

[MS-ESREST]: Excel Services REST Protocol

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Revision Summary

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1 Introduction

The Excel Services REST Protocol extensions to the Atom Publishing Protocol (AtomPub) [\[RFC5023\]](#) and its extensions specified in the Open Data Protocol (ODATA) Specification [\[MS-ODATA\]](#) enable applications to expose spreadsheet data, using common Web technologies, as a data service that can be consumed by clients within corporate networks and across the Internet.

Sections 1.8, 2, and 3 of this specification are normative and can contain the terms MAY, SHOULD, MUST, MUST NOT, and SHOULD NOT as defined in RFC 2119. Sections 1.5 and 1.9 are also normative but cannot contain those terms. All other sections and examples in this specification are informative.

1.1 Glossary

The following terms are defined in [\[MS-GLOS\]](#):

XML
XML namespace

The following terms are defined in [\[MS-OFCGLOS\]](#):

atom feed
cell
data culture
formula
Hypertext Markup Language (HTML)
JavaScript Object Notation (JSON)
list
named range
PivotTable
published item
range
row
site
 slicer
table
UI culture
Uniform Resource Locator (URL)
Web Services Description Language (WSDL)
workbook
workbook file
worksheet
WSDL message
XML schema

The following terms are specific to this document:

cell error value: Any of a number of special values that are returned as a result of an unsuccessful formula calculation.

HTML fragment: Lines of text that adhere to HTML tag rules, as described in [HTML], but do not have processing instructions or any other type of header information.

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

1.2 References

References to Microsoft Open Specifications documentation do not include a publishing year because links are to the latest version of the documents, which are updated frequently. References to other documents include a publishing year when one is available.

1.2.1 Normative References

We conduct frequent surveys of the normative references to assure their continued availability. If you have any issue with finding a normative reference, please contact dochelp@microsoft.com. We will assist you in finding the relevant information. Please check the archive site, <http://msdn2.microsoft.com/en-us/library/E4BD6494-06AD-4aed-9823-445E921C9624>, as an additional source.

[MC-CSDL] Microsoft Corporation, "[Conceptual Schema Definition File Format](#)".

[MS-DPRDL] Microsoft Corporation, "[Report Definition Language Data Portability Overview](#)".

[MS-ODATA] Microsoft Corporation, "[Open Data Protocol \(OData\)](#)".

[MS-RDL] Microsoft Corporation, "[Report Definition Language \(RDL\) File Format Structure Specification](#)".

[RFC1766] Alvestrand, H., "Tags for the Identification of Languages", RFC 1766, March 1995, <http://www.ietf.org/rfc/rfc1766.txt>

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997, <http://www.rfc-editor.org/rfc/rfc2119.txt>

[RFC2616] Fielding, R., Gettys, J., Mogul, J., et al., "Hypertext Transfer Protocol -- HTTP/1.1", RFC 2616, June 1999, <http://www.ietf.org/rfc/rfc2616.txt>

[RFC4287] Nottingham, M., and Sayre, E.R., "The Atom Syndication Format", RFC 4287, December 2005, <http://www.ietf.org/rfc/rfc4287.txt>

[WSDL] Christensen, E., Curbera, F., Meredith, G., and Weerawarana, S., "Web Services Description Language (WSDL) 1.1", W3C Note, March 2001, <http://www.w3.org/TR/2001/NOTE-wsdl-20010315>

[XMLNS] Bray, T., Hollander, D., Layman, A., et al., Eds., "Namespaces in XML 1.0 (Third Edition)", W3C Recommendation, December 2009, <http://www.w3.org/TR/2009/REC-xml-names-20091208/>

[XMLSCHEMA1] Thompson, H.S., Beech, D., Maloney, M., Eds., and Mendelsohn, N., Ed., "XML Schema Part 1: Structures", W3C Recommendation, May 2001, <http://www.w3.org/TR/2001/REC-xmlschema-1-20010502/>

[XMLSCHEMA2] Biron, P.V., and Malhotra, A., Eds., "XML Schema Part 2: Datatypes", W3C Recommendation, May 2001, <http://www.w3.org/TR/2001/REC-xmlschema-2-20010502/>

1.2.2 Informative References

[MS-GLOS] Microsoft Corporation, "[Windows Protocols Master Glossary](#)".

[MS-OFCGLOS] Microsoft Corporation, "[Microsoft Office Master Glossary](#)".

[RFC2818] Rescorla, E., "HTTP Over TLS", RFC 2818, May 2000, <http://www.ietf.org/rfc/rfc2818.txt>

1.3 Overview

This protocol enables protocol clients to access information stored in **workbooks** maintained by a protocol server using common Web technologies. Various types of resources within spreadsheets can be retrieved, such as **ranges**, **tables**, charts, **slicers**, timelines, interactive reports and **PivotTable** reports. The information returned by the protocol can be in one of several formats, such as **HTML**, image, **JavaScript Object Notation (JSON)**, and as an **Atom feed**. This protocol client also allows for values to be inserted into **cells** of the workbook.

A typical scenario for using this protocol is a custom application where workbook data is used as a data source that is connected to other processes that act on that data, such as displaying it in a novel way or taking specific action based on the contents of that data. Another typical scenario for this protocol is in embedding of workbook data into applications that support common Web standards.

1.4 Relationship to Other Protocols

This protocol uses the AtomPub messaging protocol for formatting requests and responses as described in [\[RFC5023\]](#) and URI and Payload extensions to the AtomPub protocol as described in [\[MS-ODATA\]](#). It transmits these messages using the HTTP protocol as described in [\[RFC2616\]](#) or the HTTPS protocol as described in [\[RFC2818\]](#).

The following diagram shows the underlying messaging and transport stack that the protocol uses:

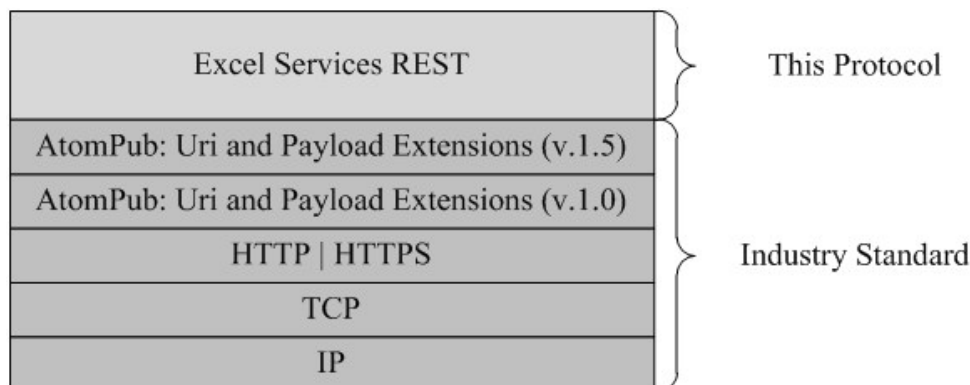


Figure 1: This protocol in relation to other protocols

1.5 Prerequisites/Preconditions

This protocol operates against a **site (1)** that is identified by a **URL** that is known by protocol clients. It is a prerequisite that the client obtain a URL to the server before these extensions can be used.

1.6 Applicability Statement

AtomPub, as described in [\[RFC5023\]](#), in combination with the extensions defined in this document, is appropriate for use in Web services that need a uniform, flexible, general purpose interface for exposing retrieve operations on a data model to clients.

1.7 Versioning and Capability Negotiation

This document covers versioning issues in the following areas:

- **Supported transports:** This document can be implemented on top of the Atom Publishing Protocol as described in section [2.1](#).
- **Protocol versions:** Servers specify the protocol version by using the **X-XLSVersion** response header.

The **X-XLSVersion** response header is present on any response message.

The syntax of the **X-XLSVersion** header is defined as follows:

```
X-XLSVersion= "X-XLSVersion:" VersionNum  
VersionNum= DIGIT *DIGIT "." DIGIT *DIGIT "." DIGIT *DIGIT
```

The **VersionNum** section of the header value states the version of the protocol server.

- **Localization:** This document does not specify any localization-dependent behavior.
- **Capability negotiation:** The protocol that is defined in this document enables limited capability negotiation using the **X-XLSVersion** response header.

On a response from the server to the client, the **X-XLSVersion** header needs to be specified. The value states the version of the protocol the server used to generate the response.

1.8 Vendor-Extensible Fields

None.

1.9 Standards Assignments

None.

2 Messages

2.1 Transport

No new transports are required except for those specified in [\[MS-ODATA\]](#) section 2.1.

2.2 Common Message Syntax

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

2.2.1 Namespaces

This specification defines and references various **XML namespaces** by using the mechanisms specified in [\[XMLNS\]](#). Although this specification associates a specific XML namespace prefix for each XML namespace that is used, the choice of any particular XML namespace prefix is implementation-specific and not significant for interoperability.

Prefix	Namespace URI	Reference
tns	http://schemas.microsoft.com/office/excel/server/webservices	
xs	http://www.w3.org/2001/XMLSchema	[XMLSCHEMA1] [XMLSCHEMA2]
atom	http://www.w3.org/2005/Atom	[RFC4287]

2.2.2 Messages

This specification does not define any common **WSDL message** definitions.

2.2.3 Elements

This specification does not define any common XML schema element definitions.

2.2.4 Complex Types

The following table summarizes the set of common XML schema complex type definitions defined by this specification. XML schema complex type definitions that are specific to a particular operation are described with the operation.

Complex type	Description
Range	A range of cells in a worksheet.
Row	Represents a row (2) in a worksheet .
Cell	Represents a cell in a worksheet.
JSONReference	Represents a reference to an Entity Set.
JSONCollection	Represents a collection of Entities.

2.2.4.1 Range

Represents a range of cells in a worksheet.

2.2.4.1.1 Range XML Value

If **Range** value is used in response **XML**, it MUST conform to the following XML schema.

```
<xs:complexType name="Range">
  <xs:element name="row" type="Row" minOccurs="0" maxOccurs="unbounded"/>
  <xs:attribute name="name" type="string" use="required"/>
</xs:complexType>
```

row: Represents a row (2) from the spreadsheet.

name: Contains the name of the range

2.2.4.1.2 Range JSON Value

If **Range** value is used in response XML, it is represented as a JSON object. It has the JSON members listed in the following table.

Member Name	Member Value
name	A JSON string value representing the name of the range. This member MUST be present.
rows	A JSON array representing a collection of row (2) in a worksheet. This member MUST be present.

2.2.4.2 Row

Represents a row(2) in a worksheet.

