OData Atom Format Version 4.0

Committee Specification Draft ~~01~~02 / Public Review Draft ~~01~~02

~~26 April~~24 June 2013

Specification URIs

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Additional artifacts:

This prose specification is one component of a Work Product ~~which~~that also includes:

- ~~OData Metadata XML Schema: http://docs.oasis-open.org/odata/odata-atom-format/v4.0/csprd01/schemas/metadata.xsd~~
- ~~OData Atom Vocabulary: http://docs.oasis-open.org/odata/odata-atom-format/v4.0/csprd01/vocabularies/Org.OData.Atom.V1.xml~~
- XML schema: http://docs.oasis-open.org/odata/odata-atom-format/v4.0/csprd02/schemas/

- OData Atom Vocabulary: http://docs.oasis-open.org/odata/odata-atom-format/v4.0/csprd02/vocabularies/

Related work:

This specification is related to:

- *OData Version 4.0*, a multi-part Work Product which includes:
  - *OData Version 4.0 Part 1: Protocol*. Latest version. ~~http://docs.oasis-open.org/odata/odata/v4.0/odata-v4.0-part1-protocol.html~~http://docs.oasis-open.org/odata/odata/v4.0/odata-v4.0-part1-protocol.html
  - *OData Version 4.0 Part 2: URL Conventions*. Latest version. http://docs.oasis-open.org/odata/odata/v4.0/odata-v4.0-part2-url-conventions.html
  - *OData Version 4.0 Part 3: Common Schema Definition Language (CSDL)*. Latest version. http://docs.oasis-open.org/odata/odata/v4.0/odata-v4.0-part3-csdl.html
  - ABNF components: *OData ABNF Construction Rules Version 4.0* and *OData ABNF Test Cases.* 24 June 2013. http://docs.oasis-open.org/odata/odata/v4.0/csprd0~~1~~2/abnf/
  - Vocabulary components: *OData Core Vocabulary, OData Measures Vocabulary* and *OData Capabilities Vocabulary*. 24 June 2013. http://docs.oasis-open.org/odata/odata/v4.0/csprd02/vocabularies/
- *OData JSON Format Version 4.0*. Latest version. ~~http://docs.oasis-open.org/odata/odata-json-format/v4.0/odata-json-format-v4.0.html~~http://docs.oasis-open.org/odata/odata-json-format/v4.0/odata-json-format-v4.0.html

Declared XML namespaces:

- ~~http://docs.oasis-open.org/odata/ns/data~~
- ~~http://docs.oasis-open.org/odata/ns/metadata~~
- http://docs.oasis-open.org/odata/ns/data
- http://docs.oasis-open.org/odata/ns/metadata

Abstract:

The Open Data Protocol (OData) ~~is~~enables the creation of REST-based data services, which allow resources, identified using Uniform Resource Identifiers (URIs) and defined in an Entity Data Model (EDM), to be published and edited by Web clients using simple HTTP messages. OData version 4.0 defines the core semantics and facilities of the protocol, a set of ~~specifications~~recommended (but not required) rules for ~~representing and interacting with structured content. This document~~constructing URLs to identify the data and metadata exposed by an OData service as well as a set of reserved URL query string operators, an Entity Data Model (EDM), and an XML representation of the entity data model exposed by an OData service. OData Atom Format version 4.0 extends the ~~core OData Protocol specification~~former by defining representations for OData requests and responses using an Atom format.

Status:

This document was last revised or approved by the OASIS Open Data Protocol (OData) TC on the above date. The level of approval is also listed above. Check the "Latest version" location noted above for possible later revisions of this document.

Technical Committee members should send comments on this specification to the Technical Committee's email list. Others should send comments to the Technical Committee by using the "Send A Comment" button on the Technical Committee's web page at ~~http://www.oasis-open.org/committees/odata/.~~ http://www.oasis-open.org/committees/odata/.

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When referencing this specification the following citation format should be used:

[OData-Atom-Format-v4.0]

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~~format/v4.0/csprd01/odata-atom-format-v4.0-csprd01.html~~http://docs.oasis-open.org/odata/odata-atom-format/v4.0/csprd02/odata-atom-format-v4.0-csprd02.html.

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Table of Contents

1 Introduction

The OData protocol is comprised of a set of specifications for representing and interacting with structured content. ~~This document describes the OData Atom Format of the payload returned from an OData Service when requesting the `application/atom+xml` mime type~~The core specification for the protocol is in [OData-Protocol]. The OData Atom Format specification extends the former by defining representations for OData requests and responses using an Atom format.

An OData payload may represent:

- ~~a single primitive value~~
- a service document describing the top-level resources exposed by the service
- ~~a sequence of primitive values~~
- ~~a single structured ("complex") value~~
- ~~a sequence of structured ("complex") values~~
- ~~an entity (~~single entity (a structured type with an identity)
- ~~a resource reference~~
- ~~a sequence of entities~~
- ~~a sequence of changes~~
- ~~a media resource~~
- ~~a single instance of a mime type~~
- ~~a single link to a related entity~~
- ~~a collection of links to related entities~~
- ~~a service document describing the collections (entity sets) exposed by the service~~
- a resource reference
- a collection of entities
- a single primitive or complex type value
- a collection of primitive or complex type values
- a media resource
- a collection of changes
- a single link to a related entity
- a collection of links to related entities
- an error document
- an xml document describing the entity model exposed by the service
- ~~an error document~~
- a batch of requests to be executed in a single request
- a set of responses returned from a batch request

For a description of the xml format for describing an entity model, see **[OData-CSDL]**. For a description of batch requests and responses, see ~~**[Error! Reference source not found.]**~~**[OData-Protocol]**.

1.1 Terminology

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in ~~[~~**[RFC2119]**~~]~~.

1.2 Normative References

This document references the following related documents:

[GML] Portele, C., Ed., "OpenGIS Geography Markup Language (GML) Encoding", August 2007. http://portal.opengeospatial.org/files/?artifact_id=20509.

[OData-ABNF] *OData ABNF Construction Rules Version 4.0*.
See link in “Related work” section on cover page.

[OData-CSDL] OData Version 4.0 Part 3: Common Schema Definition Language (CSDL).
See link in “Related work” section on cover page.

[OData-MetaXML] *OData Metadata XML Schema.*
See link in “Additional artifacts” section on cover page.

[OData-Protocol] *OData Version 4.0 Part1: Protocol.*
See link in“Related work” section on cover page.

[OData-URL] *OData Version 4.0 Part 2: URL Conventions*.
See link in "Related work" section on cover page.

[OData-VocAtom] *OData Atom Vocabulary.*
See link in “Additional artifacts” section on cover page.

[OData-VocCap] *OData Capabilities Vocabulary.*
See link in "Related work" section on cover page.

[RFC2119] Bradner, S., “Key words for use in RFCs to Indicate Requirement Levels”, BCP 14, RFC 2119, March 1997. http://www.ietf.org/rfc/rfc2119.txt.

[RFC3986] Berners-Lee, T., Fielding, R., and L. Masinter, “Uniform Resource Identifier (URI): Generic Syntax”, IETF RFC3986, January 2005. http://www.ietf.org/rfc/rfc3986.txt.

[RFC3987] Duerst, M. and M. Suignard, “Internationalized Resource Identifiers (IRIs)”, RFC 3987, January 2005. http://www.ietf.org/rfc/rfc3987.txt.

[RFC4287] Nottingham, M., Ed., and R. Sayre, Ed. “The Atom Syndication Format”, RFC 4287, December 2005. http://www.ietf.org/rfc/rfc4287.txt.

[RFC5023] Gregorio, J., Ed., and B. de hOra, Ed., “The Atom Publishing Protocol”, RFC 5023, October 2007. http://www.ietf.org/rfc/rfc5023.txt.

[RFC5646] Phillips, A., Ed., and M. Davis, Ed., “Tags for Identifying Languages”, BCP 47, RFC 5646, September 2009. http://tools.ietf.org/html/rfc5646.

[RFC6721] Snell, J., "The Atom 'deleted-entry' Element", RFC 6721, September 2012, http://tools.ietf.org/html/rfc6721.

1.3 Typographical Conventions

Keywords defined by this specification use this `monospaced` font.

```
Normative source code uses this paragraph style.
```

Some sections of this specification are illustrated with non-normative examples.

Example 1: text describing an example uses this paragraph style

```
Non-normative examples use this paragraph style.
```

All examples in this document are non-normative and informative only.

All other text is normative unless otherwise labeled.

2 Atom Format Design

The Atom Syndication Format **[RFC4287]** defines an XML-based format for describing ~~collections (“~~feeds~~”)~~ made up of individual ~~“~~entries~~”.~~. The Atom Publishing Protocol **[RFC5023]** defines an application-level protocol based on HTTP transfer of Atom-formatted representations.

OData builds on **[RFC4287]** and **[RFC5023]** by defining additional conventions and extensions for representing and querying entity data, e.g. OData collections are represented as Atom feeds, with one Atom entry for each entity within a collection.

As specified in **[RFC4287]** and **[RFC5023]** processors that encounter foreign markup MUST NOT stop processing and MUST NOT signal an error. This includes additional elements or attributes in any namespace, including elements and attributes in the OData ~~Data~~ Data and ~~Metadata~~ Metadata namespaces, e.g. values for properties not declared in `$metadata`, and ~~annotations~~ annotation that are not defined in the version of the payload being returned.

2.1 Namespaces

OData defines meaning for elements and attributes defined in the following namespaces.

2.1.1 Atom Syndication

Atom elements and attributes are defined within the Atom namespace~~:~~ ~~`http://www.w3.org/2005/Atom.`~~, see **[RFC4287]**:

`http://www.w3.org/2005/Atom`

In this specification the namespace prefix `atom` is used to represent the Atom Namespace, however the prefix name is not prescriptive.

2.1.2 Atom Publishing Protocol

Atom Publishing Protocol (AtomPub) elements and attributes are defined within the AtomPub namespace~~: `http://www.w3.org/2007/app.`~~, see **[RFC5023]**:

`http://www.w3.org/2007/app`

In this specification the namespace prefix `app` is used to represent the AtomPub Namespace, however the prefix name is not prescriptive.

2.1.3 Atom Tombstone

The `deleted-entry` element is defined within the Atom Tombstone namespace~~:~~ ~~`http://purl.org/atompub/tombstones/1.0.`~~, see **[RFC6721]**:

`http://purl.org/atompub/tombstones/1.0`

In this specification the namespace prefix `atom-tombstone` is used to represent the Atom Tombstone Namespace, however the prefix name is not prescriptive.

2.1.4 OData Data

Elements that describe the actual data values for an entity are qualified with the OData Data Namespace: ~~`http://docs.oasis-open.org/odata/ns/data.`~~

`http://docs.oasis-open.org/odata/ns/data`

In this specification the namespace prefix `data` is used to represent the OData Data Namespace, however the prefix name is not prescriptive.

2.1.5 OData Metadata

Attributes and elements that represent metadata (such as type, null usage, and entry-level etags) are defined within the OData Metadata Namespace:

```
http://docs.oasis-open.org/odata/ns/metadata.
```

Custom elements or attributes MUST NOT use this namespace.

In this specification the namespace prefix `metadata` is used to represent the OData Metadata Namespace, however the prefix name is not prescriptive.

~~2.1.6~~2.2 XML Schema Definition for OData Metadata

This specification contains a normative XML schema for the ~~OData Metadata namespace, see **[OData-MetaXML].**~~OData Metadata namespace, see **[OData-MetaXML]**.

It only defines the shape of well-formed OData metadata, but is not descriptive enough to define what correct OData metadata is. This specification document defines additional rules that correct OData metadata MUST fulfill. In case of doubt on what makes OData metadata correct the rules defined in this specification document take precedence.

3 Requesting the Atom Format

The OData Atom format MAY be requested using the `$format` query option in the request URL with the MIME type `application/atom+xml`, or the case-insensitive abbreviation `atom` which MUST NOT be followed by format parameters.

Alternatively, this format MAY be requested using the `Accept` header with the MIME type `application/atom+xml`.

If specified, `$format` overrides any value specified in the `Accept` header.

