Specification

OpenPeppol AISBL

Peppol Transport Infrastructure
ICT - Models

Service Metadata Publishing (SMP)

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Revision History

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1.0.1	2010-10-01	EC approved	Klaus Vilstrup Pedersen, DIFI
1.1.0	2012-08-15	Make room for alternative Transport Protocols e.g. AS2	Klaus Vilstrup Pedersen, DIFI
1.2.0	2021-02-24	Updated the references Improved layout Explicitly allowing Content-Type "application/xml" as it is equivalent to "text/xml" (chapter 5.1) Removing the requirement that the encoding attribute value is case sensitive (chapter 5.2) Change "is not" to "MUST NOT" in chapter 5.5 Replaced the references to the BusDox Common Definition document (BDEN-CEDF) Added clarifications on ServiceActivationDate and ServiceExpirationDate Linking peppol-smp-types-v1.xsd in the Appendix Fixed a typo in the name of the transformation Changed the Canonicalization Algorithm from "Exclusive" to "Inclusive"	Philip Helger, OpenPeppol OO

Statement of originality

This deliverable contains original unpublished work except where clearly indicated otherwise. Acknowledgement of previously published material and of the work of others has been made through appropriate citation, quotation or both.

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Table of contents

1   Introduction

1.1   Objective

This document describes the REST (Representational State Transfer) interface for Service Metadata Publication within the Business Document Exchange Network (BUSDOX). It describes the request/response exchanges between a Service Metadata Publisher and a client wishing to discover endpoint information. A client could be an end-user business application or an Access Point. It also defines the request processing that must happen at the client.

1.2   Scope

This specification relates to the Technical Transport Layer i.e. BusDox specifications. The BusDox specifications can be used in many interoperability settings. In the Peppol context, it provides transport for procurement documents as specified in the Peppol Profiles.
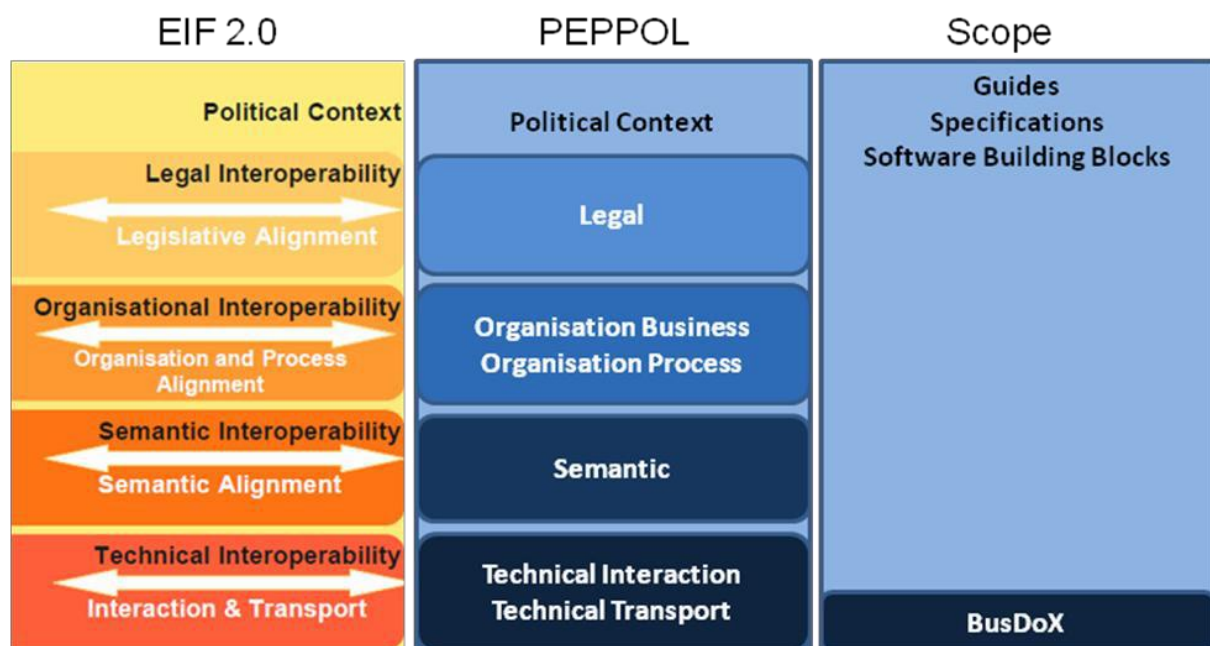
<div align="center">Fig. 1: Peppol Interoperability</div>

1.3   Goals and non-goals

The goal of this document is to define the REST lookup interface that Service Metadata Publishers ("SMP") and clients must support. Decisions regarding physical data format and management interfaces are left to implementers of such a service.

Service Metadata Publishers may be subject to additional constraints of agreements and governance frameworks within instances of the BUSDOX infrastructure not covered in this specification, which only addresses the technical interface of such a 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

[XML-DSIG] "XML Signature Syntax and Processing Version 1.1",
            https://www.w3.org/TR/xmldsig-core1/

[RFC3986]   "Uniform Resource Identifier (URI): Generic Syntax",
            http://tools.ietf.org/html/rfc3986

[WSA-1.0]   "Web Services Addressing 1.0 – Core",
            http://www.w3.org/TR/2005/CR-ws-addrcore-20050817/
            and "Web Services Addressing 1.0 - SOAP Binding",
            http://www.w3.org/TR/wsaddr-soap/

[RFC2119]   "Key words for use in RFCs to Indicate Requirement Levels",
            http://www.ietf.org/rfc/rfc2119.txt

[PFUOI4]   "Peppol Policy for use of Identifiers 4.1.0",
            https://docs.peppol.eu/edelivery/policies/PEPPOL-EDN-Policy-for-use-of-identifiers-4.1.0-2020-03-11.pdf

1.4.3 Non-normative references

[WSDL-2.0] "Web Services Description Language (WSDL) Version 2.0 Part 1: Core Language",
            http://www.w3.org/TR/wsdl20/

[REST]   "Architectural Styles and the Design of Network-based Software Architectures",
            https://www.ics.uci.edu/~fielding/pubs/dissertation/top.htm