2.2.4.2.1 Row XML Value

If **Row** value is used in response XML, it MUST conform to the following XML schema.

```
<xs:complexType name="Row">
  <xs:element name="c" type="Cell" minOccurs="0" maxOccurs="unbounded"/>
</xs:complexType>
```

c: Represents a cell in the worksheet. The number of **c** elements inside a **row** element MUST be the same for all **row** elements inside the same **range** element

2.2.4.2.2 Row JSON Value

If **Row** value is used in response JSON text, it MUST conform to JSON array representation format. The JSON array representing the **Row** SHOULD contain **Cell** objects.

2.2.4.3 Cell

Represents a cell in a worksheet.

2.2.4.3.1 Cell XML Value

If **Cell** value is used in response XML, it MUST conform to the following XML schema.

```
<xs:complexType name="Cell">
  <xs:element name="fv" xsi:type="xs:string" minOccurs="0" maxOccurs="1"/>
  <xs:element name="v" xsi:type="xs:anyType" minOccurs="0" maxOccurs="1"/>
</xs:complexType>
```

fv: Represents a cell formatted using a **number format** according to how the worksheet cell is number formatted in the workbook value in a cell. If the **v** element is present and the **xsi:type** attribute on it is set to "string" then this element MUST NOT be present. MUST NOT be present if the cell is empty.

v: Represents the value of the cell. The **xsi:type** attribute MUST be set to either "double" (as the default), "Boolean", "String" or "Error". If the **xsi:type** attribute is set to "Error", the value of the cell MUST be one of values defined in Error type (section [2.2.5.1](#)). MUST be present if the cell is not empty

2.2.4.3.2 Cell JSON Value

If **Cell** value is used in response JSON text, it MUST conform to JSON object value representation format. It has the JSON members listed in the following table.

Member Name	Member Value
v	A JSON value representing the value of the cell. The type of the JSON value is one of the intrinsic JSON types – string, number or boolean. MUST NOT be present if the cell is empty or the cell is an error.
fv	A JSON string value representing a cell formatted using a number format according to how the worksheet cell is number formatted in the workbook value in a cell. MUST NOT be present if the type of v member is JSON string.
t	A JSON string value representing the type of data in a cell. MUST be present and set to "error" if the cell is an error. MUST NOT be present if the cell is empty.

2.2.4.4 JSONReference

Represents a reference to an Entity Set in a workbook.

If **JSONReference** value is used in response JSON text, it MUST conform to JSON object value representation format. It has the JSON member listed in the following table.

Member Name	Member Value
baseUri	A JSON string value representing the URL that is used to access the Entity Set using the default Entity Set representation. The default representation is XML for Entity Sets accessed in the context of Model Entity Set . The default representation is JSON for Entity Sets accessed in the context of Session Entity Set .
jsonUri	A JSON string value representing the URL that is used to access the Entity Set using the

Member Name	Member Value
	JSON representation.

2.2.4.5 JSONCollection

Represents a collection of Entities.

If **JSONCollection** value is used in response JSON text, it MUST conform to JSON object value representation format. It has the JSON member listed in the following table.

Member Name	Member Value
items	A JSON array representing a collection of objects of the same type.

2.2.5 Simple Types

The following table summarizes the set of common XML schema simple type definitions defined by this specification. XML schema simple type definitions that are specific to a particular operation are described with the operation.

Simple type	Description
Error	An enumeration of the set of cell error values that a worksheet cell can contain.

2.2.5.1 Error

The **Error** type is an enumeration of the set of cell error values that a worksheet cell can contain.

This simple type is defined as follows.

```
<xs:simpleType name="Error">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Div0"/>
    <xs:enumeration value="Name"/>
    <xs:enumeration value="Num"/>
    <xs:enumeration value="Value"/>
    <xs:enumeration value="NotApplicable"/>
    <xs:enumeration value="Null"/>
    <xs:enumeration value="Ref"/>
  </xs:restriction>
</xs:simpleType>
```

The following table specifies the allowable values for Error:

Value	Meaning
Div0	Worksheet cell contains a number that is divided by 0.
NotApplicable	Worksheet cell contains a value not available to a formula .
Name	Worksheet cell contains text not recognized by a formula.

Value	Meaning
Null	Worksheet cell contains an empty intersection of two areas.
Num	Worksheet cell contains invalid numeric values in a formula.
Ref	Worksheet cell contains a reference that is not valid.
Value	Worksheet cell contains a formula that includes worksheet cells that contain different data types.

2.2.6 Attributes

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

2.2.7 Groups

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

2.2.8 Attribute Groups

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

2.2.9 Common Data Structures

This specification does not define any common XML schema data structures.

3 Protocol Details

3.1 Server Details

3.1.1 Abstract Data Model

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

The relationship between the Excel Services REST Protocol data model and the Entity Data Model defined in [\[MC-CSDL\]](#) are described as follows. The mapping between Entity Data Model concepts and those of the AtomPub specification is described in [\[MS-ODATA\]](#) section 2.2.1. The described relationship is provided to facilitate the explanation of how the protocol behaves. This document does not mandate that implementations adhere to this model, as long as their external behavior is consistent with the behavior described in [\[MS-ODATA\]](#) and [\[MC-CSDL\]](#).

Spreadsheet data structure	Description	Entity Data Model term
Model	Information about the spreadsheet.	EntitySet
Session	Information about a view session to be created on the protocol server.	EntitySet
Ranges	The list of ranges that are exposed by the spreadsheet.	EntitySet
Charts	The list of charts that are exposed by the spreadsheet.	EntitySet
Tables	The list of tables that are exposed by the spreadsheet.	EntitySet
PivotTables	The list of pivot tables that are exposed by the spreadsheet.	EntitySet
Range	A range from the spreadsheet.	Entity
Table	A table from the spreadsheet.	Entity
PivotTable	A PivotTable from the spreadsheet.	Entity
Chart	A chart from the spreadsheet.	None. Returned as a binary response to the request.
OData	The OData service document, as specified in [MS-ODATA] .	None. This is the OData service document, as specified in [MS-ODATA] .
Sessions	The entry point for creating a view session on the protocol server.	EntitySet
Slicers	The list of slicers that are exposed by the spreadsheet.	EntitySet

Spreadsheet data structure	Description	Entity Data Model term
Slicer	A slicer from the spreadsheet.	Entity
Timelines	The list of timelines that are exposed by the spreadsheet.	EntitySet
Timeline	A timeline from the spreadsheet.	Entity
_unsupported_InteractiveReports	The list of interactive reports that are exposed by the workbook.	EntitySet
Store	The Store data of interactive reports exposed by the workbook.	Entity
ConnectionInfo	The ConnectionInfo data of interactive reports exposed by the workbook.	Entity
State	The sort operations on PivotTables that are exposed by the workbook.	Entity

When the **\$format** (as specified in [\[MS-ODATA\]](#) section 2.2.3.6.1.5) Uniform Resource Locator (URL) parameter is specified, it overrides the logic specified in [\[MS-ODATA\]](#) with relation to the ACCEPT HTTP header. When there are multiple response formats that satisfy the ACCEPT HTTP header, if one of the content types corresponds to the default format for the **EntityType** or **EntitySet**, that is the one that will be returned. If none of the content types specified in the ACCEPT HTTP header is the default one, the protocol server MUST return the supported format with the highest priority in the ACCEPT HTTP header.

Requests can contain a URL parameter where the key starts with "Ranges(" and ends with ")" (case insensitive), between these two strings, the key will contain a string that refers to a range. When such a parameter is passed, the protocol server MUST place the value associated with the parameter in the spreadsheet range specified by the parameter and recalculate the spreadsheet before returning the result from the same spreadsheet. The range specified in the parameter MUST correspond to a single cell in the spreadsheet.

Model and **Session** Entities Sets are also used as contexts for other entities in the workbook. An entities is said to be "in the context" of **Model** or **Session** if the URL path used to access the entities is respectively using the /Model or /Session URL path part.

Unless specified otherwise, all access to the above entities MUST use HTTP GET verb. Whenever PUT or DELETE verbs are specified, calling these verbs needs to be implemented through the usage of HTTP tunneling technique. Such technique requires that HTTP POST verb is used with **X-HTTP-Method** request header with the value of "PUT" or "DELETE" respectively.

3.1.1.1 Model Entity Set

The Model entity set represents the spreadsheet as a whole.

The protocol server will return a value as follows:

- If a URL parameter with a key of "\$format" and value of "workbook" is passed, or the ACCEPT HTTP header, as specified in [\[RFC2616\]](#), fits one of the following content types: "application/vnd.openxmlformats-officedocument.spreadsheetml.sheet", "application/vnd.ms-excel.sheet.binary.macroEnabled.12" or "application/vnd.ms-excel.sheet.macroEnabled.12", then the protocol server will return a **workbook file**.

- If a URL parameter with a key of "\$format" and value of "json" is passed, accessing **Model** Entity Set will result in JSON text returned. This JSON text represents the list of other Entity Sets supported by the spreadsheet. The following table lists the JSON members.

Member Name	Member Value
Ranges	A JSONReference object representing ranges in the worksheet and referencing the corresponding Ranges Entity Set .
Charts	A JSONReference object representing charts in the worksheet and referencing the corresponding Charts Entity Set .
Tables	A JSONReference object representing tables in the worksheet and referencing the corresponding Tables Entity Set .
pivotTables	A JSONReference object representing PivotTables in the worksheet and referencing the corresponding PivotTables Entity Set .

- Otherwise, accessing The Model Entity Set as an entity set as specified in [\[MS-ODATA\]](#) will result in the list of other entity sets supported by the spreadsheet. The protocol server returns an **EntitySet** containing 4 entity sets, as follows:
 - An entity set with the **category** element present, as specified in [\[MS-ODATA\]](#) section 2.2.6.2.1, with the **term** attribute set to "ExcelServices.Ranges" which represents the ranges in the workbook.
 - An entity set with the **category** element present, as specified in [\[MS-ODATA\]](#) section 2.2.6.2.1, with the **term** attribute set to "ExcelServices.Charts" which represents the charts in the workbook.
 - An entity set with the **category** element present, as specified in [\[MS-ODATA\]](#) section 2.2.6.2.1, with the **term** attribute set to "ExcelServices.Tables" which represents the tables in the workbook.
 - An entity set with the **category** element present, as specified in [\[MS-ODATA\]](#) section 2.2.6.2.1, with the **term** attribute set to "ExcelServices.PivotTables" which represents the PivotTables in the workbook.

3.1.1.2 Session Entity Set

The Session entity set represents a view session that was created as described in section [3.1.1.10](#). All requests to a Session entity set, or other entities accessed in the context of Session, **MUST** specify a URL parameter "\$sid" with the value set to the session identifier returned by the protocol server for a Sessions request.