The service document MAY additionally be requested with the more specific MIME type `application/atomsvc+xml` using either `$format` or `Accept`.

All resources MAY additionally be requested with the less specific MIME type `application/xml` using either `$format` or `Accept`, or the case-insensitive abbreviation `xml` using `$format`.

Services SHOULD advertise the supported MIME types by annotating their entity container with the term `Capabilities.SupportedFormats` defined in **[OData-VocCap]**.

4 Common Characteristics

4.1 Header Content-Type

The Content-Type header for Atom responses MUST use the most specific MIME type for the requested resource that is indicated as acceptable by the client.

Requests using the $format query option with the abbreviation atom MUST receive the MIME type

- application/atomsvc+xml for the service document,
- application/atom+xml for entities and collections of entities, references, or changes,
- application/xml for all other resources.

Requests using $format or an Accept header with value application/atom+xml MUST receive the MIME type

- application/xml for the service document,
- application/atom+xml for entities and collections of entities, references, or changes,
- application/xml for all other resources.

Requests using $format or an Accept header with value application/xml or $format with the abbreviation xml MUST receive the MIME type application/xml for all resources.

Data modification requests for entities or collections of entities MUST specify a Content-Type header with a value of either application/atom+xml or application/xml. Data modification requests for all other resources MUST specify a Content-Type header with a value of application/xml.

4.2 Message Body

~~## 4.2 Message Body~~

Each message body MUST be represented as an XML document with a single root element. This element is either the representation of an ~~entity, an entity reference or a complex type instance, a primitive value, a collection of primitive values, a collection of complex values, a collection of entities, or a collection of entries that represent changes to a previous result~~entity, an entity reference, a primitive value, a complex type instance, a collection of primitive values, a collection of complex values, a collection of entities, or a collection of entries that represent changes to a previous result.

Client libraries MUST retain the order of XML elements in document order for ATOM and XML responses.

OData does not impose any ordering constraints on XML attributes within XML elements.

4.3 Relative URLs

OData payloads MAY use relative references as defined in **[RFC3986]** by specifying the xml:base attribute to define a base UR~~I~~L for relative references defined within the scope of the element containing the xml:base attribute.

If no xml:base attribute is present in the context of a relative reference or is itself a relative URL, relative URLs in responses are relative to the Content-Location header of the response.

In responses without a Content-Location header, responses with a relative URL in the Content-Location header, and in requests relative URLs are relative to the request URL.

5 Service Document

AtomPub defines the concept of a service document to represent the set of available collections. OData uses the service document to describe the entity sets, ~~named entities~~singletons, and parameterless function imports published by the service.

Example~~:~~ 2:

```
<app:service xmlns:app="http://www.w3.org/2007/app"
             xmlns:atom="http://www.w3.org/2005/Atom"
             xmlns:metadata="http://docs.oasis-open.org/odata/ns/metadata"
    metadata:metadata          xml:base="http://host:port/service/$metadata"/"
             metadata:context="$metadata"
             metadata:metadata-
etag="Hugo"W/&quot;MjAxMy0wNS0xM1QxNDo1NFo=&quot;">
>
  <app:workspace>>>
    <atom:title type="text">Data</atom:title>
    <app:collection href="OrderDetailsOrders">
      <atom:title type="text">Orders</atom:title>
    </app:collection>
    <app:collection href="OrderItems">
      <atom:title type="text">Order Details</atom:title>
    </app:collection>
    <metadata:entity href="Contoso">
      <atom:title>Contoso Ltd.</atom:title>
    </metadata:entity>
    <metadata:function-import href="TopProducts">
      <atom:title>Best-Selling Products</atom:title>
    </metadata:function-import>
    <metadata:singleton href="Contoso">
      <atom:title>Contoso Ltd.</atom:title>
    </metadata:singleton>
    <metadata:service-document href="EasternRegionSales">http://host/HR/">
      <atom:title>Eastern Region SalesHuman Resources</atom:title>
    </metadata:service-document>
  </app:workspace>
</app:service>
```

5.1 Element `app:service`

The root of a service document ~~contains~~is a single `app:service` element. The `app:service` element ~~contains~~MUST contain exactly one ~~or more~~ `app:workspace` elements.

5.1.1 Attribute `metadata:context`

An `app:workspace` element MUST have a `metadata:context` attribute, defined in the OData Metadata namespace, whose value is the URL that returns the metadata document of the service.

For more information on the format of the metadata document, see **[OData-CSDL]**.

5.1.2 Attribute `metadata:metadata-etag`

An `app:workspace` element MAY have a `metadata:metadata-etag` attribute to specify an ETag that can be used to determine the current version of the service's metadata document.

For details on how ETags are used, see **[OData-Protocol]**.

~~5.1.1~~5.2 Element app:workspace

OData represents the ~~each~~ entity container of a service (see **[OData-CSDL])** as an app:workspace element. An app:workspace element contains zero or more app:collection elements, one for each entity set published by the container, zero or more ~~metadata:function-import~~metadata:function-import elements, one for each function import published by the ~~continer, and~~container, zero or more ~~metadata:entity~~metadata:singleton elements, one for each ~~named entity~~singleton published by the container, and zero or more metadata:service-document elements, one for each related service document.

~~5.1.1.1 Attribute metadata:name~~

~~The metadata:name attribute MUST contain the namespace- or alias-qualified name of the entity container that is represented by the app:workspace element. It MAY be omitted if the workspace represents the default entity container.~~

~~For more information on namespace- and alias-qualified names, see **[OData-CSDL]**.~~

~~5.1.1.2 Attribute metadata:metadata~~

~~An app:workspace element MUST have a metadata attribute, defined in the OData Metadata namespace, whose value is the URL that returns the metadata document of the service.~~

~~For more information on the format of the metadata document, see **[OData-CSDL]**.~~

~~5.1.1.3 Attribute metadata:metadata-etag~~

~~An app:workspace element MAY have a metadata:metadata-etag attribute to specify an ETag that can be used to determine the current version of the service's metadata document.~~

~~For details on how ETags are used, see **[Error! Reference source not found.]**.~~

~~5.1.1.4 Element title~~

As defined in **[RFC-5023],** the app:workspace element MUST contain ~~a~~ an atom:title element containing the human-readable description of the workspace. This value may be different from the name of the entity container ~~exposed by the metadata:name attribute~~.

~~5.1.2~~5.3 Element app:collection

OData represents entity sets that are *not* marked with IncludeInServiceDocument="false" (see ~~**[OData-CSDL]**~~**[OData-CSDL]**) as app:collection elements contained within the ~~app:workspace~~app:workspace element.

Example 3:

```
<app:collection href="Order~~De~~Items">
  <atom:title type="text">Order Details</atom:title>
</app:collection>
```

~~5.1.2.1~~5.3.1 Attribute href

The app:collection element MUST contain an href attribute which represents a URL that can be used to retrieve the members of the entity set.

~~5.1.2.2~~5.3.2 Attribute metadata:name

The metadata:name attribute MUST contain the name of the entity set ~~which MAY be unqualified if the enclosing app:workspace represents the default entity container~~.

It MAY be omitted if its value is identical the the value of the `href` attribute, which is the case if the service uses relative URLs following the OData URL conventions described in ~~**Error! Reference source not found.**~~ **[OData-URL]**.

~~5.1.2.3~~5.3.3 Element `atom:title`

~~The `atom:title` element within~~As defined in **[RFC-5023],** the `app:collection` element MUST contain an `atom:title` element. The `atom:title` element SHOULD contain a human-readable description of the entity set which MAY be the name of the entity set.

~~5.1.3~~5.4 Element metadata:function-import

OData represents function imports that are marked with `IncludeInServiceDocument="true"` (see ~~**[OData-CSDL]**~~**[OData-CSDL]**) as `metadata:function-import` elements contained within the `app:workspace` element.

~~5.1.3.1~~5.4.1 Attribute `href`

The `metadata:function-import` element MUST contain an `href` attribute which represents a URL that can be used to retrieve the function import result.

~~5.1.3.2~~5.4.2 Attribute `metadata:name`

The `metadata:name` attribute MUST contain the name of the function import ~~which MAY be unqualified if the enclosing `app:workspace` represents the default entity container~~.

It MAY be omitted if its value is identical the the value of the `href` attribute, which is the case if the service uses relative URLs following the OData URL conventions described in ~~**Error! Reference source not found.**~~ **[OData-URL]**.

~~5.1.3.3~~5.4.3 Element `atom:title`

~~The `atom:title` element within the~~The `metadata:function-import` element MUST contain an `atom:title` element. The `atom:title` element SHOULD contain a human-readable description of the function import which MAY be the name of the function import.

~~5.1.4~~5.5 Element metadata:~~`entity`~~singleton

OData represents ~~named entities~~singletons as `metadata:`~~`entity`~~`singleton` elements contained within the `app:workspace` element.

~~5.1.4.1~~5.5.1 Attribute `href`

The `metadata:`~~`entity`~~`singleton` element MUST contain an `href` attribute which represents a URL that can be used to retrieve the ~~entity~~singleton.

~~5.1.4.2~~5.5.2 Attribute `metadata:name`

~~The `metadata:`~~If the `href` attribute of a `metadata:singleton` element contains a relative url that follows the conventions described in **[OData-URL]**, the `metadata:name` attribute can be ommited. Otherwise the `metadata:name` attribute MUST be specified and MUST contain the name of the ~~entity which MAY be unqualified if the enclosing `app:workspace` represents the default entity container~~singleton.

~~It MAY be omitted if its value is identical the the value of the `href` attribute, which is the case if the service uses relative URLs following the OData URL conventions described in **Error! Reference source not found.**~~

~~5.1.4.3~~5.5.3 Element `atom:title`

The `metadata:singleton` element MUST contain an `atom:title` element. The `atom:title` element ~~within the `metadata:entity` element MUST contain~~ SHOULD contain a human-readable description of the ~~entity~~singleton which MAY be the name of the ~~entity~~singleton.

~~5.1.5~~5.6 Element metadata:service-document

OData represents related service documents as `metadata:service-document` elements contained within the `app:workspace` element.

Example 4:

```
<metadata:service-document href="~~EasternRegionSales">~~http://host/HR/">
  <atom:title>~~Eastern Region Sales~~Human Resources</atom:title>
</metadata:service-document>
```

~~5.1.5.1~~5.6.1 Attribute `href`

The `metadata:service-document` element MUST contain an `href` attribute which represents a URL that can be used to retrieve the related service document.

~~5.1.5.2~~5.6.2 Element `atom:title`

The `metadata:service-document` element MUST contain an `atom:title` element ~~containing~~. The `atom:title` element SHOULD contain a human-readable description of the related service document.

6 Entity

Entities, whether individual or within an Atom feed, are represented as `atom:entry` elements.

Example 5:

```
<entry> xmlns="http://www.w3.org/2005/Atom"
       xmlns:metadata="http://docs.oasis-open.org/odata/ns/metadata"
       xml:base="http://host/service/"
       metadata:context="$metadata#Customers/$entity"
       metadata:metadata-etag="W/&quot;MjAxMy0wNS0xM1QxNDo1NFo=&quot;">

<id>http://services.odata.org/OData/OData.svc/Products(0host/service/$metadata
#Customers('ALFKI')</id>
  <title />
  <summary />
  <updated>2012-03-30T07:11:05Z</updated>
  <author>
    <name />
  </author>
  <link rel="edit" title="ProductCustomer" href="Products(0Customers('ALFKI')"
/>
  <link rel="http://docs.oasis-open.org/odata/ns/related/CategoryOrders"
        type="application/atom+xml;type=entryfeed"
        title="CategoryOrders"
href="Products(0)/CategoryCustomers('ALFKI')/Orders" />
  <link rel="http://docs.oasis-open.org/odata/ns/related/Supplier"
        type="application/atom+xml;type=entry"
        title="Supplier" href="Products(0Customers('ALFKI')/Supplier" />
  <category term="ODataDemo.ProductCustomer"
            scheme="http://docs.oasis-open.org/odata/ns/scheme" />
  <content type="application/xml">
    <metadata:properties>
      <data:ID metadata:type="Int32">0>ALFKI</data:ID>
      <data:Name>BreadCompanyName>Alfreds Futterkiste</data:NameCompanyName>
      <data:Description>Whole grain breadContactName>Maria
Anders</data:DescriptionContactName>
      <data:ReleaseDate metadata:type="Date">
        1992-01-01
      ContactTitle>Sales Representative</data:ReleaseDate> ContactTitle>
      <data:DiscontinuedDate metadata:type="Date"Phone>030-
0074321</data:Phone>
      <data:Fax>030-0076545</data:Fax>
      <data:Address>
        <data:Street>Obere Str. 57</data:Street>
        <data:City>Berlin</data:City>
        <data:Region metadata:null="true" />
        <data:Rating metadata:type="Int32">4PostalCode>D-12209</data:Rating>
PostalCode>
      <data:Price metadata: <link rel="http://docs.oasis-
open.org/odata/ns/related/Country"
              type="Decimal">2.5application/atom+xml;type=entry"
              title="Country of residence"
              href="Customers('ALFKI')/Address/Country" />
      </data:PriceAddress>
    </metadata:properties>
  </content>
</entry>
```

This section defines the elements and attributes within an `atom:entry` element that are assigned meaning in OData.