[BDEN-SML] "Peppol Service Metadata Locator (SML) 1.2.0",
            https://docs.peppol.eu/edelivery/sml/PEPPOL-EDN-Service-Metadata-Locator-1.2.0-2020-06-25.pdf

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

ds	http://www.w3.org/2000/09/xmldsig#
ids	http://busdox.org/transport/identifiers/1.0/
smp	http://busdox.org/serviceMetadata/publishing/1.0/
wsa	http://www.w3.org/2005/08/addressing
xs	http://www.w3.org/2001/XMLSchema

2 The Service Discovery Process

68 The interfaces of the Service Metadata Locator (SML) service and the Service Metadata Publisher
69 (SMP) service cover both sender-side lookup and metadata management performed by SMPs.
70 Business Document Exchange Network (BUSDOX) mandates the following interfaces for these
71 services:

72 • Service Metadata Locator:
73   o DNS-based resolve mechanism to locate individual SMPs
74   o Management interface towards SMPs
75 • Service Metadata Publishers:
76   o Discovery interface towards senders

77 This specification only covers the discovery interface for Service Metadata Publication services.

2.1 Discovery flow

79 For a sender, the first step in the Discovery process is to establish the location of the Service
80 Metadata relating to the particular Participant Identifier to which the sender wants to transmit a
81 message. Each participant identifier is registered with one and only one Service Metadata Publisher.
82 The sender looks up the endpoint for the Service Metadata Publisher using the DNS-based Service
83 Metadata Locator service (this is a regular DNS resolve). The sender can then retrieve the metadata
84 associated with the Participant Identifier. This metadata includes the information necessary to
85 transmit the message to the recipient endpoint.

86 The diagram below represents the lookup flow for a sender contacting both the Service Metadata
87 Locator and the SMP.

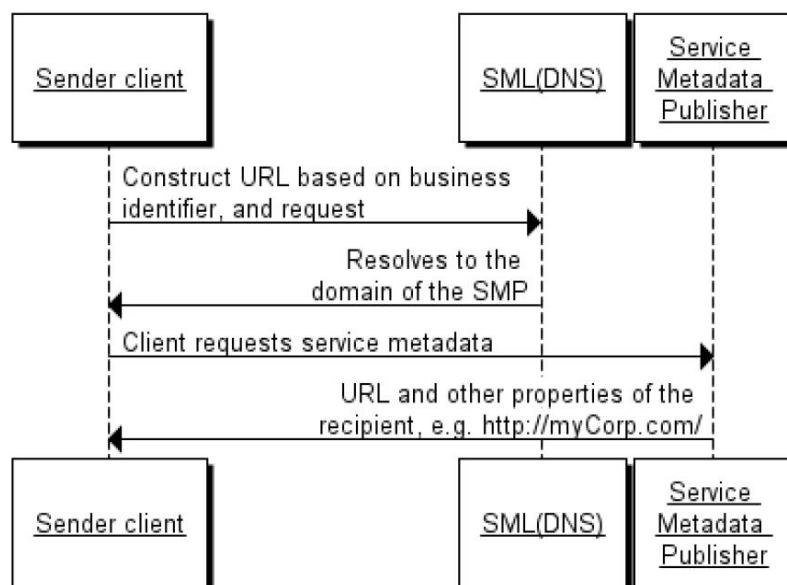**Fig. 2: Endpoint lookup with Service Metadata**

90 Note: For optimization reasons, the discovery doesn't have to be performed for every transfer if the
91 necessary information for transfer is already cached from previous transmissions. Though necessary
92 exception handling has to be in place i.e. new lookup has to be performed if the sending shows that
93 information is outdated e.g. old endpoint address.

94 **2.1.1 Discovering services associated with a Participant Identifier**

95 In addition to the direct lookup of Service Metadata based on participant identifier and document
96 type, a sender may want to discover what document types can be handled by a specific participant
97 identifier. Such discovery is relevant for applications supporting several equivalent business
98 processes. Knowing the capabilities of the recipient is valuable information to a sender application
99 and ultimately to an end user. E.g. the end user may be presented with a choice between a "simple"
100 and a "rich" business process.

101 This is enabled by a pattern where the sender first retrieves the *ServiceGroup* entity, which holds a
102 list of references to the *ServiceMetadata* resources associated with it. The *SignedServiceMetadata* in
103 turn holds the metadata information that describes the capabilities associated with the recipient
104 participant identifier

2.2 Service Metadata Publisher Redirection

106 For each participant identifier, the SML may only point to a single SMP. There are cases however
107 where the owner of a participant identifier may want to use different SMPs for different document
108 types or processes. This is supported by Service Metadata Publisher Redirection.