When accessing the entity using HTTP GET verb, the protocol server will return a value as follows:

- If a URL parameter with a key of "\$format" and value of "json" is passed, accessing **Session** Entity Set will result in JSON text returned. This JSON text represents the list of other Entity Sets supported by the spreadsheet. It has the JSON members listed in the following table.

Member Name	Member Value
Ranges	A JSONReference object representing ranges in the worksheet and referencing the corresponding Ranges Entity Set .

Member Name	Member Value
Charts	A JSONReference object representing charts in the worksheet and referencing the corresponding Charts Entity Set .
Tables	A JSONReference object representing tables in the worksheet and referencing the corresponding Tables Entity Set .
pivotTables	A JSONReference object representing PivotTables in the worksheet and referencing the corresponding PivotTables Entity Set .
Slicers	A JSONReference object representing slicers in the worksheet and referencing the corresponding Slicers Entity Set .
Timelines	A JSONReference object representing timelines in the worksheet and referencing the corresponding Timelines Entity Set .
_unsupported_InteractiveReports	A JSONReference object representing interactive reports in the workbook and referencing the corresponding _unsupported_InteractiveReports Entity Set .

- Otherwise, accessing The Session Entity Set as an entity set as specified in [\[MS-ODATA\]](#) will result in the list of other entity sets supported by the spreadsheet. The protocol server returns an **EntitySet** containing 4 entity sets, as follows:
 - An entity set with the **category** element present, as specified in [\[MS-ODATA\]](#) section 2.2.6.2.1, with the **term** attribute set to "ExcelServices.Ranges" which represents the ranges in the workbook.
 - An entity set with the **category** element present, as specified in [\[MS-ODATA\]](#) section 2.2.6.2.1, with the **term** attribute set to "ExcelServices.Charts" which represents the charts in the workbook.
 - An entity set with the **category** element present, as specified in [\[MS-ODATA\]](#) section 2.2.6.2.1, with the **term** attribute set to "ExcelServices.Tables" which represents the tables in the workbook.
 - An entity set with the **category** element present, as specified in [\[MS-ODATA\]](#) section 2.2.6.2.1, with the **term** attribute set to "ExcelServices.PivotTables" which represents the PivotTables in the workbook.
 - An entity set with the **category** element present, as specified in [\[MS-ODATA\]](#) section 2.2.6.2.1, with the **term** attribute set to "ExcelServices.Slicers" which represents the slicers in the workbook.
 - An entity set with the **category** element present, as specified in [\[MS-ODATA\]](#) section 2.2.6.2.1, with the **term** attribute set to "ExcelServices.Timelines" which represents the timelines in the workbook.

When accessing the entity using HTTP DELETE verb, the protocol server will close the view session and all subsequent attempts to access the same session will fail.

3.1.1.3 Ranges Entity Set

Ranges in the spreadsheet are represented as an **EntitySet**, which contains **Entities** of a single **EntityType** as specified in section [3.1.1.4](#). The **Ranges** entity set represents the list of ranges exposed by the spreadsheet. The protocol server will return a value as follows:

- If a URL parameter with a key of "\$format" and value of "atom" is passed, or is accessed in the context of **Model** Entity Set then the protocol server returns an entity with the category **element** present, as specified in [\[MS-ODATA\]](#) section 2.2.6.2.1, and the **term** attribute set to "ExcelServices.Range" for every **published item** in the workbook that represents a **named range**.
- If a URL parameter with a key of "\$format" and value of "json" is passed, or is accessed in the context of **Session** Entity Set then the protocol server returns JSON text containing **JSONCollection** as defined in section [2.2.4.5](#). The **JSONCollection** represents a list of entities for every published item in the workbook that represents a named range. Each entry in the **JSONCollection** has members listed in the following table.

Member Name	Member Value
name	A JSON string value representing the name of a named range.

3.1.1.4 Range Entity

The Range entity represents a range in the spreadsheet.

The protocol server will return a value as follows:

- If a URL parameter with a key of "\$format" and value of "html" is passed, or the ACCEPT HTTP header, as specified in [\[RFC2616\]](#) fits the content type: "text/html" then the protocol server will return an **HTML fragment** corresponding to the requested range.
- Accessing the Range Entity as an entity as specified in [\[MS-ODATA\]](#) (or with a URL parameter with a key of "\$format" and value of "atom") will result in a single Entity Type containing the complex type **Range** as defined in section [2.2.4.1.1](#) in a **content** element with a **type** attribute set to "application/xml", as specified in [\[MS-ODATA\]](#).
- Accessing the Range Entity with a URL parameter with a key of "\$format" and value of "json" will result in a JSON text containing the complex type **Range** as defined in section [2.2.4.1.2](#).
- Accessing the Range Entity with a URL parameter with a key of "\$format" and value of "image" will result in a PNG image of the requested range. Also, the protocol server supports cropping and scaling the resulting image when optional URL parameters are specified. These parameters are described in the following table:

Parameter Name	Description
\$cropw	An unsigned integer representing the width in pixels used to limit the number of columns of the range of the returned image. The cumulative pixel width of all visible columns in the requested range will be compared with \$cropw . If the cumulative width of a column is equal or exceeds \$cropw , then that column will be last one rendered into the returned image.
\$croph	An unsigned integer representing the height in pixels used to limit the number of rows of the range of the returned image. The cumulative pixel height of all visible columns in the requested range will be compared with \$croph . If the cumulative height of a column is equal or exceeds \$croph , then that row will be last one rendered into the returned image.
\$width	An unsigned integer representing the width in pixels the returned image needs to scale to. The protocol server only provides scaling down and preserves the aspect ratio of the original image and that can cause that the width of the resulting image is smaller than \$width .

Parameter Name	Description
\$height	An unsigned integer representing the height in pixels the returned image needs to scale to. The protocol server only provides scaling down and preserves the aspect ratio of the original image and that can cause that the height of the resulting image is smaller than \$height .

3.1.1.5 Tables Entity Set

Tables in the spreadsheet are represented as an **EntitySet**, which contains **Entities** of a single **EntityType** as specified in section [3.1.1.6](#). The Tables entity set represents the list of tables exposed by the spreadsheet. The protocol server will return a value as follows:

- If a URL parameter with a key "\$format" and value of "atom" is passed, or is accessed in the context of Model Entity Set then the protocol server returns an entity with the category **element** present, as specified in [\[MS-ODATA\]](#) section 2.2.6.2.1, and the **term** attribute set to "ExcelServices.Table" for every published item in the workbook that represents a **list (2)**.
- If a URL parameter with a key of "\$format" and value of "json" is passed, or is accessed in the context of Session Entity Set then the protocol server returns JSON text containing a **JSONCollection** as defined in section [2.2.4.5](#). The **JSONCollection** represents a list of entities for every published item in the workbook that represents a list (2). Each entry in the **JSONCollection** has members listed in the following table.

Member Name	Member Value
name	A JSON string value representing the name of a list (2).

3.1.1.6 Table Entity

The Table entity represents a table in the spreadsheet.

The protocol server will return a value as follows:

- If a URL parameter with a key of "\$format" and value of "html" is passed, or the ACCEPT HTTP header (as specified in [\[RFC2616\]](#)) fits the content type: "text/html", the protocol server will return an HTML fragment representing the requested table.
- Accessing the Table Entity as an entity as specified in [\[MS-ODATA\]](#) (or with a URL parameter with a key of "\$format" and value of "atom") will result in a single **Entity** containing the complex type **Range** as defined in section [2.2.4.1.1](#) in a **content** element with a **type** attribute set to "application/xml", as specified in [\[MS-ODATA\]](#).
- Accessing the Table Entity with a URL parameter with a key of "\$format" and value of "json" will result in a JSON text containing the complex type **Range** as defined in section [2.2.4.1.2](#).

3.1.1.7 PivotTables Entity Set

PivotTables in the spreadsheet are represented as an **EntitySet**, which contains **Entities** of a single **EntityType** as specified in section [3.1.1.8](#). The **PivotTables** entity set represents the list of PivotTables exposed by the spreadsheet. The protocol server will return a value as follows:

- If a URL parameter with a key "\$format" and value of "atom" is passed, or is accessed in the context of Model Entity Set then the protocol server returns an entity with the category **element**

present (as specified in [\[MS-ODATA\]](#) section 2.2.6.2.1) and the **term** attribute set to "ExcelServices.PivotTable" for every published item in the workbook that represents a PivotTable.

- If a URL parameter with a key of "\$format" and value of "json" is passed, or is accessed in the context of Session Entity Set then the protocol server returns JSON text containing **JSONCollection** as defined in section [2.2.4.5](#). The **JSONCollection** represents a list of entities for every published item in the workbook that represents a PivotTable. Each entry in the **JSONCollection** has members listed in the following table.

Member Name	Member Value
Name	A JSON string value representing the name of a PivotTable.

3.1.1.8 PivotTable Entity

The **PivotTable** entity represents a PivotTable in the spreadsheet. The protocol server will return a value as follows:

- If a URL parameter with a key of "\$format" and value of "html" is passed, or the ACCEPT HTTP header, as specified in [\[RFC2616\]](#) fits the content type: "text/html" then the protocol server will return an HTML fragment representing the requested PivotTable.
- Accessing the PivotTable Entity as an entity as specified in [\[MS-ODATA\]](#) (or with a URL parameter with a key of "\$format" and value of "atom") will result in a single Entity Type containing the complex type **Range** as defined in section [2.2.4.1.1](#) in a **content** element with a **type** attribute set to "application/xml", as specified in [\[MS-ODATA\]](#).
- Accessing the PivotTable Entity with a URL parameter with a key of "\$format" and value of "json" will result in a JSON text containing the complex type **Range** as defined in section [2.2.4.1.2](#).

3.1.1.9 Charts Entity Set

Charts in the spreadsheet are represented as an **EntitySet**. The protocol server will return a value as follows:

- If a URL parameter with a key "\$format" and value of "json" is passed, or is accessed in the context of Model Entity Set then the protocol server returns an **entry** element with the **category** element present, as specified in [\[MS-ODATA\]](#) section 2.2.6.2.1, and the **term** attribute set to "ExcelServices.Chart" for every published item in the workbook that represents a chart. Each **entry** element has a **content** element with the **type** attribute set to "image/png" and the **src** attribute set to a URL that will return the image representing the requested chart.
- If a URL parameter with a key of "\$format" and value of "json" is passed, or is accessed in the context of Session Entity Set then the protocol server returns JSON text containing **JSONCollection** as defined in section [2.2.4.5](#). The **JSONCollection** represents a list of entities for every published item in the workbook that represents a Chart. Each entry in the **JSONCollection** has members listed in the following table.

