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**OGC® Web Coverage Service Interface Standard - XPath Extension**

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Contents Page

1 Scope 1

2 Conformance 1

3 Normative references 1

4 Terms and definitions 2

4.1 Coverage offering [of a WCS service] 2

5 Conventions 2

5.1 UML notation 2

5.2 Data dictionary tables 2

5.3 Namespace prefix conventions 2

6 *XPath* requirements class 3

6.1 Overview 3

6.2 Modifications to *GetCapabilities* 3

*6.3* Modifications to *DescribeCoverage* 3

6.4 Modifications to *GetCoverage* 3

6.5 *SelectCapabilities* request 3

6.6 Encodings 5

6.7 Exceptions 6

Bibliography 7

Annex A (normative) Abstract test suite 8

A.1 Conformance Test Class: *xpath* 8

Annex B (non-normative) Examples 10

**Tables** Page

[Table 1 — Conformance class dependencies 2](#_Toc426650035)

[Table 2 — Namespace mappings 2](#_Toc426650036)

[Table 3 — Components of WCSX::SelectCapabilities request structure 4](#_Toc426650037)

[Table 6 — XPath Extension exception codes 5](#_Toc426650038)

Preface

This specification adds one request types to the OGC Web Coverage Service (WCS): *Select­Capabilities*. This allows clients to selectively retrieve metadata from a server’s offerings through simple path expressions.

Suggested additions, changes, and comments on this document are welcome and encouraged. Such suggestions may be submitted by email message or by making suggested changes in an edited copy of this document.

Terms and definitions

This document uses the standard terms defined in Subclause 5.3 of [OGC 06-121r9], which is based on the ISO/IEC Directives, Part 2, Rules for the structure and drafting of International Standards. In particular, the word “shall” (not “must”) is the verb form used to indicate a requirement to be strictly followed to conform to this standard.

Submitting organizations

The following organizations have submitted this Interface Specification to the Open Geospatial Consortium, Inc.:

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|  |  |  |  |  |

Changes to the OpenGIS® Abstract Specification

The OpenGIS® Abstract Specification does not require any changes to accommodate the technical contents of this (part of this) document.

Future Work

Currently none foreseen.

Foreword

This WCS XPath Extension is an OGC Interface Standard which relies on WCS Core [OGC 09-110] and the GML Application Schema for Coverages [OGC 09-146].

This document includes one normative Annex and one non-normative Annex.

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Introduction

This OGC *Web Coverage Service (WCS) – XPath Extension* (in short: *XPath Extension*) defines an extension to the WCS Core [OGC 09-110] for selectively retrieving coverage metadata from a server through simple path expressions. To this end, a *SelectCapabilities* request type is introduced. Based on a path expression as input, it returns an XML document containing the metadata selected.

OGC® Web Coverage Service Interface Standard - XPath Extension

# Scope

This OGC WCS XPath Extension – in short: *XPath Extension* or *WCS-X* – defines how to selectively retrieve metadata from a WCS server.

# Conformance

This document establishes the following requirements and conformance classes:

* *xpath*, of URI <http://www.opengis.net/spec/WCS_service-extension_xpath/1.0/req/xpath>; the corresponding conformance class is *xpath*, with URI <http://www.opengis.net/spec/WCS_service-extension_xpath/1.0/conf/xpath>.

This is the mandatory core conformance class of this extension.

Standardisation target of all requirements and conformance classes are WCS implementations (currently: servers).

Requirements URIs defined in this document are relative to <http://www.opengis.net/spec/WCS_service-extension_xpath/1.0/req>,  
conformance test URIs are relative to <http://www.opengis.net/spec/WCS_service-extension_xpath/1.0/conf>.

Annex A lists the conformance tests which shall be exercised on any software artefact claiming to implement WCS.

# Normative references

This *OGC WCS XPath Extension* specification consists of the present document and an XML Schema. The complete specification is identified by OGC URI <http://www.opengis.net/spec/WCS_service-extension_xpath/1.0>, the document has OGC URI <http://www.opengis.net/doc/ISx/WCS_service-extension_xpath/1.0>.

The complete specification is available for download from [http://www.opengeospatial.org/standards/wcs](http://www.opengeospatial.org/stan%1Fdards/wcs); additionally, the XML Schema is posted online at <http://schemas.opengis.net/wcs/xpath/1.0> as part of the OGC schema repository. In the event of a discrepancy between bundled and schema repository versions of the XML Schema files, the schema repository shall be considered authoritative.

The normative documents listed in Table 1 contain provisions that, through reference in this text, constitute provisions of this specification. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. For undated references, the latest edition of the normative document referred to applies.