109 In this pattern, the sender is redirected by the SMP to a secondary, remote SMP where the actual
110 *SignedServiceMetadata* can be found. A special element within the *SignedServiceMetadata* record of
111 the SMP points to the SMP that has the actual Service Metadata and certificate information for that
112 SMP. The diagram below shows this flow:
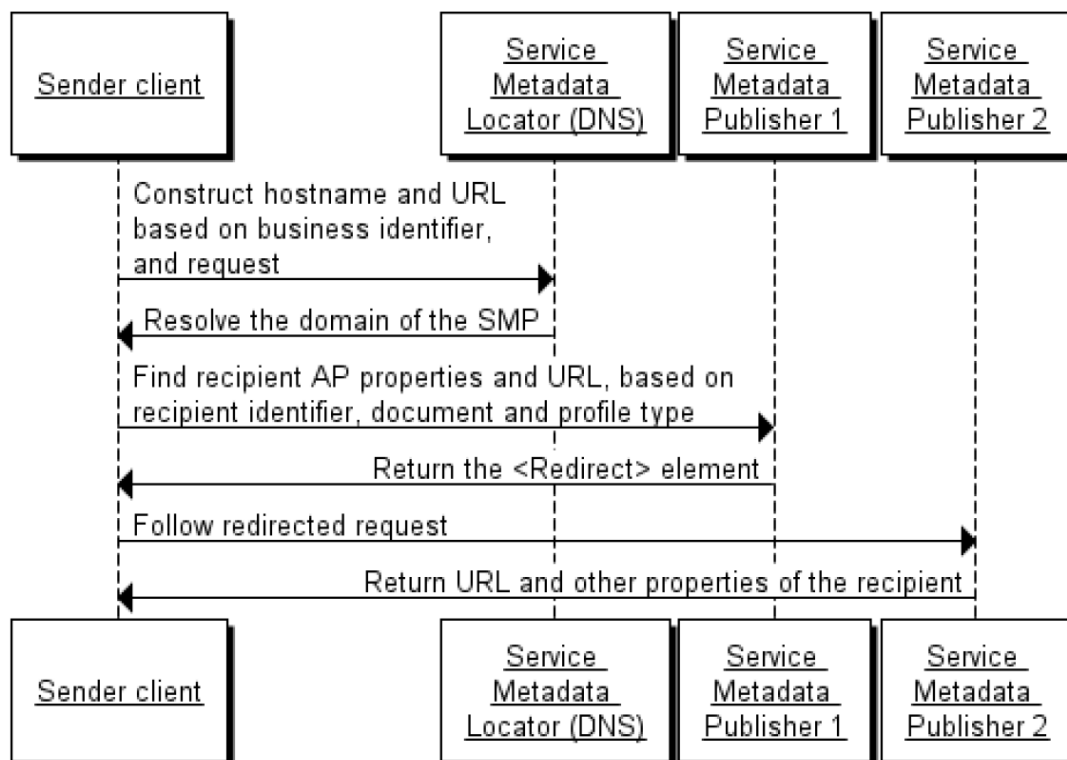
114 Fig. 3: Service Metadata Redirection

115 Note that only one degree of redirect is allowed; clients are not required to follow more than one
116 redirect, i.e. a redirect resource cannot point to another redirect resource. Allowing one level of
117 redirect permits the described use case to be realized, while avoiding the possibility of cyclic
118 references and long chains of redirects

3 Interface model

This specification defines a REST-based interface for retrieving Service Metadata, but does not specify interfaces for creating, updating, deleting and managing Service Metadata, or any internal data storage formats.

The goal is to allow the interface in this specification to expose data from many different Service Metadata back-ends, which may be based on any suitable technology such as for example RDBMS, LDAP, or UDDI.

Note that when adding or deleting Participant Identifiers in the SMP, an implementation of the SMP will need to reflect its custody of a Participant Identifier in the SML. Please see the SML specification [BDEN-SML] for a description of the processes and interfaces for doing this.

4 Data model

130 This section outlines the data model of the interface. The data model comprises the following main
131 data types:

132 •   ServiceGroup
133 •   ServiceMetadata / SignedServiceMetadata

134 Supporting data types for these main types are:

135 •   ServiceInformation
136 •   ServiceEndpointList
137 •   ParticipantIdentifier
138 •   DocumentIdentifier
139 •   Redirect
140 •   Process
141 •   ProcessList
142 •   Endpoint

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

4.1 On extension points

145 For each major entity, extension points have been added with the optional `<smp:Extension>`
146 element.

4.1.1 Semantics and use

148 Child elements of the `<smp:Extension>` element are known as "custom extension elements".
149 Extension points may be used for optional extensions of service metadata. This implies:

150 •   Extension elements added to a specific Service Metadata resource MUST be ignorable by any
151   client of the transport infrastructure. The ability to parse and adjust client behaviour based
152   on an extension element MUST NOT be a prerequisite for a client to locate a service, or to
153   make a successful request at the referenced service.
154 •   A client MAY ignore any extension element added to specific service metadata resource
155   instances.

4.2 ServiceGroup

157 The *ServiceGroup* structure represents a set of services associated with a specific participant
158 identifier that is handled by a specific SMP. The *ServiceGroup* structure holds a list of references to
159 *SignedServiceMetadata* resources in the *ServiceList* structure.

160 Pseudo-schema for *ServiceGroup*:

```
<smp:ServiceGroup>
  <ids:ParticipantIdentifier scheme="xs:string">
    xs:string
  </ids:ParticipantIdentifier>
  <smp:ServiceMetadataReferenceCollection>
    <smp:ServiceMetadataReference href="xs:anyURI" />*
  </smp:ServiceMetadataReferenceCollection>
  <smp:Extension>xs:any</smp:Extension>?
</smp:ServiceGroup>
```

170 Description of the individual fields (elements and attributes).

Field	Description
ServiceGroup	Document element
ParticipantIdentifier	Represents the business level endpoint key and key type, e.g. a DUNS or GLN number that is associated with a group of services. See [PFUOI4] for information on this data type.
ServiceMetadataReferenceCollection	This structure holds a list of references to *SignedServiceMetadata* structures. From this list, a sender can follow the references to get each *SignedServiceMetadata* structure.
ServiceMetadataReference (0..*)	Contains the URL to a specific *SignedServiceMetadata* instance - see the REST binding section for details on the URL format. Note that references MUST refer to *SignedServiceMetadata* records that are signed by the certificate of the SMP. It MUST NOT point to *SignedServiceMetadata* resources published by external SMPs.
Extension	The extension element may contain any XML element. Clients MAY ignore this element. It can be used to add extended metadata to individual references to Service Metadata resources.

4.2.1   Non-normative example

Non-normative example of a *ServiceGroup* resource:

```xml
<?xml version="1.0" encoding="utf-8" ?>
<!--
This sample assumes that the service metadata publisher resides at
"http://serviceMetadata.eu/".
It assumes that the business identifier is "0010:5798000000001".
-->
<ServiceGroup xmlns="http://busdox.org/serviceMetadata/publishing/1.0/"
xmlns:ids="http://busdox.org/transport/identifiers/1.0/">
   <ids:ParticipantIdentifier scheme="busdox-actorid-upis">
     0010:5798000000001
   </ids:ParticipantIdentifier>
   <ServiceMetadataReferenceCollection>
     <ServiceMetadataReference href="http://serviceMetadata.eu/busdox-actorid-
upis%3A%3A0010%3A5798000000001/services/busdox-docid-
qns%3A%3Aurn%3Aoasis%3Anames%3Aspecification%3Aubl%3Aschema%3Axsd%3AInvoice-
2%3A%3AInvoice%23%23UBL-2.0"/>
   </ServiceMetadataReferenceCollection>
   <Extension>
     <ex:Test xmlns:ex="http://test.eu">Test</ex:Test>
   </Extension>
</ServiceGroup>
```

4.3   ServiceMetadata

This data structure represents Metadata about a specific electronic service. The role of the *ServiceMetadata* structure is to associate a participant identifier with the ability to receive a specific

197 document type over a specific transport. It also describes which business processes a document can
198 participate in, and various operational data such as service activation and expiration times.