Member Name	Member Value
name	A JSON string value representing the name of a Chart.

When requesting an individual Chart a PNG image is returned. This image can be scaled from its original size by optionally specifying width or height or both. The scaling always maintains the original aspect ratio. In case when both width and height is specified, the protocol server **MUST** fit

the image into the rectangular area defined by those constraints. The protocol server recognizes URL parameters listed in the following table.

Parameter Name	Description
\$width	An unsigned integer representing, in pixels, the desired width of the returned image.
\$height	An unsigned integer representing, in pixels, the desired height of the returned image.

3.1.1.10 Sessions Entity Set

A view session is opened on the protocol server when a request is made to the Sessions Entity Set using a POST. The protocol server recognizes URL parameters listed in the following table.

Parameter Name	Description
\$uc	A language tag, as specified in in [RFC1766] , Section 2. Specifies the UI culture .
\$dc	A language tag, as specified in in [RFC1766] , Section 2. Specifies the data culture .

- If a URL parameter with a key of "\$format" and value of "atom" is passed the content of the Entity Set result is single entity that represents the session. Making a request to the entity URL will return a result as described in section [3.1.1.1](#).
- If a URL parameter with a key of "\$format" and value of "json" is passed, or the ACCEPT HTTP header , as specified in [\[RFC2616\]](#) fits the content type: "application/json" then the protocol server will return a JSON text. It has the JSON members listed in the following table.

Member Name	Member Value
sessionId	A JSON string value representing the session id of the view session created by protocol server.
baseUri	A URL representing the Session Entity.
itemViewerUri	A URL representing an interactive item view for the view session created by the protocol server.

3.1.1.11 Slicers

Slicers in the spreadsheet are represented as an **EntitySet**, which contains **Entities** of a single **EntityType** as specified in section [3.1.1.12](#). The Slicers entity set represents the list of Slicers exposed by the spreadsheet. Slicers can only be accessed in the context of Session Entity Set. If a URL parameter with a key of "\$format" and value of "json" is passed, or the ACCEPT HTTP header, as specified in [\[RFC2616\]](#) fits the content type: "application/json" the protocol server returns JSON text containing a **JSONCollection** as defined in section [2.2.4.5](#). The **JSONCollection** represents a list of entities for every published item in the workbook that represents a Slicer. Each entry in the **JSONCollection** has members listed in the following table.

Member Name	Member Value
name	A JSON string value representing the name of a Slicer.
caption	A JSON string value representing the caption of a Slicer.

Member Name	Member Value
updatesAllowed	A JSON boolean value representing whether the protocol server allows modifying the state of the Slicer as defined in section 3.1.1.12 .
connectedPublishedObjects[]	A JSON array containing JSON string values representing the names of published items whose state would be affected if the selection state of the Slicer is modified.

3.1.1.12 Slicer

The **Slicer** entity represents a Slicer in the spreadsheet. The protocol server supports retrieving the Slicer through HTTP GET verb as well as applying changes to the current state of the slicer through HTTP POST and PUT verbs.

When a request is made using a GET:

- If a URL parameter with a key of "\$format" and value of "json" is passed, or the ACCEPT HTTP header, as specified in [RFC2616](#) fits the content type: "application/json" then the protocol server will return a JSON text representing the items in the requested Slicer. The protocol server recognizes URL parameters listed in the following table.

Parameter Name	Description
\$skip	An unsigned integer representing the index of the first slicer item that is to be returned by the protocol server. If not specified, the default value is 0.
\$top	An unsigned integer representing the maximum number of slicer items that are to be returned by the protocol server. If not specified, the default value is 100. The maximum number of slicer items returned is 100.

The JSON object returned by protocol server has members listed in the following table.

Member Name	Member Value
totalItemCount	A JSON number value representing the total number of items in a Slicer. MUST be present.
ItemOffset	A JSON number value representing the 0-based index of the first item returned in the items array. MUST be present
hasEffectiveSelection	A JSON boolean value representing some of the slicer items are in unselected state. MUST be present.
NextOffset	A JSON number.
Items[]	A JSON array containing data about slicer items.
Items[].displayName	The JSON string value representing the display name of the slicer item.
Items[].uniqueName	The JSON string value representing the unique name of the slicer item. This name MUST be used when programmatic referencing the slicer item in the slicer update operation.
items[].unselected	The JSON boolean value representing that this item has been unselected. Present only when true.

Member Name	Member Value
items[].noData	The JSON boolean value representing that this item has no data. Present only when true.

When a request is made using PUT or POST:

If a URL parameter with a key of "\$format" and value of "json" is passed, or the ACCEPT HTTP header, as specified in [\[RFC2616\]](#) fits the content type: "application/json" then the protocol server interprets the body of the HTTP request as a JSON text. The JSON object expected by protocol server has members listed in the following table.

Member Name	Member Value
parameters	A JSON nested object representing the operation parameters passed to the protocol server. MUST be present.
parameters.selectionMode	A JSON string value representing the way the slicer state needs to be modified. Supports the following string values: <ul style="list-style-type: none"> ▪ cumulative ▪ clearFilter ▪ selectedOnly (this is the default)
parameters.selected[]	A JSON array of JSON string values representing unique names of slicer items that are to be selected. MUST be ignored if the value of selectionMode is set to clearFilter .
parameters.unselected[]	A JSON array of JSON string values representing unique names of slicer items that are not to be selected. MUST be ignored if the value of selectionMode is set to clearFilter or selectedOnly .

3.1.1.13 Timelines

Timelines in the spreadsheet are represented as an **EntitySet**, which contains **Entities** of a single **EntityType** as specified in section [3.1.1.14](#). The Timelines entity set represents the list of timelines exposed by the spreadsheet. The content of the Entity Set result is a JSON formatted array of **Entities** for every published item in the workbook that represents a Timeline. Timelines can only be accessed in the context of Session Entity Set. If a URL parameter with a key of "\$format" and value of "json" is passed, or the ACCEPT HTTP header, as specified in [\[RFC2616\]](#) fits the content type: "application/json" the protocol server returns JSON text containing a **JSONCollection** as defined in section [2.2.4.5](#). The **JSONCollection** represents a list of entities for every published item in the workbook that represents a Timeline. Each entry in the JSONCollection has members listed in the following table.

Member Name	Member Value
name	A JSON string value representing the name of a Timeline.
caption	A JSON string value representing the caption of a Timeline.
connectedPublishedObjects[]	A JSON array containing JSON string values representing the names of published items whose state would be affected if the state of the Timeline is modified.

3.1.1.14 Timeline

The **Timeline** entity represents a timeline in the spreadsheet.

The protocol server supports retrieving the timeline through HTTP GET verb as well as applying changes to the current state of the timeline through HTTP POST and PUT verbs.

When a request is made using a GET:

- If a URL parameter with a key of "\$format" and value of "json" is passed, or the ACCEPT HTTP header, as specified in [\[RFC2616\]](#) fits the content type: "application/json" then the protocol server will return a JSON text representing the items in the requested Timeline. The JSON object returned by protocol server has members listed in the following table.

Member Name	Member Value
minDate	JSON string value representing the minimum date the timeline is defined on (YYYY-MM-DD format). MUST be present.
maxDate	JSON string value representing the maximum date the timeline is defined on (YYYY-MM-DD format). MUST be present.
selectionBeginDate	JSON string value representing the begin date of timeline selected range (YYYY-MM-DD format). MUST not be present if selectionState value is equal to "clearFilter".
selectionEndDate	JSON string value representing the end date of timeline selected range (YYYY-MM-DD format). MUST not be present if selectionState value is equal to "clearFilter".
displayLevel	A JSON string value representing timeline's display level. MUST be present and be set to one of the following string values: <ul style="list-style-type: none">▪ years▪ quarters▪ months▪ days
selectionState	A JSON string value representing timeline's selection state. MUST be present and be set to one of the following string values: <ul style="list-style-type: none">▪ between▪ clearFilter▪ unsupported
displayLabel	The JSON string value representing the descriptive label of the timeline.

When a request is made using PUT or POST:

If a URL parameter with a key of "\$format" and value of "json" is passed, or the ACCEPT HTTP header, as specified in [\[RFC2616\]](#) fits the content type: "application/json" then the protocol server interprets the body of the HTTP request as a JSON text. The JSON object expected by protocol server has members listed in the following table.

Member Name	Member Value
Parameters	A JSON nested object representing the operation parameters passed to the protocol server. MUST be present.
parameters.selectionType	A JSON string value representing the requested selection Type. MUST be present and be set to one of the following string values: <ul style="list-style-type: none"> ▪ between ▪ clearFilter
parameters.selectionBeginDate	A JSON string value representing the selection begin date. Ignored if the value of selectionType is set to clearFilter .
parameters.selectionEndDate	A JSON string value representing the selection end date. Ignored if the value of selectionType is set to clearFilter .

3.1.1.15 _unsupported_InteractiveReports

_unsupported_InteractiveReports in the workbook are represented as an **EntitySet**, which contains items representing each interactive report exposed in the workbook. The content of the Entity Set result is a JSON formatted array of items for every published interactive report in the workbook. _unsupported_InteractiveReports can only be accessed in the context of a Session Entity Set. If a URL parameter with a key of "\$format" and value of "json" is passed, or the ACCEPT HTTP header, as specified in [\[RFC2616\]](#), fits the content type: "application/json", then the protocol server returns JSON text containing a **JSONCollection** as defined in section [2.2.4.5](#). The **JSONCollection** represents a list of interactive reports for every published item in the workbook that represents an interactive report. Each entry in the **JSONCollection** has members listed in the following table.

Member Name	Member Value
sheetName	A JSON string value representing the name (spreadsheet name) of an interactive report.
slideId	A JSON string value representing the identifier of an interactive report slide.

3.1.1.16 Store

Store contains data for interactive reports exposed in the workbook. The content result is a JSON formatted object consisting of properties for every published interactive report in the workbook. Store can only be accessed in the context of _unsupported_InteractiveReports as a sub-resource. If a URL parameter with a key of "\$format" and value of "json" is passed, or the ACCEPT HTTP header, as specified in [\[RFC2616\]](#), fits the content type: "application/json", then the protocol server returns a JSON object. The JSON object contains properties for interactive reports in the workbook. The JSON object has properties listed in the following table.

Member Name	Member Value
correlationId	A GUID representing the correlation identifier.
dataConnectionsInfo	A JSON object containing information about data connections in the workbook.

