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## Revision Summary

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# Table of Contents

1 Introduction ................................................................................................. 6  
  1.1 Glossary .................................................................................................. 6  
  1.2 References ............................................................................................ 7  
    1.2.1 Normative References .................................................................... 7  
    1.2.2 Informative References .................................................................. 8  
  1.3 Overview ................................................................................................ 8  
  1.4 Relationship to Other Protocols ............................................................ 8  
  1.5 Prerequisites/Preconditions ................................................................... 9  
  1.6 Applicability Statement ........................................................................ 9  
  1.7 Versioning and Capability Negotiation ................................................ 9  
  1.8 Vendor-Extensible Fields ....................................................................... 9  
  1.9 Standards Assignments ......................................................................... 9  

2 Messages ..................................................................................................... 10  
  2.1 Transport .............................................................................................. 10  
  2.2 Common Message Syntax ...................................................................... 10  
    2.2.1 Namespaces ..................................................................................... 10  
    2.2.2 Messages ......................................................................................... 10  
    2.2.3 Elements ........................................................................................ 10  
    2.2.4 Complex Types .............................................................................. 11  
    2.2.5 Simple Types .................................................................................. 11  
    2.2.6 Attributes ....................................................................................... 11  
    2.2.7 Groups ........................................................................................... 11  
    2.2.8 Attribute Groups ............................................................................ 11  

3 Protocol Details .......................................................................................... 12  
  3.1 Protocol Server Details ......................................................................... 12  
    3.1.1 Abstract Data Model ....................................................................... 12  
    3.1.2 Timers ............................................................................................ 12  
    3.1.3 Initialization ................................................................................... 12  
    3.1.4 Message Processing Events and Sequencing Rules ....................... 12  
      3.1.4.1 Resolve .................................................................................... 13  
        3.1.4.1.1 Messages ............................................................................ 13  
          3.1.4.1.1.1 ResolveSoapIn .............................................................. 13  
          3.1.4.1.1.2 ResolveSoapOut .......................................................... 14  
        3.1.4.1.2 Elements .......................................................................... 14  
          3.1.4.1.2.1 Resolve ................................................................. 14  
          3.1.4.1.2.2 ResolveResponse ...................................................... 14  
        3.1.4.1.3 Complex Types ............................................................... 15  
          3.1.4.1.3.1 ResolveResult ........................................................... 15  
          3.1.4.1.3.2 IdentifierField ......................................................... 15  
          3.1.4.1.3.3 ArrayOfFieldRecord .............................................. 16  
          3.1.4.1.3.4 FieldRecord ............................................................. 16  
        3.1.4.1.4 Simple Types ................................................................. 16  
          3.1.4.1.4.1 ResolveStatus ......................................................... 16  
        3.1.4.1.5 Attributes ................................................................. 17  
        3.1.4.1.6 Groups ............................................................................ 17  
        3.1.4.1.7 Attribute Groups .......................................................... 17  
    3.1.5 Timer Events ................................................................................... 17  
    3.1.6 Other Local Events ........................................................................ 17  

4 Protocol Examples ...................................................................................... 18  
  4.1 Retrieving Field Values for LobSystem Entities ................................ 18  

5 Security ..................................................................................................... 19  
  5.1 Security Considerations for Implementers ........................................... 19
5.2 Index of Security Parameters ................................................................................. 19
6 Appendix A: Full WSDL .......................................................................................... 20
7 Appendix B: Product Behavior ............................................................................... 22
8 Change Tracking ..................................................................................................... 23
9 Index ....................................................................................................................... 24
1 Introduction

The Business Data Catalog Data Web Service Protocol is an interface that protocol clients can use to search software systems that store business data and process rules for an instance of a particular entity.

Sections 1.5, 1.8, 1.9, 2, and 3 of this specification are normative. All other sections and examples in this specification are informative.

1.1 Glossary

This document uses the following terms:

**Entity**: A type of DataClass that represents a type of business data object that is stored in a line-of-business (LOB) system and whose instances have a persistent EntityInstanceId.

**EntityInstance**: A set of Field values that have a unique identity that represents a specific instance of an Entity, and are stored in a line-of-business (LOB) system.