199 The *ServiceMetadata* resource contains all the metadata about a service that a sender Access Point
200 needs to know in order to send a message to that service.

4.3.1   Redirection

202 For recipients that want to associate more than one SMP with their participant identifier, they may
203 redirect senders to an alternative SMP for specific document types. To achieve this, the
204 *ServiceMetadata* element defines the optional element `Redirect`. This element holds the URL of
205 the alternative SMP, as well as the Subject Unique Identifier of the destination SMPs certificate used
206 to sign its resources.

207 In the case where a client encounters such a redirection element, the client MUST follow the first
208 redirect reference to the alternative SMP. If the *SignedServiceMetadata* resource at the alternative
209 SMP also contains a redirection element, the client SHOULD NOT follow that redirect. It is the
210 responsibility of the client to enforce this constraint.

211 Pseudo-schema for this data type:

```
<smp:ServiceMetadata>
   [<smp:ServiceInformation /> | <smp:Redirect />]
</smp:ServiceMetadata>
```

215 Pseudo-schema for the `ServiceInformation` data type:

```
<smp:ServiceInformation>
  <ids:ParticipantIdentifier scheme="xs:string">xs:string
  </ids:ParticipantIdentifier>
  <ids:DocumentIdentifier scheme="xs:string" />
  <smp:ProcessList>
    <smp:Process>+
      <ids:ProcessIdentifier scheme="xs:string" />
      <smp:ServiceEndpointList>
        <smp:Endpoint transportProfile="xs:string">+
          <wsa:EndpointReference />
          <smp:RequireBusinessLevelSignature>xs:boolean
          </smp:RequireBusinessLevelSignature>
          <smp:MinimumAuthenticationLevel>xs:string
          </smp:MinimumAuthenticationLevel >?
          <smp:ServiceActivationDate>xs:dateTime
          </smp:ServiceActivationDate>?
          <smp:ServiceExpirationDate>xs:dateTime
          </smp:ServiceExpirationDate>?
          <smp:Certificate>xs:string</smp:Certificate>
          <smp:ServiceDescription>xs:string
          </smp:ServiceDescription>
          <smp:TechnicalContactUrl>xs:anyURI
          </smp:TechnicalContactUrl>
          <smp:TechnicalInformationUrl>xs:anyURI
          </smp:TechnicalInformationUrl>?
          <smp:Extension>xs:any</smp:Extension>?
        </smp:Endpoint>
      </smp:ServiceEndpointList>
      <smp:Extension>xs:any</smp:Extension>?
    </smp:Process>
  </smp:ProcessList>
  <smp:Extension>xs:any</smp:Extension>?
```

248
```
</smp:ServiceInformation>
```

249 Pseudo-schema for the `Redirect` data type:

250
251
252
253
```
<smp:Redirect href="xs:anyURI">
   <smp:CertificateUID>xs:string</smp:CertificateUID>
   <smp:Extension>xs:any</smp:Extension>?
<smp:Redirect>
```

254 The Extension element may contain any XML element. Clients MAY ignore this element. It can be
255 used to add extension metadata to the service metadata.

256 The `href` attribute of the `Redirect` element contains the full address of the destination SMP
257 record that the client is redirected to.

258 For example, assume that an SMP called "SMP1" has the address `http://smp1.eu`, and another
259 SMP called "SMP2" has the address `http://smp2.eu`, and a client requests a resource with the
260 following URL (note that these examples have been percent encoded):

261
262
263
264
```
http://smp1.eu/busdox-actorid-
upis%3A%3A0010%3A5798000000001/services/busdox-docid-
qns%3A%3Aurn%3Aoasis%3Anames%3Aspecification%3Aubl%3Aschema%3Axsd%3AInvoice
- 2%3A%3AInvoice%23%23UBL-2.0
```

265 We now assume that the owner of these metadata has moved them to SMP2. SMP1 would then
266 return a *SignedServiceMetadata* resource with a `Redirect` child element that has the `href`
267 attribute set to

268
269
270
271
```
http://smp2.eu/busdox-actorid-
upis%3A%3A0010%3A5798000000001/services/busdox-docid-
qns%3A%3Aurn%3Aoasis%3Anames%3Aspecification%3Aubl%3Aschema%3Axsd%3AInvoice
- 2%3A%3AInvoice%23%23UBL-2.0
```

272 For the list of endpoints under each `Endpoint` element in the `ServiceEndpointList`, each
273 endpoint MUST have different values of the `transportProfile` attribute, i.e. represent bindings
274 to different transports.

275 Description of the individual fields (elements and attributes).

Field	Description
/ServiceMetadata	Document element
ServiceMetadata/Redirect	The direct child element of `ServiceMetadata` is either the `Redirect` element or the `ServiceInformation` element. The `Redirect` element indicates that a client must follow the URL of the `href` attribute of this element.
Redirect/CertificateUID	Holds the Subject Unique Identifier of the certificate of the destination SMP. A client SHOULD validate that the Subject Unique Identifier of the certificate used to sign the resource at the destination SMP matches the Subject Unique Identifier published in the redirecting SMP.