Member Name	Member Value
dataConnectionsInfo.dataConnectionInfo[]	A JSON array of data connection information.
dataConnectionsInfo.dataConnectionInfo[].connectionName	A JSON string value representing the data connection's connection name.
dataConnectionsInfo.dataConnectionInfo[].connectionString	A JSON string value representing the data connection's connection string.
dataConnectionsInfo.dataConnectionInfo[].dataSourceName	A JSON string value representing the data connection's data source name.
dataConnectionsInfo.dataConnectionInfo[].isEmbedded	A JSON boolean value representing whether the data connection is embedded.
dataConnectionsInfo.dataConnectionInfo[].refreshTimestamp	A JSON string timestamp in ISO 8601 format representing the data connection's last refresh date and time.
dataConnectionsInfo.dataConnectionInfo[].securityToken	A JSON string value representing the data connection's security token.
dataConnectionsInfo.dataConnectionInfo[].slidesIds[]	A JSON array of slide identifiers associated with this data connection.
dataConnectionsInfo.dataConnectionInfo[].sourceIndex	A JSON string value representing the data connection's source index.
dataConnectionsInfo.dataConnectionInfo[].state	A JSON string value representing the data connection state. MUST be set to one of the following string values: <ul style="list-style-type: none"> ▪ Failed ▪ Streaming ▪ Succeeded
dataConnectionsInfo.dataSources	A JSON string value representing the data sources in the workbook.
reportData	A JSON string value representing the report data as specified in [MS-DPRDL] and [MS-RDL] .

3.1.1.17 ConnectionInfo

ConnectionInfo contains data for interactive reports exposed in the workbook. The difference between ConnectionInfo and Store is that ConnectionInfo does not contain reportData for optimization purposes. The content result is a JSON formatted object consisting of properties for every published interactive report in the workbook. ConnectionInfo can only be accessed in the context of `_unsupported_InteractiveReports` as a sub-resource. If a URL parameter with a key of "\$format" and value of "json" is passed, or the ACCEPT HTTP header, as specified in [\[RFC2616\]](#), fits the content type: "application/json", then the protocol server returns a JSON object. The JSON object contains properties for interactive reports in the workbook. The JSON object has properties listed in the following table.

Member Name	Member Value
correlationId	A GUID representing the correlation identifier.
dataConnectionsInfo	A JSON object containing information about data connections in the workbook.
dataConnectionsInfo.dataConnectionInfo[]	A JSON array of data connection information.
dataConnectionsInfo.dataConnectionInfo[].connectionName	A JSON string value representing the data connection's connection name.
dataConnectionsInfo.dataConnectionInfo[].connectionString	A JSON string value representing the data connection's connection string.
dataConnectionsInfo.dataConnectionInfo[].dataSourceName	A JSON string value representing the data connection's data source name.
dataConnectionsInfo.dataConnectionInfo[].isEmbedded	A JSON boolean value representing whether the data connection is embedded.
dataConnectionsInfo.dataConnectionInfo[].refreshTimestamp	A JSON string timestamp in ISO 8601 format representing the data connection's last refresh date and time.
dataConnectionsInfo.dataConnectionInfo[].securityToken	A JSON string value representing the data connection's security token.
dataConnectionsInfo.dataConnectionInfo[].slidesIds[]	A JSON array of slide Ids associated with this data connection.
dataConnectionsInfo.dataConnectionInfo[].sourceIndex	A JSON string value representing the data connection's source index.
dataConnectionsInfo.dataConnectionInfo[].state	A JSON string value representing the data connection state. MUST be set to one of the following string values: <ul style="list-style-type: none"> ▪ Failed ▪ Streaming ▪ Succeeded
dataConnectionsInfo.dataSources	A JSON string value representing the data sources in the workbook.

3.1.1.18 State

State contains data for PivotTables stored in the workbook. The content result is a JSON formatted object representing a PivotTable in the workbook. If a URL parameter with a key of "\$format" and value of "json" is passed, or the ACCEPT HTTP header, as specified in [\[RFC2616\]](#), fits the content type "application/json", then the protocol server returns a JSON object. The JSON object represents a PivotTable in the workbook. The JSON object has properties listed in the following table.

Member Name	Member Value
Name	A JSON string value representing the current rest resource.

Member Name	Member Value
Parent	A JSON string value representing parent level rest resource.
Index	A JSON string value representing rest resource index
ValidatedParameters	A JSON string value representing the name collection of validated parameters.
VerifyMethodsCalled	A JSON boolean value representing whether verified methods are invoked.

3.1.2 Timers

None.

3.1.3 Initialization

None.

3.1.4 Message Processing Events and Sequencing Rules

None.

3.1.5 Timer Events

None.

3.1.6 Other Local Events

None.

4 Protocol Examples

The examples in this section use the following sample data and configuration:

- A site at <http://www.contoso.com> exists.
- A workbook with the title Sales.xlsx exists on the site. The workbook contains the following resources:
 - A table named "SalesProjections".
 - A chart named "CommissionChart".
 - A range named "CommissionRate_Bikes".

4.1 Retrieve the Entity Container for the Content of a Workbook

The following example illustrates the exchange of messages required for a client to retrieve the entity container for the content of the Sales.xlsx workbook.

Request

```
GET /_vti_bin/ExcelRest.aspx/Cycles/Sales.xlsx/Model/ HTTP/1.1
Accept: application/atom+xml
Host: www.contoso.com
```

Response

```
HTTP/1.1 200 OK
Cache-Control: private
Content-Type: application/atom+xml;charset=utf-8
Server: Microsoft-IIS/7.5
SPRequestGuid: 63c0d5ca-8b6e-43bf-92a5-d6ed45210f5b
X-SharePointHealthScore: 4
X-AspNet-Version: 2.0.50727
X-Powered-By: ASP.NET
MicrosoftSharePointTeamServices: 14.0.0.4732
Date: Wed, 20 Jan 2010 19:48:13 GMT
Content-Length: 3158

<?xml version="1.0" encoding="utf-8" standalone="yes"?>
<feed xmlns="http://www.w3.org/2005/Atom"
xmlns:x="http://schemas.microsoft.com/office/2008/07/excelservices/rest"
xmlns:d="http://schemas.microsoft.com/ado/2007/08/dataservice"
xmlns:m="http://schemas.microsoft.com/ado/2007/08/dataservices/metadata">
  <title type="text">Model</title>
  <id>http://www.contoso.com/_vti_bin/ExcelRest.aspx/Cycles/Sales.xlsx/Model/</id>
  <updated>2010-01-20T19:48:13Z</updated>
  <author>
    <name />
  </author>
  <link rel="self"
href="http://www.contoso.com/_vti_bin/ExcelRest.aspx/Cycles/Sales.xlsx/Model/" title="Model"
/>
  <entry>
    <category term="ExcelServices.Ranges"
scheme="http://schemas.microsoft.com/ado/2007/08/dataservices/scheme" />
```

```

<title>Ranges</title>
<id>http://www.contoso.com/_vti_bin/ExcelRest.aspx/Cycles/Sales.xlsx/Model/Ranges</id>
<updated>2010-01-20T19:48:13Z</updated>
<author>
  <name />
</author>
<link rel="alternate"
href="http://www.contoso.com/_vti_bin/ExcelRest.aspx/Cycles/Sales.xlsx/Model/Ranges?$format=atom" title="Ranges" />
  <content type="application/atom+xml;charset=utf-8"
src="http://www.contoso.com/_vti_bin/ExcelRest.aspx/Cycles/Sales.xlsx/Model/Ranges?$format=atom" />
</entry>
<entry>
  <category term="ExcelServices.Charts"
scheme="http://schemas.microsoft.com/ado/2007/08/dataservices/scheme" />
  <title>Charts</title>
  <id>http://www.contoso.com/_vti_bin/ExcelRest.aspx/Cycles/Sales.xlsx/Model/Charts</id>
  <updated>2010-01-20T19:48:13Z</updated>
  <author>
    <name />
  </author>
  <link rel="alternate"
href="http://www.contoso.com/_vti_bin/ExcelRest.aspx/Cycles/Sales.xlsx/Model/Charts?$format=atom" title="Charts" />
    <content type="application/atom+xml;charset=utf-8"
src="http://www.contoso.com/_vti_bin/ExcelRest.aspx/Cycles/Sales.xlsx/Model/Charts?$format=atom" />
  </entry>
<entry>
  <category term="ExcelServices.Tables"
scheme="http://schemas.microsoft.com/ado/2007/08/dataservices/scheme" />
  <title>Tables</title>
  <id>http://www.contoso.com/_vti_bin/ExcelRest.aspx/Cycles/Sales.xlsx/Model/Tables</id>
  <updated>2010-01-20T19:48:13Z</updated>
  <author>
    <name />
  </author>
  <link rel="alternate"
href="http://www.contoso.com/_vti_bin/ExcelRest.aspx/Cycles/Sales.xlsx/Model/Tables?$format=atom" title="Tables" />
    <content type="application/atom+xml;charset=utf-8"
src="http://www.contoso.com/_vti_bin/ExcelRest.aspx/Cycles/Sales.xlsx/Model/Tables?$format=atom" />
  </entry>
<entry>
  <category term="ExcelServices.PivotTables"
scheme="http://schemas.microsoft.com/ado/2007/08/dataservices/scheme" />
  <title>PivotTables</title>

<id>http://www.contoso.com/_vti_bin/ExcelRest.aspx/Cycles/Sales.xlsx/Model/PivotTables</id>
<updated>2010-01-20T19:48:13Z</updated>
<author>
  <name />
</author>
<link rel="alternate"
href="http://www.contoso.com/_vti_bin/ExcelRest.aspx/Cycles/Sales.xlsx/Model/PivotTables?$format=atom" title="PivotTables" />
  <content type="application/atom+xml;charset=utf-8"
src="http://www.contoso.com/_vti_bin/ExcelRest.aspx/Cycles/Sales.xlsx/Model/PivotTables?$format=atom" />
</entry>

```

```
</entry>
</feed>
```

4.2 Retrieve a Table from a Workbook as HTML

The following example illustrates the exchange of messages required for a client to retrieve the HTML representation of a table called SalesProjections within the Sales.xlsx workbook.