6.1 Element atom:entry

An atom:entry element is used to represent a single OData entity, which is an instance of a structured type with an identity.

Services can advertise the values of the atom:title, atom:summary, atom:published, and atom:updated child elements of an atom:entry element by annotating their OData entity types with the Atom.Title, Atom.Summary, Atom.Published, and Atom.Updated terms defined in **[OData-VocAtom]**.

6.1.1 Attribute metadata:etag

The atom:entry element MAY contain a metadata:etag attribute, representing an opaque string value that can be used in a subsequent request to determine if the value of the entity has changed. For details on how ETags are used, see to ~~**[Error! Reference source not found.]**~~**[OData-Protocol]**.

6.1.2 Attribute metadata:~~metadata~~context

If the root of the response is an ~~atom:entry~~atom:entry element, or the entity set cannot be determined from the ~~metadata URL~~context URL of the feed, the atom:entry element MUST have a metadata:context attribute, defined in the ~~OData Metadata namespace~~OData Metadata namespace, whose value is the ~~metadata~~context URL that describes the entity represented by the atom:entry. This URL MAY be absolute or relative to the ~~metadata~~context URL of the feed.

For more information on the ~~metadata~~context URL, see ~~**[Error! Reference source not found.]**~~**[OData-Protocol]**.

6.1.3 Attribute metadata:metadata-etag

If the root of the response is an atom:entry element, it MAY have a metadata:metadata-etag attribute to specify an ETag that can be used to determine the current version of the service's metadata document.

For details on how ETags are used, see ~~**[Error! Reference source not found.]**~~**[OData-Protocol]**.

6.2 Element atom:id

The atom:id element ~~defines a durable, opaque, globally unique identifier for~~MUST contain the ~~entry. Its content must be an IRI~~entity-id; see **[OData-Protocol]**. By convention the entity-id is identical to the canonical URL of the entity, as defined in ~~**RFC3987**. The consumer of the feed must~~ **[OData-URL]**.

If the entity is transient (i.e. cannot be read or updated), the atom:id SHOULD follow the pattern odata:transient:{some-generated-unique-identifier-to-not-break-atom-parsers}.

Clients MAY assume ~~this IRI can~~that an entity with an atom:id that matches the transient pattern cannot be ~~de-referenced, nor assume any semantics from its structure~~compared to other entities, reread, or updated.

~~6.2.1~~6.3 Element atom:category

An OData entry MUST contain a single atom:category element with a scheme attribute equal to

```
http://docs.oasis-open.org/odata/ns/scheme
```

to identify the entity type of the entry.

An atom:category element describing an OData entity type MUST have a term attribute whose value is the namespace-qualified or alias-qualified name of the entity type of the entry, in which case the type MUST be defined in the metadata document indicated by the current ~~metadata~~context URL, otherwise it MUST be a full URL to a metadata document with the namespace-qualified name of the instance's type appended as a URL fragment.

~~For example, the following represents an~~Example 6: entity ~~whose~~of type ~~is "~~`Model.VipCustomer`~~",~~ defined ~~with~~in the ~~current~~ metadata document~~:~~ of the same service

```
<category rel="http://docs.oasis-open.org/odata/ns/scheme"
          term="Model~~1~~.VipCustomer"/>
```

~~The following represents an~~Example 7: entity ~~whose~~of type ~~is "~~`Model.VipCustomer`~~",~~ defined ~~with~~in the ~~"http://host/alternate/$~~metadata~~"~~ document~~:~~ of a different service

```
<category rel="http://docs.oasis-open.org/odata/ns/scheme"
          term="http://host/alternate/$metadata#Model~~1~~.VipCustomer"/>
```

For more information on namespace-qualified and alias-qualified names, see **[OData-CSDL]**.

The entry MAY contain additional `atom:category` elements with different scheme values; such `atom:category` elements have no semantic meaning in OData.

~~6.3~~6.4 Element `atom:~~content~~link`

~~The `atom:content` element contains the properties of the entity as a `metadata:properties` element unless the entity is a media entity.~~

~~6.3.1 Self and Edit Links~~

Atom defines two types of links within an entry that represent retrieve or update/delete operations on the entry:

- `atom:link` elements with a `rel` attribute of `self` can be used to retrieve the entity (via the URL specified in the href attribute).
- `atom:link` elements with a `rel` attribute of `edit` can be used to retrieve, update, or delete the entity (via the URL specified in the href attribute).

An ~~`atom:entry`~~`atom:entry` element representing an OData entity ~~SHOULD~~ MUST contain an edit link if and only if the entity is updatable. It MUST contain a self link~~, an edit link,~~ if and only if the entity is read-only or ~~both for a particular entry, but MUST NOT contain more than one~~the read link is different from the edit link~~ for a given entity. The absence of~~. Transient entities contain neither a self link ~~implies that~~nor an edit link.

Clients MAY use the edit link ~~can be used~~ to retrieve the entity~~. The absence of an edit link implies that the entity is read-only~~ if no self link is present. They SHOULD NOT attempt to update an entity that does not contain an edit link.

6.5 Element `atom:content`

The `atom:content` element contains the properties of the entity as a `metadata:properties` element unless the entity is a media entity.

7 Structural Property

7.1 Primitive Value

OData Atom and XML payloads represent values of primitive types following the rules of **[GML]** Portele, C., Ed., "OpenGIS Geography Markup Language (GML) Encoding", August 2007. http://portal.opengeospatial.org/files/?artifact_id=20509.

[OData-ABNF].

[OData-ABNF].

Geography and Geometry values are represented as defined in **[[GML]]**.

Values of the other primitive types are represented according to the `xxxValue` rules, i.e. `Edm.Binary` as `binaryValue` etc.

Example 8:

```
<metadata:properties>
  <data:NullValue metadata:null="true"/>
  <data:TrueValue metadata:type="Boolean">true</data:TrueValue>
  <data:FalseValue metadata:type="Boolean">false</data:FalseValue>
  <data:IntegerValue metadata:type="SByte">-128</data:IntegerValue>
  <data:DoubleValue metadata:type="Double"
       >3.1415926535897931</data:DoubleValue>
  <data:SingleValue metadata:type="Double">INF</data:SingleValue>
  <data:DecimalValue metadata:type="Decimal">34.95</data:DecimalValue>
  <data:StringValue>Say "Hello",
then go!</data:StringValue>
  <data:DateValue metadata:type="Date">2012-12-03</data:DateValue>
  <data:DateTimeOffsetValue metadata:type="DateTimeOffset"
       >2012-12-03T07:16:23Z</data:DateTimeOffsetValue>
  <data:DurationValue metadata:type="Duration"
       >P12DT23H59M59.999999999999S</data:DurationValue>
  <data:TimeOfDayValue metadata:type="TimeOfDay"
       >07:59:59.999</data:TimeOfDayValue>
  <data:GuidValue metadata:type="Guid"
       >01234567-89ab-cdef-0123-456789abcdef</data:GuidValue>
  <data:Int64Value metadata:type="Int64">0</data:Int64Value>
  <data:ColorEnumValue metadata:type=""="#org.example.Pattern"
       >Yellow</data:ColorEnumValue>
  <data:GeographyPoint metadata:type="GeographyPoint">
    <gml:Point>
      <gml:pos>64.1 142.1</gml:pos>
    </gml:Point>
  </data:GeographyPoint>
</metadata:properties>
```

Note that the line break in the body of `StringValue` is intentional, it represents a line break.

7.2 Element `metadata:properties`

The `metadata:properties` element represents property values for an entity.

7.3 Element `data:[PropertyName]`

Within the `metadata:properties` element, individual entity properties are represented as elements where the name of the element is the name of the entity property within the OData Data Namespace.

The `data:[PropertyName]` element MAY include a `metadata:type` attribute to specify the type of the primitive- or complex-typed instance.

~~For example, the following element within an `metadata:properties` element represents the "Rating" field with an integer value of 4:~~

Example 9:

```
<data:Rating metadata:type="Int32">4</data:Rating>
```

The `data:[PropertyName]` element MAY include a ~~`metadata:null`~~`metadata:null` attribute to specify that the primitive- or complex-typed instance has the `null` value.

~~For example:~~

Example 10:

```
<data:Rating metadata:null="true~~" />~~"/>
```

7.3.1 Attribute `metadata:type`

If the type of the property is anything other than `Edm.String`, the property representation MUST contain a `metadata:type` attribute to specify the URI that identifies the type of the property.

For built-in primitive types the value is the unqualified name of the primitive type. For all other types, the URI may be absolute or relative to the URI of the containing type. The root `metadata:type` may be absolute or relative to the root context URL.

For non-built in primitive types, the URI contains the namespace-qualified or alias-qualified type, specified as a URI fragment. For properties that represent a collection of values, the fragment is the namespace-qualified or alias-qualified element type prefixed with `Collection` and enclosed in parentheses.

Example 11:

```
<data:Age metadata:type="Int32">25</data:Age>
```

7.3.2 Attribute `metadata:null`

Null-valued properties are represented as empty elements with the `metadata:null="true"` attribute.

The `metadata:null` attribute distinguishes null values from other empty content (such as an empty string).

Example 12:

```
<data:Apartment metadata:null="true"/>
```

The absence of the `metadata:null` attribute is equivalent to specifying `metadata:null="false"`.

~~7.3.1~~7.4 Primitive and Enumeration Property

For primitive properties, the content of the ~~`data:[PropertyName]`~~`data:[PropertyName]` element represents the value of the property following the syntax for ~~primitive values~~primitive values. ~~For example, the following would represent the~~

Example 13: string value ~~"`CEO`" for the `Title` property of an entity:~~

```
<data:Title>CEO</data:Title>
```

~~*The following would represent the combined*~~*Example 14: enumeration ~~values `Yellow` and `Solid` for the `Pattern` property of an entity:~~value*

```
<data:Pattern
metadata:type~~="~~="#~~org.example.Pattern">Solid,Yellow</data:Pattern>
```

7.3.27.5 Complex Property

For complex properties, the content of the ~~data:[PropertyName]~~data:[PropertyName] element consists of nested data:[PropertyName] elements describing the properties of the complex type. ~~It MAY include a metadata:type attribute to specify the type.~~

~~For example, the complex typed property "Name", with properties "FirstName" and "LastName" would be respresented as:~~

Example 15:

```
<data:NameShipTo metadata:type="MyModel.FullName">  ="#Model.Address">
  <data:FirstName>JulieStreet>Obere Str. 57</data:FirstName>  Street>
  <data:LastName>SwansworthCity>Berlin</data:LastName>  City>
</  <data:Name>Region metadata:null="true"/>
  <data:PostalCode>D-12209</data:PostalCode>
</data:ShipTo>
```

7.3.37.6 Primitive and Enumeration Property Collection ~~Property~~

For properties that represent a collection of primitive or enumeration values, the ~~data:[PropertyName] element may include a metadata:type~~URI fragment specified in the metadata:type attribute ~~with a value of "~~is the namespace-qualified or alias-qualified element type prefixed with Collection~~([PrimitiveTypeName])". The content of the~~ and enclosed in parenthesis.