Field	Description
Redirect/Extension	The `Extension` element may contain any XML element. Clients MAY ignore this element. It can be used to add extension metadata to the `Redirect`.
ServiceMetadata/ServiceInformation	The direct child element of `ServiceMetadata` is either the `Redirect` element or the `ServiceInformation` element. The `ServiceInformation` element contains service information for an actual service registration, rather than a redirect to another SMP.
ServiceInformation/ParticipantIdentifier	The participant identifier. Comprises the identifier, and an identifier scheme. This identifier MUST have the same value of the {id} part of the URI of the enclosing *ServiceMetadata* resource. See the ParticipantIdentifier section of the 'Policy for use of identifiers' document [PFUOI4] for information on this data type.
ServiceInformation/DocumentIdentifier	Represents the type of document that the recipient is able to handle. The document type is represented by an identifier (identifying the document type) and an identifier scheme, which the format of the identifier itself. See the DocumentTypeIdentifier section of the 'Policy for use of identifiers' document [PFUOI4] for information on this data type.
ServiceInformation/ProcessList	Represents the processes that a specific document type can participate in, and endpoint address and binding information. Each process element describes a specific business process that accepts this type of document as input and holds a list of endpoint addresses (in the case that the service supports multiple transports) of services that implement the business process, plus information about the transport used for each endpoint. See the Process section of the 'Policy for use of identifiers' document [PFUOI4] for information on the identifier format.
Process/ProcessIdentifier	The identifier of the process. See the 'Policy for use of identifiers' document for a definition of process identifiers [PFUOI4]
Process/ServiceEndpointList	List of one or more endpoints that support this process.
ServiceEndpointList/Endpoint	`Endpoint` represents the technical endpoint and address type of the recipient, as an URL.

Field	Description
Endpoint/EndpointReference	The address of an endpoint, as a WS-Addressing Endpoint Reference (EPR).
Endpoint/@transportProfile	Indicates the type of transport protocol that is being used between access points, e.g. the Peppol AS4 profile (`peppol-transport-as4-v2_0`). A list of valid transport protocols is referenced from the 'Policy for use of identifiers' document [PFUOI4].
Endpoint/RequireBusinessLevelSignature	Set to `true` if the recipient requires business-level signatures for the message, meaning a signature applied to the business message before the message is put on the transport. This is independent of the transport-level signatures that a specific transport profile, such as the Peppol AS4 profile, might mandate. This flag does not indicate which type of business-level signature might be required. Setting or consuming business-level signatures would typically be the responsibility of the final senders and receivers of messages, rather than a set of APs.
Endpoint/MinimumAuthenticationLevel	Indicates the minimum authentication level that recipient requires. The specific semantics of this field is defined in a specific instance of the BUSDOX infrastructure. It could for example reflect the value of the "urn:eu:busdox:attribute:assurance-level" SAML attribute defined in the START specification.
Endpoint/ServiceActivationDate	Activation date of the service. Senders MUST ignore services that are not yet activated. A missing activation date MUST be interpreted as "valid since forever". Format of `ServiceActivationDate` is `xs:dateTime`.
Endpoint/ServiceExpirationDate	Expiration date of the service. Senders MUST ignore services that are expired. A missing expiration date MUST be interpreted as "valid until eternity". Format of `ServiceExpirationDate` is `xs:dateTime`.
Endpoint/Certificate	Holds the complete signing certificate of the recipient AP, as a PEM (base 64) encoded X509 DER formatted value.
Endpoint/ServiceDescription	A human readable description of the service.

Field	Description
Endpoint/TechnicalContactUrl	Represents a link to human readable contact information. This might also be an email address.
Endpoint/TechnicalInformationUrl	A URL to human readable documentation of the service format. This could for example be a web site containing links to XML Schemas, WSDLs, Schematrons and other relevant resources.
Process/Extension	The `Extension` element may contain any XML element. Clients MAY ignore this element. It can be used to add extension metadata to the process metadata block as a whole.
ServiceInformation/Extension	The `Extension` element may contain any XML element. Clients MAY ignore this element. It can be used to add extension metadata to the service metadata.

276 **4.3.2 Non-normative example**

277 For a non-normative example of a *ServiceMetadata* resource, see the *SignedServiceMetadata* non-
278 normative example below.

4.4 SignedServiceMetadata

280 The *SignedServiceMetadata* structure is a *ServiceMetadata* structure that has been signed by the
281 SMP, according to governance policies that are not covered by this document. Pseudo-schema for
282 this data type:

```
283  <smp:SignedServiceMetadata>
284    <smp:ServiceMetadata />
285    <ds:Signature />
286  </smp:SignedServiceMetadata>
```

287 • `ServiceMetadata` is the `ServiceMetadata` element covered by the signature.
288 • `Signature` represents an enveloped XML signature over the
289   `SignedServiceMetadata` element.