**EntityInstanceId**: A set of Field values of an EntityInstance that collectively and uniquely identify an EntityInstance in a line-of-business (LOB) system.

**field**: The data elements that constitute an Entity in a line-of-business (LOB) system.

**Identifier**: The Field or Fields that define the Identity of an EntityInstance. Also referred to as Key.

**line-of-business (LOB) system**: A software system that is used to store business data and can also contain business rules and business logic that support business processes.

**LobSystem**: A type of MetadataObject that represents a specific version of a line-of-business (LOB) system. An LOB system can be a database or a web service.

**LobSystemInstance**: A type of MetadataObject that represents a specific deployed instance of a line-of-business (LOB) system, as represented by a LobSystem. LobSystemInstances are contained by LobSystems. LobSystemInstance Properties describe how to connect to an instance of the LobSystem that contains them by providing information such as the server name, connection string, and authentication mode.

**metadata store**: A database that is stored on a back-end database server and contains all stored procedures and storage for the MetadataObject types.

**MetadataObject**: An abstract data structure that consists of a set of attributes that represent a LobSystem, LobSystemInstance, DataClass, Entity, Method, MethodInstance, Parameter, TypeDescriptor, Identifier, FilterDescriptor, Action, ActionParameter, or Association.

**Model**: A MetadataObject that defines a set of references to a logically related set of Entities. Models are typically used to facilitate easy transfer into and out of Metadata stores.

**site**: A group of related pages and data within a SharePoint site collection. The structure and content of a site is based on a site definition. Also referred to as SharePoint site and web site.

**SOAP action**: The HTTP request header field used to indicate the intent of the SOAP request, using a URI value. See [SOAP1.1] section 6.1.1 for more information.

**SOAP body**: A container for the payload data being delivered by a SOAP message to its recipient. See [SOAP1.2-1/2007] section 5.3 for more information.
**SOAP fault:** A container for error and status information within a SOAP message. See [SOAP1.2-1/2007] section 5.4 for more information.

**Uniform Resource Locator (URL):** A string of characters in a standardized format that identifies a document or resource on the World Wide Web. The format is as specified in [RFC1738].

**Web Services Description Language (WSDL):** An XML format for describing network services as a set of endpoints that operate on messages that contain either document-oriented or procedure-oriented information. The operations and messages are described abstractly and are bound to a concrete network protocol and message format in order to define an endpoint. Related concrete endpoints are combined into abstract endpoints, which describe a network service. WSDL is extensible, which allows the description of endpoints and their messages regardless of the message formats or network protocols that are used.

**XML namespace:** A collection of names that is used to identify elements, types, and attributes in XML documents identified in a URI reference [RFC3986]. A combination of XML namespace and local name allows XML documents to use elements, types, and attributes that have the same names but come from different sources. For more information, see [XMLNS-2ED].

**XML schema:** A description of a type of XML document that is typically expressed in terms of constraints on the structure and content of documents of that type, in addition to the basic syntax constraints that are imposed by XML itself. An XML schema provides a view of a document type at a relatively high level of abstraction.

**MAY, SHOULD, MUST, SHOULD NOT, MUST NOT:** These terms (in all caps) are used as defined in [RFC2119]. All statements of optional behavior use either MAY, SHOULD, or SHOULD NOT.

### 1.2 References

Links to a document in the Microsoft Open Specifications library point to the correct section in the most recently published version of the referenced document. However, because individual documents in the library are not updated at the same time, the section numbers in the documents may not match. You can confirm the correct section numbering by checking the Errata.

#### 1.2.1 Normative References

We conduct frequent surveys of the normative references to assure their continued availability. If you have any issue with finding a normative reference, please contact dochelp@microsoft.com. We will assist you in finding the relevant information.


This document specifies a consistent selection process for information stored in any line-of-business (LOB) system for protocol client retrieval.

Enterprises store a variety of information in various line-of-business (LOB) systems. This protocol specifies unified information selection for all types of LobSystems. The protocol enables consistent processing for the user experience because it describes LobSystems in terms of Models, LobSystemInstances, and the business data types they store as Entities. It also describes how the protocol client selects information from the protocol server.