Request

```
GET /_vti_bin/ExcelRest.aspx/Cycles/Sales.xlsx/Model/Tables('SalesProjections')?$format=html
HTTP/1.1
Accept: text/html
Host: www.contoso.com
```

Response

```
HTTP/1.1 200 OK
Cache-Control: private
Content-Type: text/html; charset=utf-8
Last-Modified: Wed, 20 Jan 2010 11:49:08 GMT
Vary: Accept-Encoding
Server: Microsoft-IIS/7.5
SPRequestGuid: eaelc496-30f7-4263-92aa-3a31fb2d8c89
X-SharePointHealthScore: 4
X-AspNet-Version: 2.0.50727
X-Powered-By: ASP.NET
MicrosoftSharePointTeamServices: 14.0.0.4732
Date: Wed, 20 Jan 2010 19:49:08 GMT
Content-Length: 18625
```

```
<div style="overflow:hidden"><table cellpadding="0" cellspacing="0" class="ewr-sheettable
tnov rnov bnov lnov" style="border-collapse:collapse;margin-left:-2px;margin-top:-
2px;"><tr><td style="border-bottom:1px solid transparent;width:1px;font-
size:1px;height:1px;line-height:1px;"><div class="clp">&nbsp;</div></td><td style="font-
size:1px;height:1px;line-height:1px;width:97px;"><div class="clp"
style="width:97px;">&nbsp;</div></td><td style="font-size:1px;height:1px;line-
height:1px;width:78px;"><div class="clp" style="width:78px;">&nbsp;</div></td><td
style="font-size:1px;height:1px;line-height:1px;width:62px;"><div class="clp"
style="width:62px;">&nbsp;</div></td><td style="font-size:1px;height:1px;line-
height:1px;width:62px;"><div class="clp" style="width:62px;">&nbsp;</div></td><td
style="font-size:1px;height:1px;line-height:1px;width:69px;"><div class="clp"
style="width:69px;">&nbsp;</div></td><td style="font-size:1px;height:1px;line-
height:1px;width:83px;"><div class="clp" style="width:83px;">&nbsp;</div></td></tr><tr><td
style="border-bottom:1px solid transparent;width:1px;"><div class="clp"
style="height:19px;">&nbsp;</div></td><td data-range="B9" style="text-align:left;vertical-
align:bottom;font:bold 11pt 'Calibri';color:#000000;text-decoration:none;border-top:solid 1px
#F79646;border-left:solid 1px #F79646;"><div class="cv-nwl" style="width:95px;max-
height:18px;">Salesperson</div></td><td data-range="C9" style="text-align:left;vertical-
align:bottom;font:bold 11pt 'Calibri';color:#000000;text-decoration:none;border-top:solid 1px
#F79646;border-left:solid 1px #F79646;"><div class="cv-nwl" style="width:76px;max-
height:18px;">Accessories</div></td><td data-range="D9" style="text-align:left;vertical-
align:bottom;font:bold 11pt 'Calibri';color:#000000;text-decoration:none;border-top:solid 1px
#F79646;border-left:solid 1px #F79646;"><div class="cv-nwl" style="width:60px;max-
height:18px;">Bikes</div></td><td data-range="E9" style="text-align:left;vertical-
align:bottom;font:bold 11pt 'Calibri';color:#000000;text-decoration:none;border-top:solid 1px
#F79646;border-left:solid 1px #F79646;"><div class="cv-nwl" style="width:60px;max-
height:18px;">Clothing</div></td><td data-range="F9" style="text-align:left;vertical-
```

align:bottom;font:bold 11pt 'Calibri';color:#000000;text-decoration:none;border-top:solid 1px #F79646;border-left:solid 1px #F79646;"/>

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Excel Services REST Protocol

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```

height:19px;">&nbsp; $ &nbsp; &nbsp; &nbsp; 1,287 </div></td><td data-range="E15" style="text-align:left;vertical-align:bottom;font:normal 11pt 'Calibri';color:#000000;text-decoration:none;border-top:solid 1px #F79646;border-left:solid 1px #F79646;"><div class="cv-nwl" style="width:60px;max-height:19px;">&nbsp; $ &nbsp; &nbsp; &nbsp; 3,243 </div></td><td data-range="F15" style="text-align:left;vertical-align:bottom;font:normal 11pt 'Calibri';color:#000000;text-decoration:none;border-top:solid 1px #F79646;border-left:solid 1px #F79646;"><div class="cv-nwl" style="width:67px;max-height:19px;">&nbsp; $ &nbsp; &nbsp; &nbsp; &nbsp; &nbsp; &nbsp; &nbsp; 6,917 </div></td><td data-range="G15" style="text-align:left;vertical-align:bottom;font:bold 11pt 'Calibri';color:#000000;text-decoration:none;border-top:solid 1px #F79646;border-left:solid 1px #F79646;border-right:solid 1px #F79646;"><div class="cv-nwl" style="width:81px;max-height:19px;">&nbsp; $ &nbsp; &nbsp; &nbsp; &nbsp; &nbsp; &nbsp; &nbsp; &nbsp; &nbsp; &nbsp; &nbsp; &nbsp; 114 </div></td></tr><tr><td style="border-bottom:1px solid transparent;width:1px;"><div class="clp" style="height:19px;">&nbsp; &nbsp; &nbsp; </div></td><td data-range="B16" style="text-align:left;vertical-align:bottom;background-color:#FDE9D9;font:bold 11pt 'Calibri';color:#000000;text-decoration:none;border-top:solid 1px #F79646;border-left:solid 1px #F79646;"><div class="cv-nwl" style="width:95px;max-height:18px;">Elizabeth</div></td><td data-range="C16" style="text-align:left;vertical-align:bottom;background-color:#FDE9D9;font:normal 11pt 'Calibri';color:#000000;text-decoration:none;border-top:solid 1px #F79646;border-left:solid 1px #F79646;"><div class="cv-nwl" style="width:76px;max-height:18px;">&nbsp; $ &nbsp; &nbsp; &nbsp; &nbsp; &nbsp; &nbsp; &nbsp; 3,454 </div></td><td data-range="D16" style="text-align:left;vertical-align:bottom;background-color:#FDE9D9;font:normal 11pt 'Calibri';color:#000000;text-decoration:none;border-top:solid 1px #F79646;border-left:solid 1px #F79646;"><div class="cv-nwl" style="width:60px;max-height:18px;">&nbsp; $ &nbsp; &nbsp; &nbsp; &nbsp; &nbsp; 1,719 </div></td><td data-range="E16" style="text-align:left;vertical-align:bottom;background-color:#FDE9D9;font:normal 11pt 'Calibri';color:#000000;text-decoration:none;border-top:solid 1px #F79646;border-left:solid 1px #F79646;"><div class="cv-nwl" style="width:60px;max-height:18px;">&nbsp; $ &nbsp; &nbsp; &nbsp; &nbsp; &nbsp; 3,489 </div></td><td data-range="F16" style="text-align:left;vertical-align:bottom;background-color:#FDE9D9;font:normal 11pt 'Calibri';color:#000000;text-decoration:none;border-top:solid 1px #F79646;border-left:solid 1px #F79646;"><div class="cv-nwl" style="width:67px;max-height:18px;">&nbsp; $ &nbsp; &nbsp; &nbsp; &nbsp; &nbsp; &nbsp; &nbsp; 8,662 </div></td><td data-range="G16" style="text-align:left;vertical-align:bottom;background-color:#FDE9D9;font:bold 11pt 'Calibri';color:#000000;text-decoration:none;border-top:solid 1px #F79646;border-left:solid 1px #F79646;border-right:solid 1px #F79646;"><div class="cv-nwl" style="width:81px;max-height:18px;">&nbsp; $ &nbsp; &nbsp; &nbsp; &nbsp; &nbsp; &nbsp; &nbsp; 139 </div></td></tr><tr><td style="border-bottom:1px solid transparent;width:1px;"><div class="clp" style="height:19px;">&nbsp; &nbsp; &nbsp; </div></td><td data-range="B17" style="text-align:left;vertical-align:bottom;font:bold 11pt 'Calibri';color:#000000;text-decoration:none;border-top:double 3px #F79646;border-left:solid 1px #F79646;border-bottom:solid 1px #F79646;"><div class="cv-nwl" style="width:95px;max-height:18px;">Total</div></td><td data-range="C17" style="text-align:left;vertical-align:bottom;font:bold 11pt 'Calibri';color:#000000;text-decoration:none;border-top:double 3px #F79646;border-left:solid 1px #F79646;border-bottom:solid 1px #F79646;"><div class="cv-nwl" style="width:76px;max-height:18px;">&nbsp; $ &nbsp; &nbsp; &nbsp; &nbsp; &nbsp; &nbsp; &nbsp; 18,167 </div></td><td data-range="D17" style="text-align:left;vertical-align:bottom;font:bold 11pt 'Calibri';color:#000000;text-decoration:none;border-top:double 3px #F79646;border-left:solid 1px #F79646;border-bottom:solid 1px #F79646;">&nbsp; $ &nbsp; &nbsp; &nbsp; &nbsp; &nbsp; &nbsp; &nbsp; 14,500 </div></td><td data-range="E17" style="text-align:left;vertical-align:bottom;font:bold 11pt 'Calibri';color:#000000;text-decoration:none;border-top:double 3px #F79646;border-left:solid 1px #F79646;border-bottom:solid 1px #F79646;"><div class="cv-nwl" style="width:60px;max-height:18px;">&nbsp; $ &nbsp; &nbsp; &nbsp; &nbsp; &nbsp; &nbsp; &nbsp; 15,408 </div></td><td data-range="F17" style="text-align:left;vertical-align:bottom;font:bold 11pt 'Calibri';color:#000000;text-decoration:none;border-top:double 3px #F79646;border-left:solid 1px #F79646;border-bottom:solid 1px #F79646;"><div class="cv-nwl" style="width:67px;max-height:18px;">&nbsp; $ &nbsp; &nbsp; &nbsp; &nbsp; &nbsp; &nbsp; &nbsp; 48,075 </div></td><td data-range="G17" style="text-align:left;vertical-align:bottom;font:bold 11pt 'Calibri';color:#000000;text-decoration:none;border-top:double 3px #F79646;border-left:solid 1px #F79646;border-right:solid 1px #F79646;border-bottom:solid 1px #F79646;"><div class="cv-nwl" style="width:81px;max-height:18px;">&nbsp; $ &nbsp; &nbsp; &nbsp; &nbsp; &nbsp; &nbsp; &nbsp; &nbsp; &nbsp; &nbsp; &nbsp; &nbsp; 780 </div></td></tr></table></div>

```

4.3 Retrieve a Range from a Workbook as an Atom Feed

The following example illustrates the exchange of messages required for a client to retrieve a range from the Sales.xlsx workbook as an Atom feed.

Request

```
GET /_vti_bin/ExcelRest.aspx/Cycles/Sales.xlsx/Model/Ranges('C17%7CE17')?$format=atom
HTTP/1.1
Accept: application/atom+xml
Host: www.contoso.com
```

Response