290 **4.4.1 Non-normative example**

291 Non-normative example of a *SignedServiceMetadata* resource.

```
292  <?xml version="1.0" encoding="utf-8" ?>
293  <!--
294  This sample assumes that the service metadata publisher resides at
295  "http://serviceMetadata.eu/".
296  It assumes that the business identifier is "0010:5798000000001".
297  -->
298  <SignedServiceMetadata xmlns="http://busdox.org/serviceMetadata/publishing/1.0/"
299  xmlns:ids="http://busdox.org/transport/identifiers/1.0/">
300    <ServiceMetadata xmlns="http://busdox.org/serviceMetadata/publishing/1.0/"
301  xmlns:wsu="http://docs.oasis-open.org/wss/2004/01/oasis-200401-wsswssecurity-
302  utility-1.0.xsd">
303      <ServiceInformation>
304        <ids:ParticipantIdentifier scheme="busdox-actorid-
305  upis">0010:5798000000001</ids:ParticipantIdentifier>
```

```
306        <ids:DocumentIdentifier scheme="busdox-docid-
307 qns">urn:oasis:names:specification:ubl:schema:xsd:Invoice-2::Invoice##UBL-
308 2.02</ids:DocumentIdentifier>
309      <ProcessList>
310        <Process>
311          <ids:ProcessIdentifier scheme="cenbii-procid-
312 ubl">BII04</ids:ProcessIdentifier>
313          <ServiceEndpointList>
314            <Endpoint transportProfile="busdox-transport-start">
315              <EndpointReference xmlns="http://www.w3.org/2005/08/addressing">
316                <Address>http://busdox.org/sampleService/</Address>
317              </EndpointReference>
318              <RequireBusinessLevelSignature>false</RequireBusinessLevelSignature>
319              <MinimumAuthenticationLevel>2</MinimumAuthenticationLevel>
320              <ServiceActivationDate>2009-05-01T09:00:00</ServiceActivationDate>
321              <ServiceExpirationDate>2016-05-01T09:00:00</ServiceExpirationDate>
322              <Certificate>TlRMTVNTUAABAAAAt7IY4gk....</Certificate>
323              <ServiceDescription>invoice service</ServiceDescription>
324              <TechnicalContactUrl>https://example.com</TechnicalContactUrl>
325        <TechnicalInformationUrl>http://example.com/info</TechnicalInformationUrl>
326            </Endpoint>
327          </ServiceEndpointList>
328        </Process>
329        <Process>
330          <ids:ProcessIdentifier scheme="cenbii-procid-
331 ubl">BII07</ids:ProcessIdentifier>
332          <ServiceEndpointList>
333            <Endpoint transportProfile="busdox-transport-start">
334              <EndpointReference xmlns="http://www.w3.org/2005/08/addressing">
335                <Address>http://busdox.org/sampleService/</Address>
336              </EndpointReference>
337              <RequireBusinessLevelSignature>true</RequireBusinessLevelSignature>
338              <MinimumAuthenticationLevel>1</MinimumAuthenticationLevel>
339              <ServiceActivationDate>2009-05-01T09:00:00</ServiceActivationDate>
340              <ServiceExpirationDate>2016-05-01T09:00:00</ServiceExpirationDate>
341              <Certificate>TlRMTVNTUAABAAAAt7IY4gk....</Certificate>
342              <ServiceDescription>invoice service</ServiceDescription>
343              <TechnicalContactUrl>https://example.com</TechnicalContactUrl>
344        <TechnicalInformationUrl>http://example.com/info</TechnicalInformationUrl>
345              <Extension>
346                <ex:Test xmlns:ex="http://test.eu">Test</ex:Test>
347              </Extension>
348            </Endpoint>
349          </ServiceEndpointList>
350          <Extension>
351            <ex:Test xmlns:ex="http://test.eu">Test</ex:Test>
352          </Extension>
353        </Process>
354      </ProcessList>
355      <Extension>
356        <ex:Test xmlns:ex="http://test.eu">Test</ex:Test>
357      </Extension>
358    </ServiceInformation>
359  </ServiceMetadata>
360  <!-- Message signature, details omitted for brevity -->
361  <Signature xmlns="http://www.w3.org/2000/09/xmldsig#"/>
362 </SignedServiceMetadata>
```

4.4.2 Redirect, non-normative example

```xml
<?xml version="1.0" encoding="utf-8" ?>
<!--
This sample assumes that the user contacts a service metadata publisher that
resides at "http://serviceMetadata.eu/",
but is redirected to a service metadata publisher that resides at
"http://serviceMetadata2.eu/".
-->
<SignedServiceMetadata xmlns="http://busdox.org/serviceMetadata/publishing/1.0/">
  <ServiceMetadata xmlns="http://busdox.org/serviceMetadata/publishing/1.0/">
    <Redirect xmlns="http://busdox.org/serviceMetadata/publishing/1.0/"
href="http://serviceMetadata2.eu/busdox-
actoridupis%3A%3A0010%3A5798000000001/services/busdox-
docidqns%3A%3Aurn%3Aoasis%3Anames%3Aspecification%3Aubl%3Aschema%3Axsd%3AInvoice-
2%3A%3AInvoice%23%23UBL-2.0">
      <CertificateUID>PID:9208-2001-3-279815395</CertificateUID>
      <Extension>
        <ex:Test xmlns:ex="http://test.eu">Test</ex:Test>
      </Extension>
    </Redirect>
  </ServiceMetadata>
  <!-- Message signature, details omitted for brevity -->
  <Signature xmlns="http://www.w3.org/2000/09/xmldsig#"/>
</SignedServiceMetadata>
```

5 Service Metadata Publishing REST binding

387

388 This section describes the REST binding of the SMP interface.

5.1 The use of HTTP

389

390 A service implementing the REST binding MUST set the HTTP `Content-Type` header, and give it a
391 value of `text/xml` or `application/xml`. A service implementing the REST profile MUST NOT
392 use TLS (Transport Layer Security) or SSL (Secure Sockets Layer). An instance of the BUSDOX
393 infrastructure MAY set restrictions on what ports are allowed.

394 An implementation of the SMP might choose to manage resources through the HTTP POST, PUT and
395 DELETE verbs. It is however up to each implementation to choose how to manage records, and use of
396 HTTP POST, PUT and DELETE is not mandated or regulated by this specification.

397 HTTP GET operations MUST return the following HTTP status codes:

HTTP Status Code	Meaning
200	Must be returned if the resource is retrieved correctly.
404	Code 404 must be returned if a specific resource could not be found. This could for example be the result of a request containing a participant identifier that does not exist.
500	Code 500 must be returned if the service experiences an internal processing error.

398 The service MAY support other HTTP status codes as well.

399 The service SHOULD NOT use HTTP redirection in the manner indicated by the HTTP 3xx codes.
400 Clients are not required to support active redirection.

5.2 The use of XML and encoding

401

402 XML document returned by HTTP GET MUST be UTF-8 encoded. They MUST contain a document type
403 declaration starting with `<?xml` which includes the `encoding` attribute set to `UTF-8`. Please
404 observe that the content of the encoding attribute is not case sensitive. Version 1.0 of XML is used.

5.3 Resources and identifiers

405

406 The REST interface comprises 2 types of resources.

Resource	URI	Method	XML resource root element	HTTP Status	Description of returned content
ServiceGroup	/{identifier scheme}::{id}	GET	<ServiceGroup>	200; 500; 404	Holds the participant identifier of the recipient, and a list of references to individual ServiceMetadata resources that are associated with that participant identifier.

SignedServiceMet adata	/{identifier scheme}::{id}/ser vices/{docType} See section below for {docType} format	GET	<SignedSe rviceMeta data>	200; 500; 404	Holds all of the metadata about a Service, or a redirection URL to another Service Metadata Publisher holding this information.

407 **Fig. 4: Table of resources and identifiers**

408 A service implementing the REST binding MUST support these resource types. It MUST provide
409 access to these using the URI scheme of table in Fig. 3.