This protocol enables a protocol client to retrieve an EntityInstanceId and the values for a list of field names for an Entity associated with a LobSystemInstance. The protocol allows the protocol client to send the LobSystemInstance name, the Entity name, a value to resolve, and a list of Entity fields to the protocol server, and to receive the serialized EntityInstanceId and the list of Entity field name-value pairs.

1.4 Relationship to Other Protocols

This protocol uses the SOAP messaging protocol for formatting requests and responses as described either in [SOAP1.1] or in [SOAP1.2/1] and [SOAP1.2/2]. It transmits these messages using the HTTP protocol as described in [RFC2616] or the HTTPS protocol as described in [RFC2818].

The following diagram shows the underlying messaging and transport stack that the protocol uses:
Figure 1: This protocol in relation to other protocols

1.5 Prerequisites/Preconditions

This protocol operates against a site that is known to protocol clients by its URL. The protocol client forms an endpoint by appending "/_vti_bin/bdcfieldsresolver.asmx" to the URL of the site, for example "http://www.contoso.com/Repository/_vti_bin/bdcfieldsresolver.asmx". This protocol assumes that the underlying protocols perform authentication.

1.6 Applicability Statement

None.

1.7 Versioning and Capability Negotiation

This document describes versioning issues in the following areas:

- Supported transports: This protocol uses multiple transports with SOAP as specified in section 2.1.

1.8 Vendor-Extensible Fields

None.

1.9 Standards Assignments

None.
2 Messages

2.1 Transport

Protocol servers MUST support SOAP over HTTP. Protocol servers additionally support SOAP over HTTPS to secure communication with protocol clients.

Protocol messages MUST be formatted as specified either in [SOAP1.1], section 4 or in [SOAP1.2/1] section 5. Protocol server faults MUST be returned using HTTP Status Codes as specified in [RFC2616] section 10, or using SOAP faults as specified in [SOAP1.1] section 4.4 or in [SOAP1.2/1] section 5.4.

2.2 Common Message Syntax

This section contains common definitions that are used by this protocol. The syntax of the definitions uses XML schema, as specified in [XMLSCHEMA1/2] and [XMLSCHEMA2/2], and WSDL, as specified in [WSDL].

2.2.1 Namespaces

This protocol specifies and references XML namespaces using the mechanisms specified in [XMLNS]. Although this document associates an XML namespace prefix for each XML namespace that is used, the choice of any particular XML namespace prefix is implementation-specific and not significant for interoperability.

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<th>Reference</th>
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<td>[XMLSCHEMA1/2] [XMLSCHEMA2/2]</td>
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2.2.2 Messages

This specification does not define any common WSDL message definitions.

2.2.3 Elements

This specification does not define any common XML schema element definitions.
2.2.4 Complex Types
This specification does not define any common XML schema complex type definitions.

2.2.5 Simple Types
This specification does not define any common XML schema simple type definitions.

2.2.6 Attributes
This specification does not define any common XML schema attribute definitions.

2.2.7 Groups
This specification does not define any common XML schema group definitions.

2.2.8 Attribute Groups
This specification does not define any common XML schema attribute group definitions.
3 Protocol Details

This protocol operates between the protocol client and a protocol server. The protocol client initiates the communication, and the protocol server responds. The protocol server does not retain any states.

The client side of this protocol is simply a pass-through. That is, no additional timers or other state is required on the client side of this protocol. Calls made by the higher-layer protocol or application are passed directly to the transport, and the results returned by the transport are passed directly back to the higher-layer protocol or application.

Except where specified, protocol clients interpret HTTP status codes returned by the protocol server as specified in [RFC2616] section 10.

Protocol servers perform implementation-specific authorization checks and notify protocol clients of authorization faults using either HTTP status codes or SOAP faults.

3.1 Protocol Server Details

3.1.1 Abstract Data Model

This section describes a conceptual model of possible data organization that an implementation maintains to participate in this protocol. The described organization is provided to facilitate the explanation of how the protocol behaves. This document does not mandate that implementations adhere to this model as long as their external behavior is consistent with that described in this document.