Table 1 — Conformance class dependencies

|  |  |  |
| --- | --- | --- |
| **XPath  conformance class** | **Dependency document** | **Dependency  conformance class** |
| *xpath* | OGC 09-146, *GML 3.2.1 Application Schema for Coverages*, version 1.0 (“GMLCOV”)[[1]](#footnote-1)  OGC 09-110, *OGC®**Web Coverage Service 2.0 Interface Standard - Core*, version 2.0 | *gml-coverage*  *core* |

# Terms and definitions

For the purposes of this document, the terms and definitions given in the above references apply. In addition, the following terms and definitions apply. An arrow ““ indicates that the following term is defined in this Clause.

## Coverage offering [of a WCS service]

The complete information offering [of a WCS service], conceptually represented by an XML document as per WCS Core [OGC 09-110]

# Conventions

## UML notation

Unified Modeling Language (UML) static structure diagrams appearing in this specification are used as described in Subclause 5.2 of OGC Web Services Common [OGC 06-121r9].

## Data dictionary tables

The UML model data dictionary is specified herein in a series of tables. The contents of the columns in these tables are described in Subclause 5.5 of [OGC 06-121r9]. The contents of these data dictionary tables are normative, including any table footnotes.

## 5.3 Namespace prefix conventions

The following namespaces are used in this document. The prefix abbreviations used constitute conventions used here, but are **not** normative. The namespaces to which the prefixes refer are normative, however.

Table 2 — Namespace mappings

|  |  |  |
| --- | --- | --- |
| **Prefix** | **Namespace URI** | **Description** |
| xsd | <http://www.w3.org/2001/XMLSchema> | XML Schema namespace |
| gml | <http://www.opengis.net/gml/3.2> | GML 3.2.1 |
| gmlcov | <http://www.opengis.net/gmlcov/1.0> | GML Application Schema for Coverages 1.0 |
| wcs | <http://www.opengis.net/wcs/2.0> | WCS 2.0 Core |
| wcsx | <http://www.opengis.net/wcs/xpath/1.0> | WCS 2.0 XPath Extension |

# *XPath* requirements class

## Overview

This Clause 6 establishes the mandatory XPath Extension core requirements class, *xpath*. Clients and servers supporting this *select* requirements class shall support XPath-based selection from a WCS server’s coverage offerings through a dedicated request type, *SelectCapabilities*. This request operates on the Capabilities document as defined in OWS Common [OGC 06-121] and WCS Core [OGC 09-110].

## Modifications to *GetCapabilities*

A server announces support of the *xpath* requirements class to a client by adding the URL identifying this extension to the list of supported extensions delivered in the Capabilities document.

1. A WCS service implementing requirements class *xpath* of this XPath Extension **shall** include the following URI in the Profile element of the ServiceIdentification in a *GetCapabilities* response:   
   http://www.opengis.net/spec/WCS\_service-extension\_xpath/1.0/conf/xpath

## Modifications to *DescribeCoverage*

None.

## Modifications to *GetCoverage*

None.

## *SelectCapabilities* request

### *SelectCapabilities* request

This request assumes an XML document on the server which is given by the model defined in WCS [2], extended with the Capabilities document as per OWS Common [4]. The XPath expression submitted is evaluated against this single conceptual XML document representing a WCS server’s offering, and the result is returned to the client.

Note The Capabilities document assumed above is identical to the one returned through a *GetCapabilities* request without any Section parameter.

1. A *SelectCoverage* request **shall** adhere to Figure 1 and Table 3.



Figure — SelectCapabilities request UML diagram

Table — Components of WCSX::SelectCapabilities request structure

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Definition** | **Data type** | **Multiplicity** |
| query | XPath expression to be evaluated by the server | string | one (mandatory) |

1. The query parameter in a *SelectCapabilities* request **shall** contain a syntactically valid XPath expression as per W3C XPath [1].

### *SelectCapabilities* response

The response to a successful *SelectCapabilities* request is an ASCII document (which may contain XML tags) containing the information extracted from the server’s offering.



Figure — WCS service offering UML diagram, based on OGC WCS [2]

1. The response to a successful *SelectCapabilities* request **shall** be given by the evaluation of the query argument against the offering of the WCS server as shown in Figure 2.

Note A server may reject requests generating foreseeably excessive amounts of data, such as retrieving range sets of coverages.

## Encodings

### 6.8.1 Overview

This Subclause specifies, for each WCS protocol binding that a client and server support, encoding of a *SelectCapabilities* operation.

