Open Geospatial Consortium Inc.

Date: 2010-02-15

Reference number of this document: OGC 10-017

Version: 1.0.0

Category: OpenGIS® IS Revision Notes

Editors: Peter Baumann, Steven Keens

OGC WCS 2.0 Revision Notes

Warning

This document is not an OGC Standard. It is distributed for review and comment. It is subject to change without notice and may not be referred to as an OGC Standard.

Recipients of this document are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Document type:	OpenGIS® IS Revision notes
Document subtype:	
Document stage:	Proposed
Document language:	English

Contents

Page

i. Preface

This document represents the revision notes for the OGC Web Coverage Service (WCS) Interface Standard version 2.0. This new WCS version supersedes previous WCS versions. In general, WCS 2.0 is not backwards compatible with earlier WCS versions.

ii. Document terms and definitions

This document uses the specification terms defined in Subclause 5.3 of [OGC 06-121r3]. 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.

iii. Document contributor contact points

All questions regarding this document should be directed to the editor or the contributors:

Name	Organization
Arliss Whiteside	BAE Systems E&IS

iv. Revision history

Date	Release	Editor	Primary clauses modified	Description
2010-02-01	10-017	Peter Baumann	All	Initial version

Foreword

This document represents the revision notes for the OGC Web Coverage Service (WCS) Interface Standard version 2.0. This new WCS version supersedes previous WCS versions. In general, WCS 2.0 is not backwards compatible with earlier WCS versions.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. The Open Geospatial Consortium Inc. shall not be held responsible for identifying any or all such patent rights.

Recipients of this document are requested to submit, with their comments, notification of any relevant patent claims or other intellectual property rights of which they may be aware that might be infringed by any implementation of the standard set forth in this document, and to provide supporting documentation.

Introduction

This document represents the revision notes for the OGC Web Coverage Service (WCS) Interface Standard version 2.0. This new WCS version supersedes previous WCS versions. In general, WCS 2.0 is not backwards compatible with earlier WCS versions.

OGC Web Coverage Service

1 Scope

The Web Coverage Service (WCS) supports electronic retrieval of geospatial data as "coverages" – that is, digital geospatial information representing space-varying phenomena. The WCS provides access to potentially detailed and rich sets of geospatial information, in forms that are useful for client-side rendering, multi-valued coverages, and input into scientific models and other clients.

This document represents the revision notes for the OGC Web Coverage Service (WCS) Interface Standard version 2.0. This new WCS version supersedes previous WCS versions. In general, WCS 2.0 is not backwards compatible with earlier WCS versions.

1.1 Core/extension modularization

Following recent OGC policy, WCS 2.0 is crafted according to the core/extension paradigm. The package which is accompanied by these Revision Notes consist of the following components (revision numbers pending final edits):

- 09-110r1 WCS 2.0 Core
- 09-146 GML 3.2.1 Application Schema for WCS
- 09-147 WCS KVP protocol extension
- 09-148 WCS XML/POST protocol extension
- 09-149 WCS XML/SOAP protocol extension

Additionally, best practice document 09-153 gives an overview on the new WCS structure.

The following WCS extensions are foreseen (for usability reasons the above extensions are included):

1.1.1 Data model extensions

1.1.1.1 Null values

Specific values can be designated to represent “nil” / “null” values. This extension is expected to be written soon. The GML 3.2 Application Schema for WCS [OGC 09-146] is already prepared for holding null values.

1.1.1.2 Domain-related extensions

The variability of WCS allows coverages of anynumber of dimensions. As WCS implementations are foreseen which focus on particular application domains and use

cases where implementing this full generality is not desirable, useful special cases have been defined in bespoke extensions.

- Time series

  Coverages are one-dimensional and have only a time dimension. Often this dimension is named “t” or “time”.

- Map imagery

  Coverages are two-dimensional and have only geographically horizontal dimensions. Often these dimensions are named “x” and “y” or “latitude and “longitude”.

- General spatio-temporal data

  Coverages are one- to four-dimensional; often their dimension names are “x”, “y”, “z”, and “t”.

- General n-dimensional data

  The domain of a coverage can have n>0 spatial, temporal, or “abstract” (i.e., non-spatio-temporal) domain axes. Dimension names are application dependent, but must not conflict nor be confusable with the names of spatio-temporal dimensions.

1.1.1.3 Complex range types

Such an extension would allow further range structures, beyond the “flat” atomic range fields currently supported by WCS 2.0. However, this would also require an update of the GML 3.2 Application Schema for WCS [OGC 09-146] and, hence, needs to be done in collaboration with the GML Working Group. This may happen in the course of jointly reconsidering the coverage model of GML 3.3 / 4.0.

1.1.1.4 Coverage hierarchies

Coverages can be grouped hierarchically, GetCoverage requests can be performed on such groupings.