The protocol server MUST maintain lists of the following MetadataObject types: LobSystem, LobSystemInstance, and Entity. The protocol server maintains the following relationships between these MetadataObject types:

- LobSystems contain all Entities.
- LobSystems contain all LobSystemInstances.

The protocol server MUST assign unique names to the following MetadataObjects:

- All Entities contained by a particular LobSystem.
- All LobSystemInstances contained by a metadata store.
- All LobSystems contained by a metadata store.

3.1.2 Timers

None.

3.1.3 Initialization

None.

3.1.4 Message Processing Events and Sequencing Rules

The following table summarizes the list of WSDL operations as defined by this specification:

<table>
<thead>
<tr>
<th>Operation</th>
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[MS-BDCDP] - v20190319
Business Data Catalog Data Web Service Protocol
Copyright © 2019 Microsoft Corporation
Release: March 19, 2019
### 3.1.4.1 Resolve

This operation searches for an **EntityInstance** that matches the specified input criteria. The input criteria are the **LobSystemInstance** name, the **Entity** name and value to resolve. The mechanism used by the protocol server to match the **EntityInstances** is implementation-specific.

```xml
<wsdl:operation name="Resolve">
  <wsdl:input message="tns:ResolveSoapIn" />
  <wsdl:output message="tns:ResolveSoapOut" />
</wsdl:operation>
```

The protocol client sends a **ResolveSoapIn** request message and the protocol server responds with a **ResolveSoapOut** response message. The protocol client MUST specify the following:

- The name of the **LobSystemInstance** to search.
- The name of the **Entity** to search.
- The search string that represents the value to resolve.
- The **field** names of the **Entity** for which to retrieve the values of the specified **EntityInstance**.

If exactly one **EntityInstance** is found, the protocol server sends the serialized **EntityInstanceId** of the specified **EntityInstance**, along with the list of name-value pairs for the fields of the specified **Entity** and the status of the operation.

This operation MUST return a **ResolveResult** message with the **ResolveStatus** element set, as specified in sections 3.1.4.1.3.1.

### 3.1.4.1.1 Messages

The following table summarizes the set of **WSDL** message definitions that are specific to this operation.

<table>
<thead>
<tr>
<th>Message</th>
<th>Description</th>
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<td>ResolveSoapIn</td>
<td>A request message for the <strong>Resolve</strong> operation.</td>
</tr>
<tr>
<td>ResolveSoapOut</td>
<td>The response message for the <strong>Resolve</strong> operation.</td>
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</table>

#### 3.1.4.1.1.1 ResolveSoapIn

The **ResolveSoapIn** message is the request message for the **Resolve** operation.

The **SOAP action** value of the message is:

```
```
The SOAP body contains a Resolve element.

### 3.1.4.1.1.2 ResolveSoapOut

The ResolveSoapOut message is the response message for the Resolve operation.

The SOAP body contains a ResolveResponse element that MUST specify the status of the operation.

#### 3.1.4.1.2 Elements

The following table summarizes the XML schema element definitions that are specific to this operation.

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resolve</td>
<td>A message containing the input data for the Resolve operation.</td>
</tr>
<tr>
<td>ResolveResponse</td>
<td>A message containing the output data of a Resolve operation.</td>
</tr>
</tbody>
</table>

#### 3.1.4.1.2.1 Resolve

The Resolve message contains the input data for the Resolve operation.

```xml
<s:element name="Resolve">
  <s:complexType>
    <s:sequence>
      <s:element minOccurs="1" maxOccurs="1" name="systemInstance" type="s:string" />
      <s:element minOccurs="1" maxOccurs="1" name="entity" type="s:string" />
      <s:element minOccurs="1" maxOccurs="1" name="valueToResolve" type="s:string" />
      <s:element minOccurs="1" maxOccurs="1" name="fieldNames" type="s:string" />
    </s:sequence>
  </s:complexType>
</s:element>
```

**systemInstance:** This element contains the name of the LobSystemInstance. The value is encoded as specified in [XML10]. The protocol server MUST only match EntityInstances obtained from the specified LobSystemInstance.