### 6.8.1 GET/KVP Encoding

1. In a *SelectCapabilities* request using the GET/KVP protocol, a query parameter with value x **shall** be represented by an http key/value pair as follows, with x properly using http entities where required:  
    QUERY=x

Example The following is a complete *SelectCapabilities* request in GET/KVP notation; it delivers a list of all coverage identifiers:

http://www.acme.com/ows?  
 SERVICE=WCS &  
 VERSION=2.0 &  
 REQUEST=SelectCapabilities &  
 QUERY=/Capabilities/Contents/CoverageSummary/CoverageId

### 6.8.2 XML/POST Encoding

1. A *SelectCapabilities* request using the XML/POST protocol **shall** be encoded as an wcsx:SelectCapabilities element as defined in the XML Schema accompanying this specification.

Example The following is a complete *InsertCoverage* request plus a response (assuming success) in XML/POST encoding:

<?xml version="1.0" encoding="UTF-8"?>  
<wcsx:SelectCapabilities  
 xmlns:wcsx=  
 "http://www.opengis.net/wcs\_service-extension\_xpath/1.0"   
 xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"  
 xsi:schemaLocation="http://www.opengis.net/wcsx/1.0  
 http://schemas.opengis.net/wcs/2.0/xpath/xpath.xsd">  
 <wcsx:query>  
 /Capabilities/Contents/CoverageSummary/CoverageId  
 </wcsx:query>  
</wcsx:SelectCapabilities>

### 6.8.3 SOAP Encoding

1. A *SelectCapabilities* request using the SOAP protocol **shall** be encoded as an wcsx:SelectCapabilities element as defined in the XML Schema accompanying this specification.

## Exceptions

1. When a WCS server encounters an error while evaluating a *SelectCapabilities* operation it **shall** return an exception report message chosen as indicated in Table 4 with a locator parameter value as specified in the right column of Table 4 for each exception­Code listed.

Table — XPath Extension exception codes

|  |  |  |  |
| --- | --- | --- | --- |
| **exceptionCode value** | **HTTP code** | **Meaning of exception code** | **locator value** |
| InvalidXPath | 404 | QUERY parameter does not represent a valid XPath expression | Position of vio­lat­ing element / para­meter |
| ExcessiveVolume | 404 | Query would return an excessive amount of data (e.g., when requesting coverage range sets) | Position of vio­lat­ing element / para­meter |

# Bibliography

1. XML Path Language (XPath) Version 1.0. W3C Recommendation 16 November 1999, <http://www.w3.org/TR/xpath/>
2. P. Baumann: OGC Web Coverage Service (WCS) 2.0 – Core. Version 2.0.1
3. P. Baumann: GML 3.2.1 Application Schema – Coverages. Version 1.0.1
4. A. Whiteside, G. Greenwood: OGC Web Services Common Standard. Version 2.0.0

# Annex A (normative) Abstract test suite

An XPath Extension implementation must satisfy the following system characteristics to be conformant with this specification.

Test identifiers below are relative to <http://www.opengis.net/spec/WCS/2.0/WCS_service-extension_xpath/1.0/conf>.

## A.1 Conformance Test Class: *xpath*

The OGC URI identifier of this conformance class is:  
[http://www.opengis.net/spec/WCS/2.0/conf/WCS\_service-extension\_xpath/1.0/conf/xpath](http://www.opengis.net/spec/WCS/2.0/conf/WCS_service-extension_xpath/1.0/conf/select).

|  |  |
| --- | --- |
| **Test Purpose:** | Requirement 1 |
| **Test method:** | Send valid *GetCapabilities* request to system under test. Check Capabilities document returned whether it contains the required element in the proper position.  Test passes if all conditions are fulfilled. |

|  |  |
| --- | --- |
| **Test Purpose:** | Requirement 2 |
| **Test method:** | Send *SelectCapabilities* requests to system under test. Verify that the structures referenced by the requirement are accepted by the server (and returned in responses, respectively), and only those. To this end, send both valid and violating requests; in case of automatically verifiable definitions (such as XML Schema), verify through appropriate tools; otherwise (such as with UML), implement according tests manually.Test passes if all conditions are fulfilled. |

|  |  |
| --- | --- |
| **Test Purpose:** | Requirement 3 |
| **Test method:** | Send *SelectCapabilities* requests to system under test containing correct and incorrect XPath expressions in the query parameter. Check responses to contain an exception exactly for the incorrect parameters.  Test passes if all conditions are fulfilled. |

|  |  |
| --- | --- |
| **Test Purpose:** | Requirement 4 |
| **Test method:** | Send valid *SelectCapabilities* requests to system under test. Check that request was successful and returned the appropriate result.  Test passes if all conditions are fulfilled. |

|  |  |
| --- | --- |
| **Test Purpose:** | Requirement 5 |
| **Test method:** | Send a valid *SelectCapabilities* request using the GET/KVP protocol to system under test following the encoding specification. Check that request was successful.  Test passes if all conditions are fulfilled. |