1.1.1.5 Uncertainty

Coverage range values can be annotated with a degree of uncertainty. This extension is under discussion, however, it is felt that an OGC-wide overarching concept should be resolved first rather, than establishing an ad-hoc solution.

1.1.2 Service model extensions

This category of extensions describes additional functionality which may be added to a WCS.

1.1.2.1 Scaling and interpolation

With this extension, GetCoverage allows for scaling of coverage results; different interpolation techniques can be selected for the resampling performed during a scaling operation.

1.1.2.2 CRS transformation

This will allow coverages to be requested in different CRSs; the server needs to be able to perform a CRS transform of the coverage prior to its delivery. This extension requires extension “Scaling and interpolation”.

NOTE This will be a normative requirement stated in the WCS 2.0 CRS Extension (which is not yet existing, but in planning at the time of this writing).

The variability and complexity of CRS handling suggests that special cases are defined in bespoke extensions:

- Use if predefined CRSs only

  CRSs are indicated through EPSG codes.

- Ad-hoc definition of CRSs

  At any position where a CRS parameter occurs in WCS, CRSs can be defined locally (including nested transformations).

scaling of coverage results; different interpolation techniques can be selected for the resampling performed during a scaling operation.

1.1.2.3 Transactional service (WCS-T)

WCS-T [OGC 07-068r4] allows to insert, update, and delete coverages offered by a WCS server.

1.1.2.4 Web Coverage Processing Service (WCPS)

WCPS defines a query language which allows to combine and process coverages for navigation, extraction (download), aggregation, and ad-hoc analysis. The abstract language is defined in [OGC 08-068r1], the WCS protocol embedding in [OGC 08-059r3]. The WCS embedding of WCPS requires implementation of [OGC 08-068r1].

1.1.3 Protocol extensions

This category of extensions describes client / server communication protocols (including request parameter encodings) which a WCS implementation may offer and use. Every WCS, be it client or server, shall support at least one protocol extension.

NOTE This does not include result coverage encodings as delivered by GetCoverage requests.

1.1.3.1 HTTP GET/KVP

Requests are sent as HTTP GET parameters. Coverages are encoded in some data format (as specified by a format encoding extension), other response parameters are encoded in XML.

1.1.3.2 HTTP POST/XML

Requests are sent as HTTP POST using an XML encoding. Coverages are transferred using some data format (as specified by a format encoding extension).

1.1.3.3 SOAP

Requests and responses are communicated via SOAP using XML. Coverages are transferred using some data format (as specified by a format encoding extension).

1.1.3.4 REST

Requests are sent using the RESTful paradigm. Coverages are encoded in some data format (as specified by a format encoding extension).

1.1.4 Coverage encoding extensions

Coverages can be delivered by GetCoverage requests (or uploaded, via WCS-T Transaction requests) in different data formats.

In addition and independently from any data format, coverages can be delivered as either pure GML documents, or as a format-encoded data file only, or as a combination where GML is used to represent the metadata and the data file holds the range values (“pixels”, “voxels”). This will be described in a separate format extension.

Every WCS, be it client or server, shall support at least one encoding format. This can be a format defined in an extension or the GML coverage representation defined in [OGC 09-110] and [OGC 09-146].

This open-ended list is likely to encompass GML, NetCDF, GeoTIFF, and many more.

Note that not all formats are suitable to transport all kinds of coverages; limitations can be given by, for example, the dimensions supported (TIFF cannot hold 4-D coverages) or the cell type (BMP cannot hold hyperspectral imagery).

1.1.5 Usability extensions

This set of extensions focuses on usability of the service overall, rather than on bespoke data or service functionality.

1.1.5.1 Multi-lingual support

Text messages can be delivered in various languages by a service.

2 Addressed Change Requests

Over the course of its lifetime the WCS SWG addressed several change requests. Some change requests were formally submitted to the OGC. Others change requests were non-formal requests for clarification that the WCS SWG deemed needed to be addressed in the standard.

Many of addressed change requests have been made irrelevant because the WCS 2.0 standard a major overhaul and is written in a different style compared to the WCS 1.1.2 standard. The biggest change is that the WCS standard has been modularized into a core plus extensions following the OGC's policy "The Specification Model — A Standard for Modular specifications [OGC 08-131r3]". The modularization of the WCS caused some change requests to no longer apply because they need to be addressed in extensions.

2.1 Resolved change requests

The following table of change requests have been addressed by the WCS SWG and a solution is in place within the WCS 2.0 family of standards. They can all be considered closed.

Several change requests are initial attempts to modularize the WCS 1.1.2 standard. Those change requests contain the ideas used by the WCS SWG to modularize the WCS 2.0 standard.