```
HTTP/1.1 200 OK
Cache-Control: private
Content-Type: application/atom+xml;charset=utf-8
Server: Microsoft-IIS/7.5
SPRequestGuid: a8fecc3b-a7ef-48e5-a988-b6152207fad1
X-SharePointHealthScore: 4
X-AspNet-Version: 2.0.50727
X-Powered-By: ASP.NET
MicrosoftSharePointTeamServices: 14.0.0.4732
Date: Wed, 20 Jan 2010 19:50:23 GMT
Content-Length: 1183

<?xml version="1.0" encoding="utf-8"?>
<entry xmlns:x="http://schemas.microsoft.com/office/2008/07/excelservices/rest"
xmlns:d="http://schemas.microsoft.com/ado/2007/08/dataservice"
xmlns:m="http://schemas.microsoft.com/ado/2007/08/dataservices/metadata"
xmlns="http://www.w3.org/2005/Atom">
  <title type="text">C17:E17</title>

  <id>http://www.contoso.com/_vti_bin/ExcelRest.aspx/Cycles/Sales.xlsx/Model/Ranges('C17%7CE17')</id>
  <updated>2010-01-20T19:50:23Z</updated>
  <author>
    <name />
  </author>
  <link rel="self"
href="http://www.contoso.com/_vti_bin/ExcelRest.aspx/Cycles/Sales.xlsx/Model/Ranges('C17%7CE17')?$format=atom" title="C17:E17" />
  <category term="ExcelServices.Range"
scheme="http://schemas.microsoft.com/ado/2007/08/dataservices/scheme" />
  <content type="application/xml">
    <x:range name="C17:E17">
      <x:row>
        <x:c>
          <x:v>18167</x:v>
          <x:fv> $18,167 </x:fv>
        </x:c>
        <x:c>
          <x:v>14500</x:v>
          <x:fv> $14,500 </x:fv>
        </x:c>
        <x:c>
          <x:v>15408</x:v>
          <x:fv> $15,408 </x:fv>
        </x:c>
      </x:row>
    </x:range>
  </content>
</entry>
```

4.4 Retrieve a Chart from a Workbook After Setting a Value in the Workbook

The following example illustrates the exchange of messages required for a client to change the value of a range named `CommissionRate_Bikes` in the `Sales.xlsx` workbook while also retrieving a chart named `CommissionChart` from the same workbook. Note the chart is returned as an image. The binary image data is represented here in hexadecimal.

Request

```
GET
/_vti_bin/ExcelRest.aspx/Cycles/Sales.xlsx/Model/Charts('CommissionChart')?$format=image&range('CommissionRate_Bikes')=0.03 HTTP/1.1
Accept: image/png
Host: www.contoso.com
```

Response

```
HTTP/1.1 200 OK
Cache-Control: private
Content-Type: image/png
Server: Microsoft-IIS/7.5
SPRequestGuid: 976f5ad3-5748-4049-9471-eb2ad4035047
X-SharePointHealthScore: 4
X-AspNet-Version: 2.0.50727
X-Powered-By: ASP.NET
MicrosoftSharePointTeamServices: 14.0.0.4732
Date: Wed, 20 Jan 2010 19:51:32 GMT
Content-Length: 9325
```

```
89504e47 0d0a1a0a 0000000d 49484452
000001b5 00000120 08060000 003301ed
2d000000 01735247 4200aece 1ce90000
00046741 4d410000 b18f0bfc 61050000
00097048 59730000 0ec30000 0ec301c7
6fa86400 00240249 44415478 5eed9ddd
91f320b2 8627a08d 600238a1 f862a3f1
d58964d7 496c0813 c8a9da1b 1f21091b
6124a3e6 bff54cd5 d4379f2d 24f5db0d
8f1a10fc 3cf94101 14400114 4001250a
fc28b103 33500005 50000550 e009d408
02144001 14400135 0a003535 aec41014
40011440 01a0460c a0000aa0 000aa851
00a8a971 2586a000 0aa0000a 00356200
05500005 50408d02 404d8d2b 31040550
00055000 a8110328 80022880 026a1410
42edef79 ffbd3d1f 6a64c010 14400114
40010d0a 9c86dadf fdf7f9f3 f3b3fefe
3eef7f9e 0c8fdbfc ddc227de fab92dfb
eb163cfa 4e83cad8 80022880 02285045
817350fb bb3f7f7f 9c0c6d82 910ba7c7
6d82dd44 33f3ef16 6a8fe7ed c701e0e6
3ca1ef02 b0ac2207 17410114 40011418
598134a8 ed587e0a 6a264bf3 d23a537e
93c98dac 30f78e02 28800228 504d8173
509b6e6b cec64cf7 e3effde9 f73cdabb
fe84daf4 cd9c9dd9 6ecb77b6 3777677a
50339f01 b56a31c0 85500005 50408d02
```

a7a1662d b7636b21 f884a0b6 1c3fc1cc
c26d0559 0ea8bdc7 f82c34f9 174d8801
62801818 3906feef 7fff4704 5a31d4e6
ab99aec3 40c6f601 b58fe3cc ecc965dc
2d04b5d4 ee47e348 2308bf68 400c1003
c4c0b831 20a1da39 a8791343 662089a0
662687ac 9349e6cc cd9f4492 365104a8
8d1bc434 40f88e18 20066c0c 9487daf4
669a81d1 3ba5ddbe abf61a6f 0b4cf9f7
bf3b9ad2 fff13ac0 49cb801a 95828691
182006c6 8f81934d ff7cf8b9 4c6dbdc2
e3969649 496ef44c 19a0367e 30d320e1
43628018 38d3eedb 630550eb 7f3511a0
4665a041 24068881 f163a012 d42497a9
5b06a88d 1fcc3448 f8901820 0624e410
646a92cb d42d03d4 a80c3488 c4003130
7e0c48c8 01d498fa cfab0fc4 0031400c
74190340 6d55804c 6dfc2734 9eb2f121
31400c00 35a0d6e5 d3168d13 8d133140
0c486200 a80135a0 46371231 400ca889
01a006d4 d404b3e4 a98e3264 03c480ae
18006a40 0da8f194 4e0c1003 6a6200a8
013535c1 cc13b7ae 276efc89 3f253150
116a7daf 2ac2ec47 2a90a402 5186b821
06fa8a81 2a50b3fb a82d8b1a 07d68034
dbccd815 f8bd3bda 2e6aec2c 86bc96b1
0b25a76e 100ad4fa 0a4c1a0a fc410c10
03921828 0fb5799b 982d8c5c 00cdd09a
96d80f6d 126abffb bc49b3f2 3f5bcf48
1c4e191a 0a628018 d01c03f5 a1b673c5
4fa81970 6db7a979 1535599a b7d70c9b
84525135 57d42bd9 f6ef7ffe e359e2f7
4a1a5ed9 d6f2509b aef0ea42 0c6c0e6a
6fe0036a 26c3fbfd 9db23c67 2fb61564
a19dafcd 67295d90 743f02c5 2b37043d
d96e80f6 dffffc2b ebaf3967 4f36722f
e5da9b2a 50b317b1 636b21f8 04a1b6c9
d4de3b5f e780da7b d3527703 53fe4617
62a0750c 94825a6b bbb87ef9 ba651e16
243f690b 1a9baec3 40c6f61d 6a4bc667
92b510d4 e87e2cf7 e4c35325 dad68c81
5250ab69 03d76a57 67ca436d 82989b99
cd408a81 dad3bc02 b0406cfe 99279cac
9343dcbf fdef2416 4d65e87e 6c178434
0068efc6 0050231e 52da0409 024e666a
4bb7e13b f5de4efe d84ed9f7 a6fccff0
7a97ddcc 0df1a6f4 7bf3464e db05d4a8
48291589 b2f9e207 a8e5d3f2 8a7179ba
f137498d a4d0e316 783f4d72 a2426580
1a15e98a 0d408f36 03b531ea 628919aa
3926f448 1021805a dfab8918 1180da18
15a9c746 987bca1b 3b402daf 9ea5e2b3
573f5582 9ae43275 cb00b531 2a52a90a
ca79fbf1 7faf8d25 31b28d91 5efd2421
87205393 5ca66e19 a0d64fa3 46e3716d
5ff4da58 129740ad 2e9512af 06d4aedd
90d260f5 e37fa0d6 8f2f8eea 45af7e92
a0804c8d bd97589d 81182816 03bd3696
3cf890a9 4980d9ac 0c99da18 4f87342c

fafd04d4 c6f071af 7e924084 4c8da7f4
624fe9a5 a1d5eb34 e4d2768f 74fe5e1b
cb9134ac 71afbdfa 09a8ad0a 90a98df1
74985a59 7bad88a9 76692a8f 8fc6a88b
bdfa09a8 01b561b3 2e4943de 6b4594d8
a2b50c3e 026a29b1 0dd4801a 504bdce6
24c72a08 2995585b 59a006d4 5262ba22
d4fa5e55 84eec731 2a524ab0 9bb23498
fdfb191f f5efa39e eb5215a8 d97dd496
458d036b 40ae8b13 ef2d4a6c cb1f2d68
9cb24128 cb648d51 895281d6 7345cc61
9b967300 b531ea63 af7e2a0f b579a57d
67657e6f 2b9a7995 fe89561f fba9d93b
9b77c0be 3fefeb5e 6acbc766 e57f078e
fe563402 abc8d4c6 a848a90d 77af1531
d52e4de5 f1d11875 b1573f09 9aff93ab
f4fb50db b962186a a6cb7281 d7e67b93
d979691d 9b848e51 115a37be bd56c4d6
baf4747d 7c34465d eed54fe5 a166f22a
938d99ae c7c0e6a0 f6064250 33dd8eb6
5bd1fd3e b4f3b57b acc8a8e9 fe7aaad8
dc4b998a dd6b45c4 df6f7fe3 a332b19f
3bc67af5 93a8fd97 143265ec d85868fc
eb036a5e 86971b6a ef4d4bdd 0d4cf95b
bb2ea52a a276dd6a da878fc6 68877af4
9301b7e4 276d4511 d37518c8 d83ea0e6
ed6c6d2b 95016228 53a3fb71 8ca7bbdc
4f8b67cf 57aa229e bd0f8edf 8f577c34
465deed5 4fe5a1e6 4d0c9981 140335ef
ce36d0f3 27863051 84aed3c8 a5cb7aad
88408eee c7d162a0 d7ba541e 6af34c45
379d7666 42bae36d af630253 fed7e38e
a6f4efbd 0e106b20 b31fc778 3a4cadf8
bd56c454 bb3495c7 4763d4c5 5efd14db
e6bbc789 ba1f1fb7 30ac2437 50a20c50
1ba322a5 36deb56 c454bb34 95c74763
d4c55efd 24e18300 6a7daf26 c2cbd763
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d9b3b393 590f1f7f f1b5fb22 50bb0ad8
e21dcf91 2515780f cccb1018 7983cf45
2dfffc169 3b5e5352 d1d2e7b6 efd88df7
12bfabcc 3af639bd 2c1e1a66 193ffee2
a2e04250 036c7121 c151a90a bc33b111
5faafe66 fd76a7f1 b121e0da ea8cad7d
93a09bef b7639aef b80b4c88 ebe69ecb
dfc8c5a0 565e50ae 80028f9b 3b8b4e33
d8869bdb 7e189c06 0a6342fa bd42d262

a03fe371 e09de005 cd095013 88461114
f85460bb 966368d7 ea311bcc 0bf9da9d
29d8bbd9 ee8c4c6f 85a4196b 2ba0475d
4734457e a096a21e 6551c02a b059cb91
493b0446 05055cb0 f9af1d04 9762ab70
4f1d5c02 a875e004 6e617005 820d0860
1bdcab9d ddfec1ac 46fbeac1 c8efd365
541ba865 1493535d 58816083 3281cd5d
05f7c2f2 607a8a02 5f760538 cad8522e
3b6859a0 36a8e3b8 ed960a68 58cbb1a5
7e5c3b5e 819de5fe fc8725b2 b497a440
2d3eba38 12052605 34ace588 23c752c0
edca3e78 f500b0cd 6e056a63 4537775b
5d01ef49 f9826be9 55979c0b 0614b0bd
03fa56d5 cfed6ea0 965b51ce a74881a3
1772afb3 969e2287 0e6ecae7 e4a37995
10c66d37 7e056a83 8739b75f 50816956
e3eebb65 175a4baf a0c29cfa b4026fb0
5df11db4 18b9805a 8c4a1c73 4d05e6a9
faeb6a0c 9b9d8297 2ea0abac a5774de7
f76c35af 8b1c7907 a8f51cbb dc5b7305
ec42b7ee 46acf367 eaf6e56b 2e353780
02591400 6a5964e4 24975260 c82d492e
e5218cbd b00240ed c2cec774 99028c65
c874a314 0ad45000 a8d55099 6ba85080
3134156e c408e50a 0035e50e c63c1440
0114b892 0240ed4a dec65614 40011450
ae005053 ee60cc43 01144081 2b2900d4
aee46d6c 45011440 01e50a00 35e50ec6
3c144001 14b89202 40ed4ade c6561440
011450ae 005053ee 60cc4301 1440812b
2900d4ae e46d6c45 01144001 e50a0035
e50ec63c 14400114 b8920240 ed4adec6
56144001 1450ae00 5053ee60 cc430114
40812b29 00d4aee4 6d6c4501 144001e5
0a0035e5 0ec63c14 400114b8 920240ed
4adec656 14400114 50ae0050 53ee60cc
43011440 812b2900 d4aee46d 6c450114
4001e50a 0035e50e c63c1440 0114b892
0240ed4a dec65614 40011450 ae005053
ee60cc43 01144081 2b2900d4 aee4ed0b
d9faef7f fee3b9f7 ebcfb0b8 fd3c7f7e
d6dfdfbb f3af814e f33ddc1e e22ba796
175f9882 28d09902 40ad3387 703b7914
3040fbef 7ffef5f1 6b3e777f 3e60f0b8
3d7fef2d b096c76e ce820257 5700a85d
3d0294da 1f05b5bf fbf3f7e7 f6dccd8f
26c0bd32 b829937b 27528fe7 6dcae8ee
af0ccf9c 63fa6ccd f6de508c 3deef9fc
bbff3a30 fd7bde7f 9decf175 8f7b9fffb
e527a71e ddfb74be fb743d6b 5b4282a8
347a306b 640580da c8dee3de 77158882
9a69f8f7 ba1b67e0 fd3e5f49 db66ff0b
c02cbc96 eecbf5d8 0d28638f f3a064ee
2b449abd cf271536 508cb8f7 d7f967f8
1d809d18 4381c114 006a8339 8cdb8d53
20196a01 8018782d 2033b07a 83c000e5
0d21934d 5918c61e e7675a36 ebf361b3
f7f97728 eeddbb6f 4b9cba1c 8502fd2a