7.6.1 Element metadata:element ~~consists of nested child elements named "~~

Each item in the collection is represented as a metadata:element~~"~~ element in the ~~OData Metadata Namespace~~OData Metadata namespace ~~for~~.

The value of each ~~value in the collection.~~

~~The value of each <~~metadata:element~~>~~ in the collection follows the syntax for ~~primitive values~~primitive values.

~~<~~A metadata:element~~>~~ element~~s~~ MUST NOT contain the metadata:null="true" attribute value.

Example~~:~~ 16:

```
<data:EmailAddresses metadata:type=""="#Collection(String)">
  <metadata:element>Julie@Swansworth.com</metadata:element>
  <metadata:element>Julie.Swansworth@work.com</metadata:element>
</data:EmailAddresses>
```

7.3.47.7 Complex Property Collection ~~Property~~

For properties that represent a collection of complex types, the ~~data:[PropertyName] element may include a metadata:type~~URI fragment specified in the metadata:type attribute is the namespace-qualified or alias-qualified element type prefixed with ~~a value of~~ "Collection~~([ComplexTypeName])" attribute. The content of the~~" and enclosed in parenthesis..

7.7.1 Element metadata:element ~~consists of nested child elements named "element", in the OData Metadata Namespace, for each complex typed value~~

Each item in the collection~~.~~ is represented as a metadata:element element in the OData Metadata namespace.

~~The <metadata:element> element representing the instance may include a metadata:type attribute to specify the type of the individual element.~~ The value of each complex-typed ~~<~~metadata:element~~>~~ follows the syntax for ~~complex-typed properties~~complex-typed properties.

A metadata:element elements MUST NOT be empty and MUST NOT contain the metadata:null="true" attribute.

7.7.1.1 Attribute metadata:type

A metadata:element element MAY include a metadata:type attribute to specify the complex type of the represented instance. It MUST include a metadata:type attribute if the instance is of a type derived from the declared type of the property.

Example~~:~~ 17:

```
<data:PhoneNumbers metadata:type~~=""~~="#Collection(~~Person~~Model.PhoneNumber)">
  <metadata:element>
    <data:Number>425-555-1212</data:Number>
    <data:~~Phone~~Type>Home</data:~~Phone~~Type>
  </metadata:element>
  <metadata:element metadata:type~~="Person="~~#Model.CellPhoneNumber">
    <data:Number>425-555-0178</data:Number>
    <data:~~Phone~~Type>Cell</data:~~Phone~~Type>
    <data:C~~ell~~Carrier>Sprint</data:C~~ell~~Carrier>
  </metadata:element>
</data:PhoneNumbers>
```

~~7.3.5 Attribute metadata:null~~

~~Null-valued properties are represented as empty elements with the metadata:null="true" attribute.~~

~~The metadata:null attribute distinguishes null values from other empty content (such as an empty string).~~

~~For example, the following represents an empty apartment number:~~

```
<data:Apartment metadata:null="true"/>
```

~~The absence of the metadata:null attribute is equivalent to specifying metadata:null="false".~~

~~7.3.6 Attribute metadata:type~~

~~If the type of the property is anything other than Edm.String, the property representation MUST contain a metadata:type attribute to specify the namespace- or alias-qualified type of the property. If the type is defined in a different metadata document than specified by the current metadata URL, it MUST be a full URL to a metadata document with the namespace- or alias-qualified name of the instance's type appended as a URL fragment.~~

~~For example, the following specifies that the Age property is a 32-bit integer with the value 25:~~

```
<data:Age metadata:type="Int32">25</data:Age>
```

8 Navigation Property

A navigation property ~~represents~~is a reference ~~from a source entity~~ to zero or more related entities. It is represented as a navigation link that MAY be immediately preceded by an association link.

8.1 Navigation Link

The navigation link is a URL that allows retrieving the related entity or collection of entities~~,~~. It is represented as an `atom:link` element.

Example ~~for~~18: products related to a category~~:~~

~~<atom:link~~

```
<atom:link
    rel="http://docs.oasis-open.org/odata/ns/related/Products"
    href="Categories(0)/Products"
    type="application/atom+xml;type=feed"
    title="Products"
/>
```

The related data for the relationship MAY be included in the entity using a single child `metadata:inline` element.

8.1.1 Element `atom:link`

In the case where the `atom:link` element describes a navigation link the attributes `rel`, `href`, `type`, `metadata:~~metadata~~context`, and `title` ~~are to~~MUST be used as described in the following subsections.

8.1.1.1 Attribute `rel`

The `rel` attribute MUST be present and ~~is made up of~~MUST contain the string

~~"~~`http://docs.oasis-open.org/odata/ns/related~~/"~~ /`

followed by the name of the navigation property on the entity.

Note that the full name must be used; the use of relative URLs in the rel attribute is not allowed.

8.1.1.2 Attribute `href`

The `href` attribute MUST be present and specifies the URL that can be used to retrieve the related entities. This URL may be relative or absolute.

For navigation properties declared by an entity type the URL should be the canonical URL for the navigation property, i.e. the canonical URL of the source entity followed by a forward slash and the name of the navigation property, see Example 18.

For navigation properties declared by a complex type that is used as a single value in an entity type, the URL should be the canonical URL of the source entity, followed by a forward slash and the path to the navigation property, see second `atom:link` in Example 5.

For navigation properties declared by a complex type that is used in a collection of complex type values, the URL should be the canonical URL of the target entity.

Example 19: country related to an address within a collection

```
<data:Addresses metadata:type="#Collection(Model.Address)">
  ...
  <metadata:element>
    ...
    <atom:link rel="http://docs.oasis-open.org/odata/ns/related/Country"
               href="Countries('DE')"
               type="application/atom+xml;type=entry"
               title="Country" />
  </metadata:element>
  ...
</data:Addresses>
```

8.1.1.3 Attribute `type`

The `type` attribute MUST be present and determines whether the cardinality of the related end is a single entity or a collection of entities. The value `"application/atom+xml;type=entry"` represents a single entity and the value `"application/atom+xml;type=feed"` an collection of entities.

8.1.1.4 Attribute `metadata:~~metadata~~context`

The `metadata:~~metadata~~context` Attribute MUST be present if the navigation property is not defined in metadata. The value of the `metadata:~~metadata~~context` attribute, defined in the ~~OData Metadata namespace,~~OData Metadata namespace, specifies the ~~metadata~~context URL that describes the type of the related entity or entities.

For details on the ~~metadata~~context URL, see **~~[Error! Reference source not found.]~~[OData-Protocol]**.

8.1.1.5 Attribute `title`

The `title` attribute SHOULD be present and equal to the name of the navigation property, and provides human-readable, possibly language-dependent, and not necessarily unique information about the link.

8.2 Association Link

The association link is a URL that allows retrieving the reference or collection of references to the related entity or entities. It is represented as an `atom:link` element. If the URL follows conventions, i.e. is the navigation link with `/$ref` appended, the association link MAY be omitted.

Example ~~for~~20: products related to a category~~:~~

~~Example for products related to a category:~~

```
<atom:link
  rel="http://docs.oasis-open.org/odata/ns/relatedlinks/Products"
  href="Categories(0)/Products/$ref"
  type="application/xml"
  title="Products"
/>
```

8.2.1 Element `atom:link`

A collection of relationship links is represented by an `atom:link` element. The attributes `rel`, `href`, `type`, `metadata:~~metadata~~context`, and `title` ~~are to~~MUST be used as described in the following subsections.

8.2.1.1 Attribute `rel`

The `rel` attribute MUST be present. The value MUST ~~be made up of~~contain the string

"`http://docs.oasis-open.org/odata/ns/relatedlinks~~/"~~/`

followed by the name of the navigation property ~~on~~of the entity.

Note that the full name must be used; the use of relative URLs in the `rel` attribute is not allowed.

8.2.1.2 Attribute `href`

The `href` attribute MUST be present and MUST specify the URL that represents the collection of relationship links. This URL may be relative or absolute.

8.2.1.3 Attribute `type`

The `type` attribute MUST be present with the string `"application/xml"` as value.

8.2.1.4 Attribute `title`

The `title` attribute SHOULD be present and be set to the name of the navigation property. The `title` attribute provides human-readable, possibly language-dependent, and not necessarily unique information about the link.

8.3 Expanded Navigation Property

An expanded navigation property MUST be represented as a single `metadata:inline` child element of the `atom:link` element representing the navigation link. The value of the `metadata:inline` element MUST be the correct representation of the related entity or collection of entities.

It is valid to include the `metadata:inline` element in only a subset of the entries within a feed.

If at most one entity can be related, the value is the representation of the related entity, or the `metadata:inline` element is empty if no entity is currently related.

If a collection of entities can be related, it MUST be represented as an ~~`atom:feed`.~~`atom:feed`. An empty ~~set~~collection of entities (one that contains no entity type instances) MUST be represented as an empty `atom:feed`.

Each entity MUST be represented as an ~~`atom:entry`~~`atom:entry` element or as an entity reference.

Example~~:~~ 21:

```
<atom:link
  rel="http://docs.oasis-open.org/odata/ns/related/Products"
  href="Categories(0)/Products"
  type="application/atom+xml;type=feed"
  title="Products"
>
  <metadata:inline>
    <atom:feed>
      ...
    </atom:feed>
  </metadata:inline>
</atom:link>
```

8.4 Deep Insert~~s~~

When inserting a new entity with a `POST` request, related new entities MAY be specified using the same representation as for an expanded navigation property.

Deep inserts are not allowed in update operations using `PUT` or `PATCH` requests.

Example ~~for~~ 22: inserting a new order ~~with order details and~~ for a new customer~~:~~ with order items related to existing products

```
<entry>
  ...
  <link rel="http://docs.oasis-open.org/odata/ns/related/Customer"
        type="application/atom+xml;type=entry"
        title="Customer" href="Orders(11643)/Customer">
    <metadata:inline>
      <entry>
        ...
        <content type="application/xml">
          <metadata:properties>
            <data:ID>ANEWONE</data:ID>
            ...
          </metadata:properties>
        </content>
      </entry>
      </metadata:inline>
  </link>
  <link rel="http://docs.oasis-open.org/odata/ns/related/~~Details~~Items"
        type="application/atom+xml;type=feed"
        title="Details" href="Orders(11643)/~~Details~~Items">
    <metadata:inline>
    <feed>
        <entry>
          ...
          <~~content~~link rel="http://docs.oasis-
open.org/odata/ns/related/Product"
                href="http://host/service/Products(28)"
                type="application/atom+xml~~>~~;type=entry"
            ~~<metadata:properties>~~    title="Product"/>
            ~~<data:ProductID metadata:type="Int32">28</data:ProductID>~~
            ~~...~~
          ~~</metadata:properties>~~
        ~~</content>~~
      ~~</entry>~~
      ~~<entry>~~
        ~~...~~
          <content type="application/xml">
            <metadata:properties>
            ~~<data:ProductID metadata:type="Int32">39</data:ProductID>~~
              ...
            </metadata:properties>
          </content>
        </entry>
          ...
```

```
        <entry>
          <link rel="http://docs.oasis-open.org/odata/ns/related/Product"
                href="http://host/service/Products(29)"
                type="application/atom+xml;type=entry"
                title="Product"/>
          <content type="application/xml">
            <metadata:properties>
              ...
            </metadata:properties>
          </content>
        </entry>
      ...
      </feed>
    </metadata:inline>
  </link>
  <content type="application/xml">
    <metadata:properties>
      <data:OrderIDID metadata:type="Int32">11643</data:ID>
      <data:CustomerID>ANEWONE</data:CustomerID>
      <data:EmployeeID metadata:type="Int32">6</data:EmployeeID>
    ...
    </metadata:properties>
  </content>
</entry>
```

8.5 Bind Operations

When inserting or updating an entity, relationships of navigation properties MAY be inserted or updated via bind operations.

If at most one entity can be related, the bind operation MUST be represented as a navigation link whose `href` attribute MUST contain the id of the entity to be related.