OGC ###	Title & Description
04-049r1 *closed*	**WCS Change Proposal for SOAP Profile** The WCS 2.0 standard package has a SOAP encoding extension. This change request is superseded by OWS Common 1.2 [OGC 06-121r8] and Add SOAP encoding [OGC 06-085r2].
06-150 *closed*	**Define URN to identify service type** All service type URNs fall under the purview of the OGC naming authority. See http://www.opengeospatial.org/ogcna
07-084 *closed*	**Reduce Implementation Options** This change request is a precursor to the modularization of the WCS standard into a core plus extensions. This is similar to CR "Add conformance classes [07-058r2]".
07-102 *closed*	**Divide Specification Into Base Plus Extensions** This change request is a precursor to the modularization of the WCS standard.
08-116 *closed*	**Coverage encoding extension interface** This change request is a precursor to the modularization of the WCS standard.

08-178 *closed*	**Separate Grid Coverage Common** This change request is a precursor to the modularization of the WCS standard.
08-012r3 *closed*	**Use OWS Common nilValue elements** The WCS 2.0 standard is derived from OWS Common 1.2 and uses the URNs defined by the OGC naming authority (OGC NA).
06-085r2 *closed*	**Add SOAP encoding** This CSR is addressed by the WCS SOAP extension [OGC 09-149]. It is a variation of change request [OGC 04-049r1].
07-058r2 *closed*	**Add conformance classes** This change is addressed by the modularization of the WCS and it follows the OGC's policy "The Specification Model — A Standard for Modular specifications [OGC 08-131r3]".
08-033r1 *closed*	**Abstract Test Suite** The WCS 2.0 has an abstract test suite.
08-166r1 *closed*	**Expand output coverage metadata** The WCS core addresses this issue by making the WCS GML application schema the canonical coverage. All coverages need to support the metadata described in the WCS GML schema.

2.2 Change requests that should be addressed in extensions

The following change requests were considered by the WCS SWG but did not result in documents or make it into any of the existing WCS 2.0 documents. The WCS SWG deemed the following change requests required extensions to the WCS 2.0 core and family of extensions.

OGC ###	Title & Description
08-017r1 *postponed*	**Clarify "none" Interpolation Method Type** The WCS SWG did not add this in the WCS 2.0 core or any extensions. An extension is needed to address this issue. This change request may be addressed by a later incarnation of the WCS SWG.
08-049r1 *postponed*	**Modify Spatial Domain Structure** The WCS SWG did not add this in the WCS 2.0 core or any extensions. An extension is needed to address this issue. With the new refactoring this may no longer be an issue.
08-202 *postponed*	**Generalized Constraint Capability In Core** The WCS SWG did not add this to the WCS 2.0 core or any extensions. An

	extension is needed to address this issue.
07-145 *postponed*	**JP2GML Encoding Extension**
	The WCS SWG did not add this to the WCS 2.0 core or any extensions. An extension is needed to address this issue.
07-146 *postponed*	**JPIP Encoding Extension**
	The WCS SWG did not add this to the WCS 2.0 core or any extensions. An extension is needed to address this issue.
07-146 *postponed*	**Extension for ECWP encoding format**
	The WCS SWG did not add this to the WCS 2.0 core or any extensions. An extension is needed to address this issue.

2.3 Postponed change requests

The following change requests have been postponed

OGC ###	Title & Description
08-008 *postponed*	**General Reference Systems**
	Three variations of the change request were presented (Option A: 08-008r3, Option B: 08-008r4, Option C: 08-008r5 - OpenGIS® Abstract Specification Proposed Topic 19: General Reference Systems) to the CRS DWG. All three were rejected by the CRS DWG. Thus, the WCS SWG chose to not support general reference systems within the WCS 2.0 standard. The WCS SWG decided to only allow any combination of spatial and temporal axes within the domain. This will be re-addressed once the CRS DWG resolves the issue.
08-196r1 *postponed*	**Refactor XML Schemas**
	This change request was forgotten during the WCS SWG's work. It is not critical to the WCS standards functionality.
09-099 *postponed*	**Incorporate UncertML**
	The WCS SWG decided to wait for feedback from the OAB and the overall OGC membership on the direction to take with regards to uncertainty measures.
08-105r5 *postponed*	**Improve CRS description**
	Several versions of this change request were produced: 08-105r1, 08-105r2, 08-105r2 SDK, 08-105r3, 08-105r4, & 08-105r5. The WCS SWG did not add this to the WCS 2.0 core or any extensions. An extension is needed to address this issue.

2.4 Change requests addressed in WCS 1.1.2.

These change requests have been addressed and resolved in the WCS 1.1.2 standard. They are included here to ensure that the official change request page [http://www.opengeospatial.org/standards/cr] is updated to reflect the existing status. Please see corrigendum document [OGC 07-066r5] for details on each change request.

OGC ###	Title & Description
07-149r2 *closed*	Allow non-georeferenced images
07-173r2 *closed*	Summarize CRS uses
08-018r1 *closed*	Clarify Temporal Domain Parameter