**entity:** This element contains the name of the Entity. The value is encoded as specified in [XML10]. The protocol server MUST only match EntityInstances of the specified Entity.

**valueToResolve:** This element contains the value to resolve to an EntityInstance. The value is encoded as specified in [XML10]. The value is resolved to EntityInstances using an implementation-specific algorithm. For example, a specific implementation of a protocol server could resolve a given value of "ab" and Entity "Customer", by returning customers that have names starting with "ab". Another implementation of the protocol server could return customer whose names, last names, or addresses contain "ab".

**fieldNames:** This element contains the field names associated with the Entity. Each field name is encoded as specified in [RFC3986]. The field names are concatenated into a single string with a colon (:) between field names.

#### 3.1.4.1.2.2 ResolveResponse

The ResolveResponse message contains the output data of a Resolve operation.

---

[MS-BDCDP] - v20190319
Business Data Catalog Data Web Service Protocol
Copyright © 2019 Microsoft Corporation
Release: March 19, 2019
<s:element name="ResolveResponse">
  <s:complexType>
  <s:sequence>
  <s:element minOccurs="1" maxOccurs="1" name="ResolveResult" type="tns:ResolveResult" />
  </s:sequence>
  </s:complexType>
</s:element>

ResolveResult: This element contains the serialized EntityInstanceId element that is associated with the specified EntityInstance element, along with the list of name-value pairs for the fields of the specified Entity and the status of the operation.

3.1.4.1.3 Complex Types

The following table summarizes the XML schema complex type definitions that are specific to this operation.

<table>
<thead>
<tr>
<th>Complex type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ResolveResult</td>
<td>A message containing the output data of a Resolve operation.</td>
</tr>
<tr>
<td>IdentifierField</td>
<td>An element containing the Identifier of the EntityInstance.</td>
</tr>
<tr>
<td>ArrayOfFieldRecord</td>
<td>An element containing an array of elements of type FieldRecord.</td>
</tr>
<tr>
<td>FieldRecord</td>
<td>An element containing the Entity field (4) name-value pair.</td>
</tr>
</tbody>
</table>

3.1.4.1.3.1 ResolveResult

The ResolveResult message contains the output data of a Resolve operation.

Identifier: This element contains the Identifier of the EntityInstance found. If exactly one EntityInstance is not found, the value MUST be absent.

Results: This element contains the list of name-value pairs of the fields of the specified Entity if the fieldNames element is not absent. If exactly one EntityInstance element is not found, the value MUST be absent.

Status: This element contains the status of the operation. This ResolveStatus element MUST be present. The protocol server MUST set this value as specified in section 3.1.4.1.4.1.

3.1.4.1.3.2 IdentifierField

The IdentifierField element contains the Identifier of the EntityInstance. If exactly one EntityInstance is not found, the value MUST be absent.
3.1.4.1.3.3 ArrayOfFieldRecord

This **ArrayOfFieldRecord** element contains an array of elements of type **FieldRecord**, as specified in section 3.1.4.1.3.4.

```xml
<s:complexType name="ArrayOfFieldRecord">
  <s:sequence>
    <s:element name="FieldRecord" type="tns:FieldRecord" nillable="true" minOccurs="0" maxOccurs="unbounded"/>
  </s:sequence>
</s:complexType>
```

**FieldRecord**: This element contains the **Entity field** name-value pair.

3.1.4.1.3.4 FieldRecord

The **FieldRecord** element contains the **Entity field** name-value pair. The name of the field is contained in the **FieldName** attribute of the element and the value of the field is the value of the element.

```xml
<s:complexType name="FieldRecord">
  <s:simpleContent>
    <s:extension base="s:string">
      <s:attribute name="FieldName" type="s:string"/>
    </s:extension>
  </s:simpleContent>
</s:complexType>
```

**FieldName**: This attribute contains the name of the field. Each field name is encoded as specified in [RFC3986].

3.1.4.1.4 Simple Types

The following table summarizes the **XML schema** simple type definitions that are specific to this operation.