|  |  |
| --- | --- |
| **Test Purpose:** | Requirement 6 |
| **Test method:** | Send a valid *SelectCapabilities* request using the POST/XML protocol to system under test following the encoding specification. Check that request was successful.  Test passes if all conditions are fulfilled. |

|  |  |
| --- | --- |
| **Test Purpose:** | Requirement 7 |
| **Test method:** | Send a valid *SelectCapabilities* request using the SOAP protocol to system under test following the encoding specification. Check that request was successful.  Test passes if all conditions are fulfilled. |

|  |  |
| --- | --- |
| **Test Purpose:** | Requirement 8 |
| **Test method:** | For each exception situation, send an invalid *SelectCapabilities* request resembling this situations. Check that appropriate exception is returned.  Test passes if all conditions are fulfilled. |

-- end of ATS –

# Annex B (non-normative) Examples

This Annex contains examples of *SelectCapabilities* requests and responses. Note that the actual responses depend on the server’s concrete, individual offerings and will normally be at least in part be different from the results displayed.

* The complete Capabilities document”

XPath request:

/CoverageOfferings/Capabilities

Response: a standard Capabilities document.

* “All WCS Extensions supported by this server”

XPath request:

/CoverageOffering/Capabilities/ServiceIdentification/Profile/text()

Sample response:

http://www.opengis.net/spec/GMLCOV/1.0/conf/gml  
http://www.opengis.net/spec/GMLCOV/1.0/conf/gml-coverage  
http://www.opengis.net/spec/GMLJP2/2.0  
http://www.opengis.net/spec/WCS\_coverage-encoding\_geotiff/1.0  
http://www.opengis.net/spec/WCS\_coverage-encoding\_jpeg2000/1.0/  
http://www.opengis.net/spec/WCS\_coverage-encoding\_netcdf/1.0  
http://www.opengis.net/spec/WCS\_protocol-binding\_get-kvp/1.0/conf/get-kvp  
http://www.opengis.net/spec/WCS\_protocol-binding\_post-xml/1.0  
http://www.opengis.net/spec/WCS\_protocol-binding\_soap/1.0  
http://www.opengis.net/spec/WCS\_protocol-binding\_get-rest/1.0/conf/get-rest  
http://www.opengis.net/spec/WCS\_service-extension\_processing/2.0/conf/processing  
http://www.opengis.net/spec/WCS\_service-extension\_range-subsetting/1.0/conf/record-subsetting  
http://www.opengis.net/spec/WCS\_service-extension\_transaction/2.0/conf/insert+delete  
http://www.opengis.net/spec/WCS\_service-extension\_scaling/1.0/conf/scaling  
http://www.opengis.net/spec/WCS\_service-extension\_interpolation/1.0/conf/interpolation  
http://www.opengis.net/spec/WCPS/1.0/conf/wcps-core

* “All data formats supported by this server”

XPath request:

/CoverageOfferings/Capabilities/ServiceIdentification/ServiceMetadata/formatSupported/text()

Sample response:

application/netcdf  
image/jp2  
image/tiff  
image/png  
application/gml+xml

* “Identifiers of all coverages offered”

XPath request:

/CoverageOffering/Capabilities/Contents/CoverageSummary/CoverageId/text()

Sample response:

NASA\_NIGHT\_EARTH  
NASA\_NIGHT\_EARTH\_SCALED\_SHALLOW\_TOPO

* “spatial extent of coverage X”

XPath request:

//coverage[@id=“X”]/boundedBy

Sample response:

<boundedBy>  
 <Envelope  
 srsName="http://www.opengis.net/def/crs/EPSG/0/4326"  
 axisLabels="Lat Long"  
 uomLabels="deg deg"  
 srsDimension="2">  
 <lowerCorner>  
 -179.9933330866212 -0.0133335802515  
 </lowerCorner>  
 <upperCorner>  
 0.0133338271788 359.9933332102485  
 </upperCorner>  
 </Envelope>  
</boundedBy>

* “spatio-temporal locations of all 3-D coverages on this server”.

XPath request:

//coverage/[@srsDimension=3]/boundedBy

Sample response:

(sequence of GML boundedBy elements)

* “Native CRS of coverage X”

XPath request:

//coverage[@id=“X”]/boundedBy/Envelope/@srsName

Sample response:

http://www.opengis.net/def/crs/EPSG/0/4326

* “Pixel values of coverage X”

This is likely **not** supported to avoid returning excessively large documents.

For retrieval of coverages in GML use a *GetCoverage* request with  
 FORMAT=application/xml+gml   
(if supported by the server, which can be checked in the Profile section of the Capabilities document).

1. This WCS XPath Extension likewise applies, without any modifications, to the GMLCOV successor version, the OGC Coverage Implementation Schema 1.1 [09-146r3]. [↑](#footnote-ref-1)