```
00d4faf5 0d7796a0 4014d48e ba1f77a0
b62450b1 b08a3d2e d07d38db 1e0fb74d
a676e2de 815a4290 51b44b05 805a976e
e1a65215 889bfdb8 8e51b95d 7d0674e6
ff5fbbf0 4a666aae f5cb3d7e f6466e3f
3fd7fde8 66805bf0 a6ea4e79 1468ad00
506bed01 aedf5881 fdc917df 265bd809
26b9bb1f e7f3d957 0cccbf2b d1f63e37
026e279a 9824ef60 92cb660c 0da8350e
402e9f59 01a09659 504e8702 28800228
d04e01a0 d64e7bae 8c022880 02289059
01a09659 504e8702 28800228 d04e01a0
d64e7bae 8c022880 02289059 01a09659
504e8702 28800228 d04e01a0 d64e7bae
8c022880 02289059 01a09659 504e8702
28800228 d04e01a0 d64e7bae 8c022880
02289059 01a09659 504e8702 28800228
d04e01a0 d64e7bae 8c022880 02289059
01a09659 504e8702 28800228 d04e01a0
d64e7bae 8c022880 02289059 01a09659
504e8702 28800228 d04e01a0 d64e7bae
8c022880 02289059 01a09659 504e8702
28800228 d04e81ff 0789e388 1dbe1730
00000000 0049454e 44ae4260 82
```

4.5 Retrieve the OData service document for a workbook

The following example illustrates the exchange of messages required for a client to request the OData service document.

Request

```
GET
http://office/15/teams/DBI/xlservices/_vti_bin/ExcelRest.aspx/Users/adean/DatesAndTimes.xlsx/
OData HTTP/1.1
Accept: text/html, application/xhtml+xml, */*
Accept-Language: en-US
User-Agent: Mozilla/5.0 (compatible; MSIE 9.0; Windows NT 6.1; WOW64; Trident/5.0)
Accept-Encoding: gzip, deflate
Connection: Keep-Alive
Host: office
```

Response

```
HTTP/1.1 200 OK
Cache-Control: private
Content-Type: application/xml;charset=utf-8
Server: Microsoft-IIS/7.5
X-SharePointHealthScore: 0
DataServiceVersion: 1.0;
X-AspNet-Version: 4.0.30319
SPRequestGuid: 7cab629b-4882-d026-23a5-2bd43a07d980
X-Powered-By: ASP.NET
MicrosoftSharePointTeamServices: 15.0.0.3407
X-Content-Type-Options: nosniff
```

Date: Tue, 18 Oct 2011 19:38:41 GMT
Content-Length: 461
<?xml version="1.0" encoding="utf-8" standalone="yes"?>
<service
xml:base="http://office/_vti_bin/ExcelRest.aspx/Users/adean/DatesAndTimes.xlsx/OData/"
xmlns:atom="http://www.w3.org/2005/Atom" xmlns:app="http://www.w3.org/2007/app"
xmlns="http://www.w3.org/2007/app">
 <workspace>
 <atom:title>Default</atom:title>
 <collection href="DatesTextFormatted">
 <atom:title>DatesTextFormatted</atom:title>
 </collection>
 </workspace>
</service>

5 Security

5.1 Security Considerations for Implementers

None.

5.2 Index of Security Parameters

None.

6 Appendix A: Full WSDL

None.

7 Appendix B: Product Behavior

The information in this specification is applicable to the following Microsoft products or supplemental software. References to product versions include released service packs:

- Microsoft SharePoint Server 2010
- Microsoft SharePoint Server 2013

Exceptions, if any, are noted below. If a service pack or Quick Fix Engineering (QFE) number appears with the product version, behavior changed in that service pack or QFE. The new behavior also applies to subsequent service packs of the product unless otherwise specified. If a product edition appears with the product version, behavior is different in that product edition.

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

8 Change Tracking

This section identifies changes that were made to the [MS-ESREST] protocol document between the July 2013 and November 2013 releases. Changes are classified as New, Major, Minor, Editorial, or No change.

The revision class **New** means that a new document is being released.

The revision class **Major** means that the technical content in the document was significantly revised. Major changes affect protocol interoperability or implementation. Examples of major changes are:

- A document revision that incorporates changes to interoperability requirements or functionality.
- The removal of a document from the documentation set.

The revision class **Minor** means that the meaning of the technical content was clarified. Minor changes do not affect protocol interoperability or implementation. Examples of minor changes are updates to clarify ambiguity at the sentence, paragraph, or table level.

The revision class **Editorial** means that the formatting in the technical content was changed. Editorial changes apply to grammatical, formatting, and style issues.

The revision class **No change** means that no new technical changes were introduced. Minor editorial and formatting changes may have been made, but the technical content of the document is identical to the last released version.

Major and minor changes can be described further using the following change types:

- New content added.
- Content updated.
- Content removed.
- New product behavior note added.
- Product behavior note updated.
- Product behavior note removed.
- New protocol syntax added.
- Protocol syntax updated.
- Protocol syntax removed.
- New content added due to protocol revision.
- Content updated due to protocol revision.
- Content removed due to protocol revision.
- New protocol syntax added due to protocol revision.
- Protocol syntax updated due to protocol revision.
- Protocol syntax removed due to protocol revision.

- Obsolete document removed.

Editorial changes are always classified with the change type **Editorially updated**.

Some important terms used in the change type descriptions are defined as follows:

- **Protocol syntax** refers to data elements (such as packets, structures, enumerations, and methods) as well as interfaces.
- **Protocol revision** refers to changes made to a protocol that affect the bits that are sent over the wire.

The changes made to this document are listed in the following table. For more information, please contact dochelp@microsoft.com.

Section	Tracking number (if applicable) and description	Major change (Y or N)	Change type
1.7 Versioning and Capability Negotiation	In the details about the issues covered in the Protocol versions area, changed "MUST be" to "is".	N	Content updated.
2.2.4.2.2 Row JSON Value	Changed "...the Row MAY contain..." to "...the Row SHOULD contain...".	N	Content updated.
2.2.4.3.1 Cell XML Value	Changed "xsi-type" to "xsi:type" in schema and element descriptions.	N	Content updated.
3.1.1 Abstract Data Model	Added a reference link for the \$format parameter.	N	Content updated.
3.1.1.12 Slicer	Updated the description for the member value of the "parameters.unselected[]" member from "...that are to be selected" to "...that are not to be selected".	N	Content updated.
3.1.1.14 Timeline	In the description for the value of the "parameters.selectionEndDate" member, removed the phrase "or selectedOnly".	N	Content updated.

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