For update operations a bind operation on a collection navigation property MUST be represented as a navigation link with an inlined collection of entity references. The referenced entities are added as additional related entities, and existing relationships are not updated or deleted.

For insert operations collection navigation property bind operations and deep insert operations MAY be combined by inlining an ~~atom:feed~~atom:feed that contains ~~atom:entry~~atom:entry elements and ~~metadata:ref~~metadata:ref elements.

Example ~~for assigning~~23: assign a product to an existing category ~~with an update request:~~

```
<atom:link
    rel="http://docs.oasis-open.org/odata/ns/related/Category"
    href="http://host/service/Categories(~~0~~6)"
    type="application/atom+xml;type=entry"
    title="Category"
/>
```

9 Stream Property

9.1 Element atom:link

An entity ~~may~~MAY have one or more stream properties (for example, a photo property of an employee entity). Properties that represent streams have a type of `Edm.Stream`.

OData uses the `atom:link` element to represent a ~~named~~ stream property of an entity.

~~For example, a stream property named "Photo" could be represented by an `atom:link` element as a child of the `atom:entry` element as follows:~~

Example 24: read link of stream property `Thumbnail`

```
<atom:link rel="http://docs.oasis-
open.org/odata/ns/mediaresource/PhotoThumbnail"
           type="image/jpeg" title="Photo"
href="CategoriesProducts(0)/PhotoThumbnail"
/>
```

~~A stream property named "Photo" could be edited through an `atom:link` element as a child of the `atom:entry` element as follows:~~

Example 25: edit link of stream property `Thumbnail`

```
<atom:link
  rel="http://docs.oasis-open.org/odata/ns/edit-media/PhotoThumbnail"
  type="image/jpeg" title="Photo" href="CategoriesProducts(0)/PhotoThumbnail"
/>
```

The attributes `rel`, `href`, `type`, `metadata:etag`, and `title` are to be used as described in the following subsections.

9.1.1 Attribute rel

The `rel` attribute MUST be present and MUST be made up of the string `http://docs.oasis-open.org/odata/ns/mediaresource/`, followed by the name of the stream property on the entity.

The `rel` attribute for an `atom:link` element that can be used to change a stream property value is made up of the string `http://docs.oasis-open.org/odata/ns/edit-media/`, followed by the name of the stream property on the entity.

In both cases the full name must be used; the use of relative URLs in the `rel` attribute is not allowed.

9.1.2 Attribute href

The `href` attribute MUST be present and MUST contain the URL that can be used to read, or write, the stream, according to the `rel` attribute. This URL may be relative or absolute.

9.1.3 Attribute type

The `type` attribute MAY be present and specifies the ~~meda~~MIME-type of the stream ~~property~~.

9.1.4 Attribute metadata:etag

The `metadata:etag` attribute MAY be present and specifies an etag value that can be used in an `if-match` header to conditionally write to the stream property as described in **~~[Error! Reference source not found.]~~[OData-Protocol]**.

9.1.5 Attribute `title`

The `title` attribute MAY be present and provides human-readable, possibly language-dependent, and not necessarily unique information about the link. ~~It has no implied semantics in OData.~~

10 Media Entity

Media entities (in AtomPub: media link entries, see **[RFC5023]**) are entities that describe and link to a media resource.

Example 26:

```
<entry>
  <id>http://host/service/Employees(6)</id>
  ...
  ...
  <link rel="edit-media" title="Employee" href="Employees(6)/$value"/>
  <content type="image/jpeg" src="Employees(6)/$value"/>
  <metadata:properties>
    <data:ID metadata:type="Int32">6</data:ID>
    ...
  </metadata:properties>
</entry>
```

10.1 Element `atom:link`

A media entity MAY contain an `atom:link` element with a `rel` attribute of "`edit-media`" to specify a URL that can be used to write to the BLOB associated with the entity. The attributes `rel` and `href` MUST be used as described in the following subsections.

10.1.1 Attribute `rel`

The `rel` attribute MUST be present and MUST have the string "`edit-media`" as value.

10.1.2 Attribute `href`

The `href` MUST be present and its value MUST specify the URL that can be used to write the stream. This URL may be relative or absolute.

10.2 Element `atom:content`

For media entities the `atom:content` element MUST be empty. Properties of the media entity are represented by the `metadata:properties` element as a sibling to, rather than a child of, the `atom:content` element.

10.2.1 Attribute `src`

The `atom:content` element MUST contain a `src` attribute and the value of the `src` attribute MUST be a URL that can be used to retrieve the content of the media resource.

10.2.2 Attribute `type`

The `atom:content` element MUST specify a `type` attribute that SHOULD contain the MIME type of the media resource.

11 Individual Property

A valid OData payload may consist of a single ~~primitive or complex~~primitive or complex value, or of a collection of these.

A single-valued property that has the `null` value does not have a representation, see **[OData-Protocol]**.

11.1 Single Scalar Value

~~For example, a request for the first name of a given customer may return the following payloads:~~

Example 27: string value

```
<value xmlns="http://docs.oasis-open.org/odata/ns/metadata"
       context="http://host/service/$metadata#Edm.String">CEO</value>
```

~~or~~

Example 28: primitive `null` value:

```
<metadata:value xmlns:metadata=="="http://docs.oasis-
open.org/odata/ns/metadata"
                metadata:context="http://host/service/$metadata#Edm.Date"
                metadata:null="true" />
```

~~Similarly, the following payload represents a full name:~~

Example 29: complex value

```
<metadata:value metadata:type="HumanResources="#Model.Address"
          metadata:context="http://host/service/$metadata#Model.Address"
          xmlns:metadata="http://docs.oasis-open.org/odata/ns/metadata"
          xmlns="http://docs.oasis-open.org/odata/ns/data">
   <FirstName>Julie</FirstName>
   <LastName>Swansworth</LastName>
  <Street>Obere Str. 57</Street>
  <City>Berlin</City>
  <Region metadata:null="true"/>
  <PostalCode>D-12209</PostalCode>
</metadata:value>
```

11.1.1 Element `metadata:value`

Single scalar values are represented as a `metadata:value` root element that contains the representation of the scalar value. The attributes `metadata:type` and `metadata:null` MUST be used as described in the following subsections.

11.1.1.1 Attribute `metadata:~~metadata~~context`

The `metadata:value` element MUST have a `metadata:context` attribute, defined in the ~~OData Metadata namespace~~OData Metadata namespace, whose value is the ~~metadata~~context URL that describes the element.

For more information on the ~~metadata~~context URL, see **~~[Error! Reference source not found.].~~[OData-Protocol]**.

11.1.1.2 Attribute `metadata:metadata-etag`

The `metadata:value` element MAY have a `metadata:metadata-etag` attribute to specify an ETag ~~that~~for the service's metadata document. It can be used to determine whether the ~~current version~~client's cached copy of the ~~service's~~ metadata document is outdated.

For details on how ETags are used, see **~~[Error! Reference source not found.]~~[OData-Protocol]**.

11.1.1.3 Attribute `metadata:type`

If the type of the scalar value being specified is anything other than `Edm.String` the `metadata:type` attribute MUST be present and specify the namespace - or alias - qualified type of the value.

11.1.1.4 Attribute `metadata:null`

The metadata:null attribute distinguishes null values from other empty content (such as an empty string).

Null-values are represented as an empty `metadata:value` element with a `metadata:null="true"` attribute.

11.2 Collection of Scalar Values

A valid OData payload MAY consist of a collection of primitive or complex properties.

~~For example, the following payload represents a~~Example 30: collection of ~~phone numbers.~~strings

```
<metadata:value
  metadata:context="http://host/service/$metadata#Collection(Edm.String)"
  xmlns:metadata="http://docs.oasis-open.org/odata/ns/metadata~~">~~"
>
  <metadata:element>(203)555-1718</metadata:element>
  <metadata:element>(203)555-1719</metadata:element>
</metadata:value>
```

~~Similarly, the following payload represents a~~Example 31: collection of ~~full names.~~complex values

```
<metadata:value xmlns:metadata="http://docs.oasis-open.org/odata/ns/metadata"
  metadata:context="http://host/service/$metadata#Collection(Model.Address)"
  xmlns="http://docs.oasis-open.org/odata/ns/data~~">~~"
  metadata:type="#Model.BaseAddress"
>
  <metadata:element~~ metadata:type="HumanResources.FullName">~~>
    <~~FirstName>Julie</FirstName>~~Street>Obere Str. 57</Street>
    <~~LastName>Swansworth</LastName>~~City>Berlin</City>
    <PostalCode>D-12209</PostalCode>
  </metadata:element>
  <metadata:element metadata:type~~="HumanResources.FullName~~="#Model.Address">
    ~~<FirstName>Mark</FirstName>~~
    ~~<LastName>Swansworth</LastName>~~
    <Street>12345 Grant Street</Street>
    <City>Taft</City>
    <Region>Ohio</Region>
    <PostalCode>OH 98052</PostalCode>
  </metadata:element>
</metadata:value>
```

11.2.1 Element `metadata:value`

A ~~C~~collection of scalar values is represented as a ~~single~~ `metadata:value` root element that contains a ~~<~~`metadata:element`~~>~~ child element for each ~~member~~item of the collection whose content is an individual ~~primitive~~primitive or ~~complex~~complex value as defined above.

The ~~<~~`metadata:value`~~>~~ element MUST NOT contain a `metadata:null` attribute. The attribute `metadata:type` MUST be used as described in the following subsection.

11.2.1.1 Attribute `metadata:context`

The `metadata:value` element MUST have a `metadata:context` attribute, defined in the OData Metadata namespace, whose value is the context URL that describes the element.

For more information on the context URL, see **[OData-Protocol]**.

11.2.1.2 Attribute `metadata:metadata-etag`

The `metadata:value` element MAY have a `metadata:metadata-etag` attribute to specify an ETag for the service's metadata document. It can be used to determine whether the client's cached copy of the metadata document is outdated.

For details on how ETags are used, see **[OData-Protocol]**.

~~11.2.1.1~~11.2.1.3 Attribute `metadata:type`

The attribute `metadata:type` MUST be present and specify the ~~namespace- or alias-qualified~~ collection type~~.~~ according to the rules described in section 7.3.1.

For collections of complex scalar values this attribute specifies a collection type for the base type of the collection. Individual elements of a derived type MUST specify their derived type~~s~~ with a `metadata:type` attribute on the ~~<~~`metadata:element`~~>~~ element.

12 Collection of Entities

Collections of entities are represented in Atom as an ~~Atom Feed~~`atom:feed` element.

12.1 Element `atom:feed`

Collections of entities are represented using an `atom:feed` Element, where each entity is represented as an ~~`atom:entry` or~~ `atom:entry` or `metadata:ref`~~.~~ element.

12.1.1 Attribute `metadata:`~~`metadata`~~`context`

The `atom:feed` element~~, it~~ MUST have a `metadata:context` attribute, defined in the ~~OData Metadata namespace~~OData Metadata namespace, whose value is the ~~metadata~~context URL that describes the entity set represented by the feed.

For more information on the ~~metadata~~context URL, see **~~[Error! Reference source not found.]~~[OData-Protocol]**.

12.1.2 Attribute `metadata:metadata-etag`

The `metadata:metadata-etag` attribute MAY appear in an `atom:feed` in order to specify an ETag that can be used to determine the current version of the service's metadata document.

For details on how ETags are used, see **~~[Error! Reference source not found.]~~[OData-Protocol]**.

~~12.1.3~~12.2 Element `atom:id`

~~OData does not add any conventions or semantics beyond [RFC4287] to the~~ The `atom:id` element ~~for feeds~~MUST uniquely identify the collection from which the feed was generated.

~~12.1.4~~12.3 Element `metadata:count`

The `atom:feed` element MAY contain a `metadata:count` element to specify the total count of ~~rows~~entities in the result~~.~~ to the request. This MAY be greater than the number of ~~rows~~entries in the feed, if server-side paging has been applied, in which case the feed MUST include a ~~next results~~next results link~~:~~.