<table>
<thead>
<tr>
<th>Simple type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ResolveStatus</td>
<td>An enumeration that specifies the status of the Resolve operation.</td>
</tr>
</tbody>
</table>

3.1.4.1.4.1 ResolveStatus

The **ResolveStatus** simple type specifies the enumeration of status of the **Resolve** operation, as specified in section 3.1.4.1.

```xml
<s:simpleType name="ResolveStatus">
  <s:restriction base="s:string">
    <s:enumeration value="NoMatch"/>
  </s:restriction>
</s:simpleType>
```
<s:enumeration value="MultipleMatch"/>
<s:enumeration value="UniqueMatch"/>
<s:enumeration value="InvalidData"/>
</s:restriction>
</s:simpleType>

The values for this enumeration are specified in the following table.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NoMatch</td>
<td>The protocol server MUST return this value when there are no EntityInstances were found.</td>
</tr>
<tr>
<td>MultipleMatch</td>
<td>The protocol server MUST return this value when more than one EntityInstances were found.</td>
</tr>
<tr>
<td>UniqueMatch</td>
<td>The protocol server MUST return this value when exactly one EntityInstance was found.</td>
</tr>
<tr>
<td>InvalidData</td>
<td>The protocol server MUST return this value when the operation has failed because input data is not valid or an implementation-specific error has occurred.</td>
</tr>
</tbody>
</table>

3.1.4.1.5 Attributes
None.

3.1.4.1.6 Groups
None.

3.1.4.1.7 Attribute Groups
None.

3.1.5 Timer Events
None.

3.1.6 Other Local Events
None.
4 Protocol Examples

4.1 Retrieving Field Values for LobSystem Entities

This scenario resolves the specified value to an EntityInstance. For this example, the protocol client is aware of the LobSystemInstance name, the Entity name, the value to resolve and the Entity field names. The steps are as follows.

1. The protocol client encodes and concatenates the Entity field names using the colon (:) as a separator.

If the values of the fields ProductKey, ProductName, Price and Color are to be obtained, the client prepares a string of the form "ProductKey:ProductName:Price:Color"

2. The protocol client issues a Resolve request to the protocol server with the LobSystemInstance name, the Entity name, the value to resolve and the concatenated Entity field names.

   <soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
   xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
   xmlns:xsd="http://www.w3.org/2001/XMLSchema">
   <soap:Body>
   <Resolve xmlns="http://microsoft.com/webservices/SharePointPortalServer/BDCClientWS/">
   <systemInstance>bdcdfExampleInstance</systemInstance>
   <entity>Product</entity>
   <valueToResolve>1</valueToResolve>
   <fieldNames>ProductKey:ProductName:Price:Color</fieldNames>
   </Resolve>
   </soap:Body>
   </soap:Envelope>

3. The protocol server responds with the status of the operation. If the EntityInstance is found, the protocol server also returns the specified EntityInstance and the name-value pairs for the fields.

   "<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
   xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
   xmlns:xsd="http://www.w3.org/2001/XMLSchema">
   <soap:Body>
   <ResolveResult>
   <Identifier>__bg40001300</Identifier>
   <Results>
   <FieldRecord FieldName="ProductKey">1</FieldRecord>
   <FieldRecord FieldName="ProductName">Bag</FieldRecord>
   <FieldRecord FieldName="Price">3.0000</FieldRecord>
   <FieldRecord FieldName="Color">Yellow</FieldRecord>
   </Results>
   </ResolveResult>
   </ResolveResponse>
   </soap:Body>
   </soap:Envelope>
5 Security