5.3.1 On the use of percent encoding

411 When any types of BUSDOX identifiers are used in URLs, each section between slashes MUST be
412 percent encoded according to [RFC3986] individually, i.e. section by section.

413 For example, this implies that for an URL in the form of `/{identifier`
414 `scheme}::{id}/services/{docType}` the slash literals MUST NOT be URL encoded.

5.3.2 Using identifiers in the REST Resource URLs

416 This section describes specifically how participant and document identifiers are used to reference
417 *ServiceGroup* and *SignedServiceMetadata* REST resources. For a general definition on how to
418 represent participant and document identifiers in URLs, see [PFUOI4].

419 For the URL referencing a *ServiceGroup* resource, the `{identifier scheme}::{id}` part
420 follows the participant identifier format described in the "ParticipantIdentifier" section of the 'Policy
421 for use of identifiers' document [PFUOI4].

422 The following URL format is used:

423 `/{identifier scheme}::{id}`

424 In the reference to the *SignedServiceMetadata* or *Redirect* resources
425 (`/{id}/services/{docType}`), the `{docType}` part consists of `{document type`
426 `identifier scheme}::{document type identifier}`. For information on the format
427 of `{document type identifier}`, see the DocumentIdentifier section of the 'Policy for use of
428 identifiers' document [PFUOI4].

5.3.3 Non-normative identifier example

430 We assume an SMP can be accessed at the URL `http://serviceMetadata.eu`.

431 A business with the participant identifier `0010:5798000000001` would have the following
432 identifier for the *ServiceGroup* resource:

433 `http://serviceMetadata.eu/busdox-actorid-upis::0010:5798000000001`

434 After percent encoding:

435 `http://serviceMetadata.eu/busdox-actorid-upis%3a%3a0010%3a5798000000001`

436 In the case of a NES-UBL order, a *SignedServiceMetadata* or *Redirect* resource can then be identified
437 by

438 • Identifier format type: `busdox-docid-qns`
439 • Root namespace:
440 `urn:oasis:names:specification:ubl:schema:xsd:Order-2`

441 • Document element local name: `Order`
442 • Subtype identifier: `UBL-2.0` (since several versions of the Order schema may use the same
443   namespace + document element name)

444 The document type identifier will then be:

```
445 busdox-docid-qns::urn:oasis:names:specification:ubl:schema:xsd:Order-
446 2::Order##UBL-2.0
```

447 The document type identifier MUST be percent encoded as described in [RFC3986]. The above, non-
448 normative example is thus encoded to

```
449 busdox-docid-
450 qns%3A%3Aurn%3Aoasis%3Anames%3Aspecification%3Aubl%3Aschema%3Axsd%3AOrder-
451 2%3A%3AOrder%23%23UBL-2.0
```

452 The entire URL reference to a *SignedServiceMetadata* or *Redirect* resource thus has the form

```
453 {URL to server}/{identifier scheme}::{id}/services/{document identifier
454 type}::{rootNamespace}::{documentElementLocalName}[##{Subtype identifier}]
```

455 The percent-encoded form of the identifier using the above example will then be

```
456 http://serviceMetadata.eu/busdox-actorid-
457 upis%3a%3a0010%3a5798000000001/services/busdox-docid-
458 qns%3A%3Aurn%3Aoasis%3Anames%3Aspecification%3Aubl%3Aschema%3Axsd%3AOrder-
459 2%3A%3AOrder%23%23UBL-2.0
```

460 Note that the forward slashes delimiting the individual parts of the REST resource identifier URL are
461 not percent encoded, since they are part of the URL.

5.3.4   Implementation considerations

463 When a client is redirected to an SMP using the DNS-based SML scheme described in [BDEN-SML],
464 the HTTP `Host` header will be set to a value originating from the CNAME alias set in the SML
465 (http://www.w3.org/Protocols/rfc2616/rfc2616-sec14.html#sec14.23). Implementations should be
466 prepared to accept requests with this "host" header value.

5.4   Referencing the SMP REST binding

468 For referencing the SMP REST binding, for example from SML records, the following identifier should
469 be used for the version 1.0 of the SMP REST binding:

```
470 http://busdox.org/serviceMetadata/publishing/1.0/
```

471 This is identical to the target namespace of the SMP schema.

5.5   Security

473 At the transport level, the service MUST NOT be secured.

5.5.1   Message signature

475 The message returned by the service is signed by the Service Metadata Publisher with XML-Signature
476 according to [XML-DSIG].

477 The signature MUST be an enveloped XML signature represented via a `ds:Signature` element
478 embedded in the `SignedServiceMetadata` element. The `ds:Signature` element MUST be
479 constructed according to the following rules:

480   • The <Reference> MUST use exactly one <Transform> being:
481   `http://www.w3.org/2000/09/xmldsig#enveloped-signature`
482   • The <ds:KeyInfo> element MUST contain an <ds:X509Data> element with an
483   <ds:X509Certificate> sub-element containing the signer's X.509 certificate as PEM (base 64)
484   encoded X509 DER value.
485   • The canonicalization algorithm MUST be
486   `http://www.w3.org/TR/2001/REC-xml-c14n-20010315`
487   • The SignatureMethod MUST be
488   `http://www.w3.org/2000/09/xmldsig#rsa-sha1`
489   • The DigestMethod MUST be
490   `http://www.w3.org/2000/09/xmldsig#sha1`

491   ### 5.5.2   Verifying the signature

492   When verifying the signature, the consumer has access to the full certificate as a PEM (base 64)
493   encoded X509 DER value within the `dsSignature` element. The consumer may verify the signature
494   by

495   a) extracting the certificate from the `ds:X509Data` element,
496   b) verify that it has been issued by the trusted root,
497   c) perform a validation of the signature, and
498   d) perform the required certificate validation steps (which might include checking
499   expiration/activation dates and revocation lists).

500   ### 5.5.3   Verifying the signature of the destination SMP

501   For the redirect scheme, the unique identifier of the destination SMP signing certificate is stored at
502   the redirecting SMP. In addition to the regular signature validation performed by the client of the
503   destination SMP resources, the client SHOULD also validate that the identifier of the destination SMP
504   signing certificate corresponds to the unique identifier which the redirecting SMP claims belongs to
505   the destination SMP.