Example 32:

```
<feed xmlns="http://www.w3.org/2005/Atom"
      xmlns:metadata="http://docs.oasis-open.org/odata/ns/metadata
      metadata:context="http://host/service/$metadata#Customers" >
  <metadata:count>42</metadata:count>
  ...
  ...
  <atom:link rel="next"
             href="http://host/service/Customers?$skiptoken=1237"/>
</feed>
```

~~12.1.5~~12.4 Element `atom:link`

~~Atom requires that feeds~~The `atom:feed` element MAY contain a ~~"~~*self link*~~".~~ to allow reread the feed.

The `atom:feed` element MAY contain a *next link* to indicate the presence of additional ent~~r~~ities that belong to the ~~feed.~~ collection.

The `atom:feed` element representing the final page of results ~~may~~MAY contain a *delta link* that can be used to fetch subsequent changes (deltas) to the result.

All three cases are distinguished from another by the value of the rel attribute as described in the following subsection.

~~Note that the actual set of entries contained within the `atom:feed` MAY be a subset of those retrieved using the self link, for example, if filtering has been applied.~~

In a valid OData Atom response Payload the atom:link element representing a *next link* or a *delta link* MAY be positioned after the last `atom:entry` or `metadata:ref` element. This defines an exception to the Atom Specification **[RFC4287]**.

~~12.1.5.1~~12.4.1 Attribute `rel`

A self link is represented as an `atom:link` with a `rel="self"` attribute ~~and an~~. The `href` ~~that can be used to retrieve~~attribute MUST contain the ~~feed from which the current entries are taken. If the feed represents a set of related entities (addressed with a~~ request URL ~~ending in a to-many navigation property, or an inlined feed requested with $expand), the self link MUST identify the specific feed of related entities.~~

~~A self link is represented as an `atom:link` with a `rel="self"` attribute and an `href` that can be used to retrieve the feed from which the current entries are taken. If the feed represents a set of related entities (addressed with a request URL ending in a to-many navigation property, or an inlined feed requested with $expand), the self link MUST identify the specific feed of related entities~~that produced this collection.

A next link is represented as an `atom:link` with a `rel="next"` attribute and an `href` attribute containing a URL that can be used to retrieve the next set of results.

~~*For example, the following `atom:`Example 33: next link element within an `atom:feed` element indicates that additional results can be returned by following the specified `href`:*~~

```
<atom:link rel="next"

href="http://~~myservice/customers~~host/service/Customers?$skiptoken=1237"/>
```

The contents of the `href` attribute SHOULD be treated as an opaque URL that can be used to fetch the next set of results.

A delta link is represented as an `atom:link` element with a `rel` attribute of "`http://docs.oasis-open.org/odata/ns/delta`" and an `href` attribute containing a URL that can be used to retrieve subsequent changes.

~~A delta link is represented as an `atom:link` element with a `rel` attribute of "`http://docs.oasis-open.org/odata/ns/delta`" and an `href` attribute containing a URL that can be used to retrieve subsequent changes.~~

~~For example, the following `atom:link` element within an `atom:feed` element indicates that changes may be retrieved by following the specified `href`:~~

Example 34: delta link

```
<atom:link rel=" http://docs.oasis-open.org/odata/ns/delta"

href="http://~~myservice/customers~~host/service/Customers?$deltatoken=1234"/>
```

The contents of the `href` should be treated as an opaque URL that can be used to fetch subsequent changes.

The delta link MUST only appear on the last page of results. A page of results MUST NOT have both a delta link and a ~~next link.~~next link.

13 ~~Resource~~Entity Reference

~~A resource reference is a reference to an entity or a property of an entity. A resource reference referring to an entity is called an *entity reference*.~~

An entity reference (see **[OData-Protocol]**) MAY take the place of an ~~entity instance~~entity in an Atom payload, based on the client request. The id may be absolute or relative.

~~*For example, the following shows an*~~*Example 35: entity reference to order 10643*~~:~~

```
<metadata:ref ~~ref~~xmlns:metadata="http://~~services.~~docs.oasis-
open.org/odata~~.org/OData/OData.svc~~/ns/metadata"
              metadata:context="http://host/service/$metadata#$ref"
              id="http://host/service/Orders(10643)" />
```

Example 36: collection of entity references

```
<feed xmlns="http://www.w3.org/2005/Atom"
      xmlns:metadata="http://docs.oasis-open.org/odata/ns/metadata"
      metadata:context="http://host/service/$metadata#Collection($ref)" >
  <metadata:ref id="http://host/service/Orders(10643)" />
  <metadata:ref id="http://host/service/Orders(10759)" />
</feed>
```

13.1 Element `metadata:ref`

A reference to an entity or one of its properties is represented in Atom using a `metadata:ref` element. ~~The `ref` attribute MUST be present and used as described in the following subsection.~~

13.1.1 Attribute ~~`ref`~~ `metadata:context`

If the `metadata:ref` element is the root element of a response, it MUST have a `metadata:context` attribute, defined in the OData Metadata namespace, whose value is the context URL that describes the reference. If it is part of an Atom feed, the attribute is optional.

For more information on the context URL, see **[OData-Protocol]**.

13.1.2 Attribute `id`

The ~~`ref`~~`id` attribute MUST be present. For entities the ~~`ref`~~`id` attribute MUST be the ~~`atom:id`~~`atom:id` of the referenced entity~~, for entity properties it MUST~~. It may be ~~the `atom:id` of the entity followed by the resource path segment identifying the property~~relative or absolute.

14 Delta Response

The non-format specific aspects of the delta handling are described in the section “Requesting Changes” in **[OData-Protocol]**.

Responses from a delta request are returned as an ~~atom:feed~~atom:feed. The feed MUST contain all added, changed, or deleted entities, as well as ~~added~~ added or deleted links between entities, and MAY contain additional, unchanged entities.

All added, changed, or deleted entities and links, including related entities, are returned as direct children of the ~~atom:feed~~atom:feed element.

Entities that are not part of the entity set specified by the ~~value of metadata:metadata MUST include the metadata:metadata~~metadata:context attribute in the atom:~~id~~feed element MUST include a metadata:context attribute in the atom:entry element to specify the entity set of the related entity.

If the delta response contains a partial list of changes, it MUST include a next link for the client to retrieve the next set of changes.

~~If the delta response contains a partial list of changes, it MUST include a next link for the client to retrieve the next set of changes.~~

~~Changes are generally ordered by the service according to when the last change occurred to an entity, but MUST be ordered such that applying all changes across all pages, in order, to the initial set yields a consistent result.~~

The last page of a delta response SHOULD contain a delta link for retrieving subsequent changes once the current set of changes has been applied to the initial set.

If the response from the delta link contains ~~an~~a ~~inlinecount,~~metadata:count element, the returned ~~count is the count of~~number MUST include all added, changed, or deleted entities~~. $count and $inlinecount returned from a delta link do not include~~, as well as added or deleted links.

~~The following example shows the following ordered changes:~~

Example 37: delta response with five changes, in order of occurrence

~~1.~~• *ContactName for customer 'BOTTM' was changed to "Susan Halvenstern"*

~~2.~~• *Order 10643 was removed from customer 'ALFKI'*

~~3.~~• *Order 10645 was added to customer 'BOTTM'*

~~4.~~• *The shipping information for order 10643 was updated*

~~5.~~• *Customer 'ANTON' was deleted*

```
<?xml version="1.0" encoding="utf-8" standalone="yes" ?>
<feed
xml:base="http://northwinddelta.cloudapp.net/DeltaService.svchost/service/"
      xmlns:data="http://docs.oasis-open.org/odata/ns/data"
      xmlns:metadata="http://docs.oasis-open.org/odata/ns/metadata"
      xmlns="http://www.w3.org/2005/Atom"
      xmlns:at="http://purl.org/atompub/tombstones/1.0"->
      metadata:context="$metadata#Customers/$delta">
  <title type="text">Customers</title>
  <id>http://DeltaService.svchost/service/Customers</id>
  <updated>2011-02-16T01:002012-11-27T15:38:25Z</updated>
 <link rel="self" title="Customers" href="Customers" />
  <metadata:count>5</metadata:count>
  <entry>
    <id>http://DeltaServicehost/service/Customers('BOTTM')</id>
    <title type="text" />
    <updated>2011-02-16T01:00:25Z2012-11-17T15:38:22Z</updated>
    <author><name /></author>
```

```
    <link rel="edit" title="Customer" href="Customers('BOTTM')"/>
    <category term="NorthwindModelModel.Customer"
              scheme="http://docs.oasis-open.org/odata.org/ns/scheme"/>
    <content type="application/xml">
      <metadata:properties>
   d      <data:ContactName>Susan Halvenstern</ddata:ContactName>
      </metadata:properties>
    </content>
  </entry>
  <metadata:deleted-link-entry
    metadata:context="$metadata#Orders/$deleted-link"
    source="http://DeltaServicehost/service/Customers('ALFKI')"
    relationship="Orders"
    target="http://DeltaServicehost/service/Orders(10643)")"/>
   when="2011-02-16T01:00:25Z"/>
 <metadata:link-entry
    metadata:context="$metadata#Customers/$link"
    source="http://DeltaServicehost/service/Customers('BOTTM')"
    relationship="Orders"
    target="http://DeltaServicehost/service/Orders(10645)")"/>
  when="2011-02-16T01:00:25Z"/>
-<entry metadata:context="$metadata-"#Orders/@Element/$entity">
   <id>http://DeltaServicehost/service/Orders('10643')</id>
   <title type="text" />
   <updated>2011-02-16T01:00:25Z2012-11-27T15:38:24Z</updated>
   <author><name/></author>
   <link rel="edit" title="Order" href="Orders('10643')" />
   <category term="NorthwindModelModel.Order"
             scheme="http://docs.oasis-open.org/odata.org/ns/scheme" />
   <content type="application/xml">
     <metadata:properties>
    <d:ShipName>Bottom-Dollar Markets</d:ShipName>
    <d:ShipAddress       <data:ShippingAddress>
         <data:Street>23 Tsawassen Blvd.</d:ShipAddressdata:Street>
    <d:ShipCity      <data:City>Tsawassen</d:ShipCitydata:City>
    <d:ShipRegion      <data:Region>BC</d:ShipRegiondata:Region>
    <d:ShipPostalCode      <data:PostalCode>T2F
8M4</d:ShipPostalCodedata:PostalCode>
    <d:ShipCountry>Canada</d:ShipCountry>
       </data:ShippingAddress>
    </metadata:properties>
   </content>
  </entry>
  <at:deleted-entry
    metadata:context="$metadata#Customers/$deleted-entry"
    ref="http://DeltaServicehost/service/Customers('ANTON')"
    when="2011-02-16T01:00:30Z2012-11-27T15:38:25Z"
    metadata:reason="deleted"/>
  <link
    rel="http://docs.oasis-open.org/odata.org/deltaLink"/ns/delta"

href="http://DeltaServicehost/service/Customers?$expand=orders&$Orders&amp;$de
ltatoken=8015"/>
</feed>
```

14.1 Added/Changed Entity

Added or changed entities within a delta response are represented as `atom:entry` elements.

Added or changed entities MUST NOT include ~~inline content~~inline content.

Added entities MUST include all selected properties and MAY include additional, unselected properties. Collection-valued properties are treated as atomic values; any collection-valued properties returned from a delta request MUST contain all current values for that collection.

Added entities MUST include ~~navigation links~~navigation links.

Changed entities MUST include all selected properties that have changed and MAY include additional properties.

Entities whose set cannot be determined from the ~~metadata~~context URL of the feed MUST include the `metadata:`~~`metadata`~~`context` attribute in the ~~`atom:entry`~~`atom:entry` element to specify the ~~metadata URL of the entity (in this metadata URL specifies the~~ set~~,~~ that the entity belongs to~~).~~. This ~~metadata~~context URL MAY be absolute or relative to the ~~metadata~~context URL of the feed.

14.2 Deleted Entity

14.2.1 Element `atom-tombstone:deleted-entry`

A deleted entit~~i~~y within a delta response is represented as an `atom-tombstone:deleted-entry` element, defined within the Atom Tombstone namespace, as defined in **[RFC6721]**.

