*
  <NextPageIdentifier/>?
</ParticipantIdentifierPage>
```

- `ServiceMetadataPublisherID (1..1) : xs:string`
  holds the Unique Identifier of the SMP
- `ids:ParticipantIdentifier (1..1): xs:string`
  the participant identifier
- `NextPageIdentifier (0..1): xs:string`
  an element containing a string identifying the next page of `ParticipantIdentifiers`:

```
<NextPageIdentifier>
  [ Identifier for_Next_Page ]
</NextPageIdentifier>
```

If no `<NextPageIdentifier/>` element is present, it implies that there are no further pages.

3.2.6 MigrationRecord

The `MigrationRecord` represents the data required to control the process of migrating a ParticipantIdentifier from the control of one SMP to another SMP.

```
<MigrationRecord>
  <ServiceMetadataPublisherID/>
  <ParticipantIdentifier/>*
  <MigrationKey/>?
</MigrationRecord>
```

MigrationRecord has the following sub elements:

- `ServiceMetadataPublisherID (1..1) : xs:string`
  holds the Unique Identifier of the SMP.
- `ParticipantIdentifier (1..1) : ids:ParticipantIdentifierType`
  the participant identifier
- `MigrationKey (1..1) : xs:string`
  a string which is a unique key controlling the migration of the metadata for a given `ParticipantIdentifier` from one SMP to another. The `MigrationKey` string is a string of characters and numbers only, with a maximum length of 24 characters.

4 Service Bindings

This section describes the Bindings of the services provided by the SML to specific transports.

4.1 Services Provided as Web services - characteristics

Some of the services described by this specification are provided through Web service bindings.

Where services are provided through Web services bindings, those bindings MUST conform to the relevant WS-I Profiles, in particular WS-I Basic Profile 1.1 and WS-I Basic Security Profile 1.0.

4.2 ManageBusinessIdentifier service - binding

The ManageBusinessIdentifier service is provided in the form of a SOAP-based Web service.

4.2.1 Transport binding

The `ManageBusinessIdentifier` interface is bound to an HTTP SOAP 1.1 transport.

The WSDL files are published together with this specification.

4.2.2 Security

The service is secured at the transport level with a two-way TLS connection. The requestor must authenticate using a client certificate (mTLS) issued for use in the infrastructure by a trusted third-party. In the Peppol Network, a Peppol SMP certificate will be issued to the participants when they have signed the Service Provider agreements and live up to the stated requirements. The server must reject TLS clients that do not authenticate with a certificate issued under the Peppol root CA.

4.3 ManageServiceMetadata service - binding

SMPs use this interface to create or update metadata such as the endpoint address for retrieval of metadata about specific participant services.

The ManageServiceMetadata service is provided in the form of a SOAP-based Web service.

4.3.1 Transport binding

The `ManageServiceMetadata` interface is bound to an HTTP SOAP 1.1 transport.

The WSDL files are published together with this specification.

4.3.2 Security

The service is secured at the transport level with a two-way TLS connection. The requestor must authenticate using a client certificate issued for use in the infrastructure by a trusted third-party.

5 DNS Spoof Mitigation

The regular lookup of the address of the SMP for a given participant ID is performed using a standard DNS lookup. There is a potential vulnerability of this process if there exists at least one "rogue" certificate (e.g. stolen or otherwise illegally obtained).

In this vulnerability, someone possessing such a rogue certificate could perform a DNS poisoning or a man-in-the-middle attack to fool senders of documents into making a lookup for a specific identifier in a malicious SMP (that uses the rogue certificate),

effectively routing all messages intended for one or more recipients to a malicious access point. This attack could be used for disrupting message flow for those recipients, or for gaining access to confidential information in these messages (if the messages were not separately encrypted).

One mitigation for this kind of attack on the DNS lookup process is to use DNSSEC rather than plain DNS. DNSSEC allow the authenticity of the DNS resolutions to be checked by means of a trust anchor in the domain chain. Therefore, it is recommended that an SML instance uses the DNSSEC infrastructure.