6 Appendix A: Schema for the REST interface

6.1 peppol-smp-types-v1.xsd (non-normative)

This section defines the XML Schema for all the resources of the REST interface. The normative version of the XML Schema is packaged together with this specification.

```xml
<?xml version="1.0" encoding="utf-8"?>
<xs:schema id="ServiceMetadataPublishing"
targetNamespace="http://busdox.org/serviceMetadata/publishing/1.0/"
elementFormDefault="qualified"
xmlns="http://busdox.org/serviceMetadata/publishing/1.0/"
xmlns:ids="http://busdox.org/transport/identifiers/1.0/"
xmlns:ds="http://www.w3.org/2000/09/xmldsig#"
xmlns:xs="http://www.w3.org/2001/XMLSchema"
xmlns:wsa="http://www.w3.org/2005/08/addressing">
  <xs:import schemaLocation="xmldsig-core-schema.xsd"
namespace="http://www.w3.org/2000/09/xmldsig#"/>
  <xs:import schemaLocation="oasis-200401-wss-wssecurity-utility-1.0.xsd"
namespace="http://docs.oasis-open.org/wss/2004/01/oasis-200401-wss-wssecurity-
utility-1.0.xsd"/>
  <xs:import schemaLocation="ws-addr.xsd"
namespace="http://www.w3.org/2005/08/addressing"/>
  <xs:import schemaLocation="peppol-identifiers-v1.xsd"
namespace="http://busdox.org/transport/identifiers/1.0/"/>

  <xs:element name="ServiceGroup" type="ServiceGroupType"/>
  <xs:element name="ServiceMetadata" type="ServiceMetadataType"/>
  <xs:element name="SignedServiceMetadata" type="SignedServiceMetadataType"/>

  <xs:complexType name="SignedServiceMetadataType">
    <xs:sequence>
      <xs:element ref="ServiceMetadata"/>
      <xs:element ref="ds:Signature"/>
    </xs:sequence>
  </xs:complexType>

  <xs:complexType name="ServiceMetadataType">
    <xs:sequence>
      <xs:choice>
        <xs:element name="ServiceInformation" type="ServiceInformationType"/>
        <xs:element name="Redirect" type="RedirectType"/>
      </xs:choice>
    </xs:sequence>
  </xs:complexType>

  <xs:complexType name="ServiceInformationType">
    <xs:sequence>
      <xs:element ref="ids:ParticipantIdentifier"/>
      <xs:element ref="ids:DocumentIdentifier"/>
      <xs:element name="ProcessList" type="ProcessListType"/>
      <xs:element name="Extension" type="ExtensionType" minOccurs="0"/>
    </xs:sequence>
  </xs:complexType>

  <xs:complexType name="ProcessListType">
    <xs:sequence>
      <xs:element name="Process" type="ProcessType" maxOccurs="unbounded"/>
```

```
561        </xs:sequence>
562      </xs:complexType>
563
564      <xs:complexType name="ProcessType">
565        <xs:sequence>
566          <xs:element ref="ids:ProcessIdentifier"/>
567          <xs:element name="ServiceEndpointList" type="ServiceEndpointList"/>
568          <xs:element name="Extension" type="ExtensionType" minOccurs="0"/>
569        </xs:sequence>
570      </xs:complexType>
571
572      <xs:complexType name="ServiceEndpointList">
573        <xs:sequence>
574          <xs:element name="Endpoint" type="EndpointType" maxOccurs="unbounded"/>
575        </xs:sequence>
576      </xs:complexType>
577
578      <xs:complexType name="EndpointType">
579        <xs:sequence>
580          <xs:element ref="wsa:EndpointReference"/>
581          <xs:element name="RequireBusinessLevelSignature" type="xs:boolean"/>
582          <xs:element name="MinimumAuthenticationLevel" type="xs:string"
583   minOccurs="0"/>
584          <xs:element name="ServiceActivationDate" type="xs:dateTime" minOccurs="0"/>
585          <xs:element name="ServiceExpirationDate" type="xs:dateTime" minOccurs="0"/>
586          <xs:element name="Certificate" type="xs:string"/>
587          <xs:element name="ServiceDescription" type="xs:string"/>
588          <xs:element name="TechnicalContactUrl" type="xs:anyURI"/>
589          <xs:element name="TechnicalInformationUrl" type="xs:anyURI" minOccurs="0"/>
590          <xs:element name="Extension" type="ExtensionType" minOccurs="0"/>
591        </xs:sequence>
592        <xs:attribute name="transportProfile" type="xs:string"/>
593      </xs:complexType>
594
595      <xs:complexType name="ServiceGroupType">
596        <xs:sequence>
597          <xs:element ref="ids:ParticipantIdentifier"/>
598          <xs:element name="ServiceMetadataReferenceCollection"
599   type="ServiceMetadataReferenceCollectionType"/>
600          <xs:element name="Extension" type="ExtensionType" minOccurs="0"/>
601        </xs:sequence>
602      </xs:complexType>
603
604      <xs:complexType name="ServiceMetadataReferenceCollectionType">
605        <xs:sequence>
606          <xs:element name="ServiceMetadataReference"
607   type="ServiceMetadataReferenceType" minOccurs="0" maxOccurs="unbounded"/>
608        </xs:sequence>
609      </xs:complexType>
610
611      <xs:complexType name="ServiceMetadataReferenceType">
612        <xs:attribute name="href" type="xs:anyURI"/>
613      </xs:complexType>
614
615      <xs:complexType name="RedirectType">
616        <xs:sequence>
617          <xs:element name="CertificateUID" type="xs:string"/>
```

```
618          <xs:element name="Extension" type="ExtensionType" minOccurs="0"/>
619        </xs:sequence>
620        <xs:attribute name="href" type="xs:anyURI"/>
621    </xs:complexType>
622
623    <xs:complexType name="ExtensionType">
624        <xs:sequence>
625          <xs:any/>
626        </xs:sequence>
627    </xs:complexType>
628 </xs:schema>
629
```