The `ref` and a `when` attribute MUST be present, the `metadata:reason` attribute MAY be present. All attributes have to be used as described in the following subsection.

14.2.1.1 Attribute `ref`

As defined in **[RFC6721]**, the `ref` attribute MUST be present. The value of the `ref` attribute MUST specify the ~~`atom:id`~~`atom:id` of the deleted entry. It may be relative or absolute.

14.2.1.2 Attribute `when`

As defined in **[RFC6721],** the `when` attribute MUST be present ~~The value of the `when` attribute MUST~~to specify the time at which the entity was deleted. ~~The value may~~This attribute is not used in OData and MAY be set to the time the ~~empty string~~delta response was generated if the service ~~is unable to determine the time at which the deletion occurred.~~does not track when deletions occur. OData clients MUST NOT assume any semantics around this value.

14.2.1.3 Attribute `metadata:reason`

The `metadata:reason` attribute MAY be present. The value of the `metadata:reason` attribute MUST specify the string value "`deleted`", if the entity was deleted (destroyed), or "`changed`" if the entity was removed from membership in the result (i.e., due to a data change).

14.3 Added Link

14.3.1 Element `metadata:link`~~`-entry`~~

A ~~L~~link within a delta response is represented by a `metadata:link`~~`-entry`~~ element.

A ~~Delta Response~~delta response MUST contain a `metadata:link`~~`-entry`~~ for each added link that corresponds to a `$expand` path in the initial request.

The ~~`source, relationship,`~~`source, relationship,` and ~~`target`~~`target` attribute MUST be present~~, the `when` attribute MAY be present~~. All attributes have to be used as described in the following subsection.

14.3.1.1 Attribute `source`

The `source` attribute MUST be present and specify the ~~`atom:id`~~`atom:id` of the entity from which the link originates. It may be relative or absolute.

14.3.1.2 Attribute `relationship`

The `relationship` MUST be present and specify the name of the navigation property on the ~~source~~`source` entity for which the link exists.

14.3.1.3 Attribute `target`

The `target` attribute MUST be present and specify the ~~`atom:id`~~`atom:id` of the related entity. It may be relative or absolute.

~~14.3.1.4 Attribute `when`~~

~~The `when` attribute MAY be present and specify the time at which the link was created. The attribute MAY be the empty string if the service is unable to determine the time at which the creation occurred.~~

14.4 Deleted Link

14.4.1 Element `metadata:deleted-link~~-entry~~`

A ~~Deleted Link~~deleted link within a delta response is represented as a `metadata:deleted-link~~-entry~~` element.

Delta responses MUST contain a `metadata:deleted-link~~-entry~~` for each deleted link that corresponds to a `$expand` path in the initial request, unless either of the following is true:

- The `source` or `target` entity has been deleted.
- The maximum cardinality of the related entity is one and there is a subsequent ~~`metadata:link-entry`~~`metadata:link` that specifies the same `source` and `relationship`.

The service MAY return a `metadata:deleted-link~~-entry~~` where one of the entitites has also been deleted, or where there is a subsequent ~~`metadata:link-entry`~~`metadata:link` with the same `source` and `relationship` and a maximum cardinality of one for the related end.

~~The `source, relationship`~~The `source, relationship` and ~~`target`~~`target` attribute MUST be present~~, the `when` attribute MAY be present~~. All attributes have to be used as described in the following subsection.

14.4.1.1 Attribute `source`

The `source` attribute MUST be present and specify the ~~`atom:id`~~`atom:id` of the entity from which the link originates. It may be relative or absolute.

14.4.1.2 Attribute `relationship`

The ~~`target`~~`relationship` attribute MUST be present and specify the ~~`atom:id`~~name of the ~~related~~navigation property on the `source` entity for which the link is deleted.

14.4.1.3 Attribute `target`

The `target` attribute MUST be present and specify the ~~`atom:id`~~`atom:id` of the related entity.

~~14.4.1.4 Attribute `when`~~

~~The `when` attribute MAY~~ It may be ~~present and specify the time at which the link was created. The attribute MAY be the empty string if the service is unable to determine the time at which the creation occurred~~relative or absolute.

15 Bound Function

Zero or more functions MAY be ~~bindable~~bound to a ~~feed or entry~~collection of entities or an entity.

The functions associated with a particular ~~feed or entry~~collection of entities or an entity MAY be described using `metadata:function` elements that are direct children of the feed or entry to which the functions can be bound.

~~Example:~~

Example 38: a function bound to an entry:

```
<atom:entry>
  ...
  <metadata:function
    metadata="#DemoService.TopProductsModel.RemainingVacation"

target="http://host/service/Categories(0)/TopProductsEmployees(2)/RemainingVacation"
    title="Best Selling ProductsRemaining Vacation"
/>
  />
  ...
</atom:entry>
```

Example 39: a function bound to a feed:

```
<atom:feed>
  ...
  <metadata:function
    metadata="#Model.RemainingVacation"
    target="http://host/service/Managers(22)/Employees/RemainingVacation"
    title="Remaining Vacation"
  />
  ...
</atom:feed>}
```

15.1 Element `metadata:function`

Each function is represented as a `metadata:function` element that MUST be a child of the ~~atom:feed~~`atom:feed` or ~~atom:entry~~`atom:entry` element representing the collection of entities or the entity on which the function exists.

15.1.1 Attribute `metadata`

The `metadata` attribute MUST be present and specify the namespace-qualified or alias-qualified name of the function, preceded by a `#`.

A function may have multiple overloads with different parameters. If the URL in the `target` attribute of the `metadata:function` element cannot be used to invoke all overloads for the function, then it MUST further be distinguished by appending ~~a~~the parentheses-enclosed, comma-separated ~~ordered~~ list of non-binding parameter ~~type~~ names, ~~enclosed~~see rule `qualifiedFunctionName` in ~~parenthesis. For example, `#Schema.Function(Schema.Product,Edm.String)`.~~**[OData-ABNF]**.

Example~~:~~ 40:

```
<metadata:function

metadata="#DemoService.TopProducts(DemoModel.Category,Edm.StringModel.RemainingVacation(Year)"
```

```
target="http://host/service/~~Categories(0)/TopProducts~~Employees(2)/RemainingVacation"
  title="~~Best-selling products~~"Remaining vacation from year..."
/>
```

15.1.2 Attribute target

The `target` attribute MUST be present and specify the URL to GET from in order to invoke the function.

The first parameter of the function MUST be a binding parameter that is bound to the feed or entity on which the function is specified, and MUST NOT be provided as a separate parameter by the client when invoking the function.

~~15.1.2~~15.1.3 Attribute `title`

The `title` attribute MUST be present and contain a human-readable, possibly language-dependent, and not necessarily unique name for the function, commonly used by clients to describe the function to a user.

16 Bound Action

Zero or more actions ~~may~~MAY be ~~bindable~~bound to a ~~feed~~collection of entities or ~~entry~~an entity.

The actions associated with a particular ~~feed~~collection of entities or ~~entry~~an entity MAY be described using `metadata:action` elements that are direct children of the feed or entry to which the actions can be bound.

~~Example:~~

Example 41: action bound to an entity

```
<atom:entry>
  ...
  <metadata:action
    metadata="#DemoService.OrderProductModel.Approval"

target="http://services.odata.org/OData/OData.svc/Products(1)/OrderProducthost
/service/LeaveRequests(2)/Approval"
    title="OrderApprove Leave Request"
/>
  />
  ...
</atom:entry>
```

Example 42: action bound to a feed

```
<atom:feed>
  ...
  <metadata:action
    metadata="#Model.Approval"
    target="http://host/service/Managers(22)/Inbox/Approval"
    title="Approve All Leave Requests"
  />
  ...
</atom:feed>
```

16.1 Element `metadata:action`

Each action is represented as a `metadata:action` element that MUST be a direct child of the ~~atom:feed~~`atom:feed` or ~~atom:entry~~`atom:entry` element representing the ~~feed~~the collection of entities or the entity on which the action exists.

16.1.1 Attribute `metadata`

The `metadata` attribute MUST be present and specify the namespace-qualified or alias-qualified name of the action element describing the action, preceded by a `#`.

~~This function element name combined with the binding parameter type MUST be unique within the entity container.~~

16.1.2 Attribute `target`

The `target` attribute MUST be present and specify the URL to POST to in order to invoke the action.

~~The `target` attribute MUST be present and specify the URL to POST to in order to invoke the action.~~

The first parameter of the action MUST be a binding parameter that is bound to the feed or entity on which the action is specified, and MUST NOT be provided as a separate parameter by the client when invoking the action.

16.1.3 Attribute `title`

The `title` attribute MUST be present and contain a human-readable, possibly language-dependent, and not necessarily unique name for the action, commonly used by clients to describe the action to a user.

17 Action ~~Parameters~~Invocation

Action parameter values in the request body MUST be encoded as an ~~individual complex scalar value~~individual complex scalar value with the name `parameters` and no `metadata:type` attribute for the `parameters` element.

Each non-binding parameter value specified MUST be encoded as an individual primitive or complex scalar value. The name of the scalar value is the name of the parameter. The value is the parameter value in the XML representation appropriate for its type.

Any parameter values not specified in the request body MUST be assumed to have the ~~default value specified in the service metadata, see **[OData-CSDL]**~~.`null` value.

Example~~:~~ 43:

```
<parameters>
  <param1>42</param1>
  <param2 metadata:type~~=""~~="#Model.Address">
    <Street>One Microsoft Way</Street>
    <Zip>98052</Zip>
  </param2>
  <param3>
    <element>1</element>
    <element>42</element>
    <element>99</element>
  </param3>
  <param4 metadata:null="true"/>
  ~~<!--~~<!-- <param5/> not specified, has ~~default~~null value ~~from $metadata~~-->
<parameters>
```

18 Instance Annotations

Annotations MAY be applied to an instance of a feed, entitry, ~~property~~entity reference, ~~complex scalar value~~complex scalar value, ~~function~~property, navigation property, function, ~~action~~action, added link, deleted link, or error within an Atom payload.

18.1 Element `metadata:annotation`

An instance annotation in Atom is represented as an XML element with the name `Annotation` in the metadata namespace.

The value of the annotation is specified according to the ~~Annotation Value,~~Annotation Value, described below.

18.1.1 Attribute `target`

The `target` attribute MAY be used to specify the annotation target. If the `target` attribute is not specified the target of the annotation is the element represented by the direct parent of the `metadata:annotation` element.

18.1.2 Attribute `term`

The `metadata:annotation` element MUST have a `term` attribute that specifies the namespace-qualified or alias-qualified name of the term being applied.

18.1.3 Attribute `metadata:type`

If the type of the annotation value being specified is anything other than `Edm.String` the `metadata:annotation` element MUST contain a `metadata:type` attribute to specify the appropriate type of the annotation value.

18.1.4 Attribute `metadata:null`

Null-valued annotations are represented as empty `metadata:annotation` elements with the `metadata:null="true"` attribute.

The `metadata:null` attribute distinguishes null values from other empty content (such as an empty string).

The absence of the `metadata:null` attribute is equivalent to specifying `metadata:null="false"`.

18.2 Annotation Value~~s~~

An instance annotation value may be specified as a primitive value, ~~structured value~~collection value, or ~~collection value~~structured value.

18.2.1 Primitive Value~~s~~

When specified in the content of an annotation element representing a primitive value, the content MUST be formatted as per ~~Primitive Types in Atom.~~Primitive Types in Atom. If the type of the annotation value is anything other than `Edm.String`, then the annotation element MUST contain the `metadata:type` attribute specifying the appropriate primitive type.

~~For example; the following annotates the "Phone" property with a string value of "Home" for the "PhoneNumberType" annotation term.~~

Example 44:

```
<entry>
  <id>Customers('ALFKI')</id>
  <content>
    <metadata:properties>
      <data:CustomerIDID>ALFKI</data:CustomerIDID>
      <data:ContmpactnyName>Alfreds Futterkiste</data:ContmpactnyName>
  <data:Phone>030-0074321</data:Phone>
    </metadata:properties>
  </content>
  <metadata:annotation
term="com.contoso.PersonalInfo.PhoneNumberTypedisplay.highlight"

target="Phone">Homemetadata:type="Boolean">true</metadata:annotation>
</metadata:propertiesentry>
```

18.2.2 Collection Values

The content of an element representing a collection-valued annotation MUST be the individual elements of that collection formatted as direct child elements of the `metadata:annotation` element as described in Collections of Primitive or Complex Scalar Values.Collections of Primitive or Collection of Complex Scalar Values.