5.1 Security Considerations for Implementers
None.

5.2 Index of Security Parameters
None.
Appendix A: Full WSDL

For ease of implementation, the full WSDL and schema are provided in this appendix.

```xml
<?xml version="1.0" encoding="utf-8"?>
<wsdl:definitions xmlns:soap="http://schemas.xmlsoap.org/wsdl/soap/
xmlns:tm="http://microsoft.com/wsdl/mime/textMatching/
xmlns:soapenc="http://schemas.xmlsoap.org/soap/encoding/
xmlns:mime="http://schemas.xmlsoap.org/wsdl/mime/
xmlns:s="http://www.w3.org/2001/XMLSchema"
xmlns:soap12="http://schemas.xmlsoap.org/wsdl/soap12/
xmlns:http="http://schemas.xmlsoap.org/wsdl/http/
xmlns:wsdl="http://schemas.xmlsoap.org/wsdl/">
<wsdl:types>
  <s:schema elementFormDefault="qualified"
targetNamespace="http://microsoft.com/webservices/SharePointPortalServer/BDCClientWS/">
    <s:element name="Resolve">
      <s:complexType>
        <s:sequence>
          <s:element minOccurs="1" maxOccurs="1" name="systemInstance" type="s:string"/>
          <s:element minOccurs="1" maxOccurs="1" name="entity" type="s:string"/>
          <s:element minOccurs="1" maxOccurs="1" name="valueToResolve" type="s:string"/>
          <s:element minOccurs="1" maxOccurs="1" name="fieldNames" type="s:string"/>
        </s:sequence>
      </s:complexType>
    </s:element>
    <s:element name="ResolveResponse">
      <s:complexType>
        <s:sequence>
          <s:element minOccurs="1" maxOccurs="1" name="ResolveResult" type="tns:ResolveResult"/>
        </s:sequence>
      </s:complexType>
    </s:element>
    <s:complexType name="ResolveResult">
      <s:sequence>
        <s:element minOccurs="0" maxOccurs="1" name="Identifier" type="tns:IdentifierField"/>
        <s:element minOccurs="0" maxOccurs="1" name="Results" type="tns:ArrayOfFieldRecord"/>
      </s:sequence>
    </s:complexType>
    <s:complexType name="IdentifierField">
      <s:simpleContent>
        <s:extension base="s:string"/>
      </s:simpleContent>
    </s:complexType>
    <s:complexType name="ArrayOfFieldRecord">
      <s:sequence>
        <s:element minOccurs="0" maxOccurs="unbounded" name="FieldRecord" nillable="true" type="tns:FieldRecord"/>
      </s:sequence>
    </s:complexType>
    <s:complexType name="FieldRecord">
      <s:complexContent>
        <s:extension base="s:string"/>
      </s:complexContent>
    </s:complexType>
  </s:schema>
</wsdl:types>
</wsdl:definitions>
```
7 Appendix B: Product Behavior

The information in this specification is applicable to the following Microsoft products or supplemental software. References to product versions include updates to those products.

- Microsoft Office SharePoint Server 2007
- Microsoft SharePoint Server 2010
- Microsoft SharePoint Server 2013
- Microsoft SharePoint Server 2016
- Microsoft SharePoint Server 2019

Exceptions, if any, are noted in this section. If an update version, service pack or Knowledge Base (KB) number appears with a product name, the behavior changed in that update. The new behavior also applies to subsequent updates unless otherwise specified. If a product edition appears with the product version, behavior is different in that product edition.

Unless otherwise specified, any statement of optional behavior in this specification that is prescribed using the terms "SHOULD" or "SHOULD NOT" implies product behavior in accordance with the SHOULD or SHOULD NOT prescription. Unless otherwise specified, the term "MAY" implies that the product does not follow the prescription.
8 Change Tracking

No table of changes is available. The document is either new or has had no changes since its last release.
Index

A
Abstract data model
  server 12
Applicability 9
Attribute groups 11
Attributes 11

C
Capability negotiation 9
Change tracking 23
Client
  overview 12
  Complex types 11

D
Data model - abstract
  server 12

E
Events
  local - server 17
  timer - server 17
Examples
  retrieving field values for LobSystem Entities 18

F
Fields - vendor-extensible 9
  Full WSDL 20

G
Glossary 6
  Groups 11

I
Implementer - security considerations 19
  Index of security parameters 19
  Informative references 8
Initialization
  server 12
  Introduction 6

L
Local events
  server 17

M
Message processing
  server 12
Messages
  attribute groups 11
  attributes 11
  complex types 11
Timers

Types
  complex 11
  simple 11

Vendor-extensible fields 9
Versioning 9

WSDL 20