For collection-valued annotations, the annotation element MUST contain the `metadata:type` attribute specifying the appropriate collection type.

For example, the following annotates the customer instance with two phone numbers.

Example 45:

```
<entry>
  <id>Customers('ALFKI')</id>
  <content>
    <metadata:properties>
      <data:CustomerIDID>ALFKI</data:CustomerIDID>
      <data:ContmpactnyName>Alfreds Futterkiste</data:ContmpactnyName>
        <data:Phone>030-0074321</data:Phone>
  </metadata:properties>
  </content>
  <metadata:annotation term="com.contoso.PersonalInfo.PhoneNumbers"
                       type="Collection(String)">
    <element>(203)555-1718</element>
    <element>(203)555-1719</element>
  </metadata:annotation>
</entry>
```

18.2.3 Structure Annotations

18.2.3 Structured Value

The content of an element representing a structured annotation MUST be a single child element for each property of the annotation type being specified, formatted as per properties within an entity type.properties within an entity type.

For structural-valued annotations, the annotation element MUST contain the `metadata:type` attribute specifying the appropriate structural type.

For example; the following specifies the `StreetAddress`, `City`, `Region`, `Country` and `PostalCode` properties of an `Address` annotation applied to a customer entity:

Example 46:

```
<entry>
  <id>Customers('ALFKI')</id>
  <link rel="http://docs.oasis-open.org/odata/ns/related/Orders"
        href="Customers('ALFKI')/Orders"
        type="application/atom+xml;type=feed"
        title="List of Orders">
    <metadata:annotation term="com.contoso.display.style"
                         metadata:type="#com.contoso.display.styleType">
      <data:order metadata:type="Int32">2</data:order>
    </metadata:annotation>
  </link>
  <content>
    <metadata:properties>
      <data:CustomerID>ALFKI</data:CustomerID>
      <data:CompanyName>Alfreds Futterkiste</data:CompanyName>
      <metadata:annotation term="com.contoso.display.style"
                           target="CompanyName"
                           metadata:type="#com.contoso.display.styleType">
        <data:Phone>030-0074321</data:Phone>
        <data:title metadata:type="Boolean">true</data:title>
        <data:order metadata:type="Int32">1</data:order>
      </metadata:annotation>
    </metadata:properties>
  </content>
  <metadata:annotation term="com.contoso.Locations.Address"
                       type="Locations.Address">
    <data:StreetAddress>Obere Str. 578</data:StreetAddress>
    <data:City>Toronto</data:City>
    <data:Region metadata:null="true"/>
    <data:PostalCode>12209</data:PostalCode>
    <data:Country>Germany</data:Country>
  </metadata:annotation>
<entry>
```

18.3 Instance Annotation Target~~s~~

Instance annotations ~~may~~MAY target model elements represented by a feed, enti~~t~~ry, ~~complex scalar value~~complex scalar value, property, ~~function~~navigation property, function, action, or error ~~element in~~within an Atom payload.

18.3.1 Feed

When annotating a feed, annotation elements MUST be direct children of the ~~atom:feed~~`atom:feed` element, and they MUST appear in a group at the beginning of the feed or (another) group at the end of the feed, depending on whether they are needed beforehand to understand the feed content, or can only be computed after serializing the feed content.

18.3.2 Entry

When annotating an entity, the annotation element MUST be a direct child of the `atom:entry` element representing the entity.

~~18.3.3 Complex Type~~

18.3.3 Entity Reference

When annotating an ~~instance of a complex type~~entity reference, the annotation element MUST be a direct child of the ~~metadata:value~~`metadata:ref` element.

18.3.4 Complex Type

When annotating an instance of a complex type, the annotation element MUST be a direct child of the metadata:value element representing the complex-typed value.

~~18.3.4~~18.3.5 Property

When annotating a property, the annotation element MUST be a direct child of the ~~metadata:properties~~`metadata:properties` element, or a direct child of the element representing a ~~complex type~~complex type in the case of annotating the property of a complex type. The value of the ~~`target`~~ `target` attribute MUST specify the name of the property being annotated. The annotation elements MUST immediately precede the target property element.

Instance annotations are not supported when serializing single primitive properties in XML as described in ~~Individual Primitive or Complex Scalar Values~~Individual Primitive or Complex Scalar Values.

~~18.3.5~~18.3.6 Navigation Property

When annotating a navigation property, ~~named~~ stream property, or other element represented by an ~~`atom:link`~~`atom:link` element, the annotation element must be a direct child of the `atom:link` element.

~~18.3.6~~18.3.7 Function or Action

When annotating a function or action, the annotation element must be a direct child of the ~~element representing~~`metadata:function` or `metadata:action` element.

18.3.8 Added Link or Deleted Link

When annotating an added or deleted link in a delta response, the ~~function or action~~annotation element must be a direct child of the `metadata:link` or `metadata:deleted-link` element.

~~18.3.7~~18.3.9 Error

When annotating an error, the `metadata:annotation` element MUST be a direct child of the `metadata:error` element. The annotation element MAY have a ~~`target`~~ `target` attribute value of ~~"code", "message",~~"code", "message", or ~~"innererror".~~"innererror". If the `target` attribute is not specified, then the annotation is applied to the error itself. The annotation elements MUST follow the other child elements of the error element.

19 Error Reponse

In the case of an error being generated in response to a request specifying an Accept header of `application/xml` or `application/atom+xml`, or that does not specify an Accept header, the service MUST respond with an error formatted as XML.

When formatting error responses as XML, servicers SHOULD include a `Content-Type` response header with the value `"application/xml"`.

19.1 Element `metadata:error`

Errors formatted as XML MUST have a root `metadata:error` element. The `metadata:error` element MUST have at least two child elements: `metadata:code` and `metadata:message`.

In addition, errors may be annotated using custom annotations.

~~For example:~~

Example 47:

```
<error xmlns="http://docs.oasis-open.org/odata/ns/metadata">
  <code>501</code>
  <message>~~Functionality not supported.~~</Unsupported functionality</message>
  <target>query</target>
  <details>
    <detail>
      <code>301</code>
      <message>$search query option not supported~~.~~</</message>
      <target>$search</target>
    </detail>
  </details>
</error>
```

19.2 Element `metadata:code`

The `metadata:error` element MUST contain one `metadata:code` element specifying a service-defined string. This value MAY be used to provide a more specific substatus to the returned HTTP response code.

19.3 Element `metadata:message`

The `metadata:error` element MUST contain a `metadata:message` element specifying a human readable, language-dependent message describing the error. The `Content-Language` header MUST contain the language code from **[RFC5646]** corresponding to the language in which the value for message is written.

19.4 Element `metadata:target`

The `metadata:error` element MAY contain a `metadata:target` element to specify the target of the error (for example, the name of the property in error).

19.5 Element `metadata:details`

The `metadata:error` element MAY contain a `metadata:details` element containing one or more `metadata:detail` elements specifying detail about the error.

19.5.1 Element metadata:detail

The metadata:detail element specifies information about an individual error detail.

19.5.2 Element metadata:code

The metadata:detail element MUST contain one metadata:code element specifying a service-defined string. This value MAY be used to provide a more specific substatus to the returned HTTP response code.

19.5.3 Element metadata:message

The metadata:detail element MUST contain a metadata:message element specifying a human readable, language-dependent message describing the error.

19.5.4 Element metadata:target

The metadata:detail element MAY contain a metadata:~~detail~~target element to specify the target of the error.

19.6 Element metadata:innererror

The metadata:error element MAY contain a metadata:innererror element containing service specific debugging information that might assist a service implementer in determining the cause of an error.

The metadata:innererror element SHOULD only be used in development environments in order to guard against potential security concerns around information disclosure.

20 Extensibility

Implementations MAY add custom content anywhere allowed by **[RFC4287]**, Section 6, “Extending Atom”, and **[RFC5023]**, Section 6.2 “Document Extensibility”. However, custom elements and attributes MUST NOT be defined in the OData Data Namespace nor the OData Metadata Namespace, and SHOULD not be required to be understood by the receiving party in order to correctly interpret the rest of the payload as the receiving party MUST ignore unknown foreign markup according to **[RFC4287]**.

21 Security Considerations

This specification raises no security issues.

This section is provided as a service to the application developers, information providers, and users of OData version 4.0 giving some references to starting points for securing OData services as specified. OData is a REST-full multi-format service that depends on other services and thus inherits both sides of the coin, security enhancements and concerns alike from the latter.

For ATOM-relevant security implications please cf. the relevant sections of **[RFC4287]** (8. Security Considerations), **[RFC5023]** (15. Security Considerations) and for the deleted-entry element: see **[RFC6721]** (7. Security Considerations) as starting points.

~~21~~22 Conformance

Conforming clients MUST be prepared to consume a service that uses any or all of the constructs defined in this specification. The exception to this are the constructs defined in Delta Response, which are only required for clients that request changes

~~The exception~~In order to ~~this are the constructs defined in Delta Response, which are only required for clients that request changes.~~

~~A~~be a conforming consumer of the OData ATOM format, a client or service:

1. MUST be prepared to receive all data types (section 7.1)
   a. defined in this specification (client)
   b. exposed by the service (service)
2. MUST be prepared to receive custom annotations (section 18)
3. MUST be prepared to receive additional constructs not defined in this version of the specification (section 20)

In addition, in order to conform to the OData Atom format, a service:

4. MUST comply with one of the conformance levels defined in **~~[Error! Reference source not found.]~~[OData-Protocol]**

~~In order to conform to the OData Atom format, a service:~~

- 5. MUST support the `application/atom+xml`, `application/xml` and `application/atomsvc+xml` media types in the `Accept` header (section 3)
  - ~~SHOULD support the `$format` system query option~~
- 6. MUST include the ~~next link~~next link in feeds containing partial results (section 12.4)
- 7. MUST return ~~service documents~~ service documents as Atom service documents (section 5)
- 8. MUST return XML responses in well formed XML according to this OData Atom specification
- 9. MUST return well-formed Atom payloads with the ~~following~~ exceptions~~:~~ for the next link and the delta link (section 12.4)
  - ~~The next link MAY be returned at the end of the payload~~
  - ~~The delta link MAY be returned at the end of the payload~~

10. MUST support entity instances with external metadata (section 6.1.2)
11. MUST support properties with externally defined data types (section 11.1.1.3)
- 12. MUST NOT violate any other aspects of this OData Atom specification

~~In order to be a conforming consumer of the OData ATOM format, a client or service:~~

- ~~MUST be prepared to receive all data types~~
  - ~~defined in this specification defined in **[OData-CSDL]** (client)~~
  - ~~exposed by the service (service)~~
- ~~MUST be prepared to receive custom annotations~~
- ~~MUST be prepared to receive additional constructs not defined in this version of the specification~~

13. SHOULD support the `$format` system query option (section 3)

Appendix A. Acknowledgments

The contributions of the OASIS OData Technical Committee members, enumerated in ~~[OData-Protocol]~~**[OData-Protocol]**, are gratefully acknowledged.

Appendix B. Revision History

Revision	Date	Editor	Changes Made
Working Draft 01	2012-08-22	Michael Pizzo	Translated Contribution to OASIS format/template
Committee Specification Draft 01	2013-04-26	Martin Zurmuehl Ralf Handl Michael Pizzo	Expanded error information Added enumerations Fleshed out descriptions and examples and addressed numerous editorial and technical issues processed through the TC Added Conformance section
Committee Specification Draft 02	2013-07-01	Martin Zurmuehl Ralf Handl Michael Pizzo	Improved metadata:type Improved entity references Simplified delta responses GML for Geo types Improved description of primitive value representation Improved examples, aligned with JSON format specification Aligned terms across specifications