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OGC® OWS-8 WCS 2.0 Earth Observation Application Profile Compliance Tests ER

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Preface

This Engineering Report was prepared as a deliverable for the OGC Web Services, Phase 8 (OWS-8) initiative of the OGC Interoperability Program. The document presents the work completed with respect to the Observation Fusion OF-Tracking sub-thread within OWS-8.

This Engineering Report describes and evaluates the specification of EO-WCS ATS and the implementation of ETS for use within an OGC SOA processing chain.

In OGC's Interoperability Initiatives, international teams of technology providers work together to solve specific geoprocessing interoperability problems posed by the Initiative's sponsoring organizations. OGC Interoperability Initiatives include test beds, pilot projects, interoperability experiments and interoperability support services - all designed to encourage rapid development, testing, validation and adoption of OGC standards.

The OWS-8 sponsors are organizations seeking open standards for their interoperability requirements. After analyzing their requirements, the OGC Interoperability Team recommend to the sponsors that the content of the OWS-8 initiative be organized around the following threads:

* Observation Fusion

* Geosynchronization (Gsync)

* Cross-Community Interoperability (CCI)

* Aviation

More information about the OWS-8 testbed can be found at:

http://www.opengeospatial.org/standards/requests/74

OGC Document [11-139] “OWS-8 Summary Report” provides a summary of the OWS-8 testbed and is available for download:

https://portal.opengeospatial.org/files/?artifact_id=46176

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1 Introduction

1.1 Scope

As a thread of activity in OWS-8, Observation Fusion thread combines the OGC Earth Observation Web Coverage Service (EO-WCS) standard and architecture with the results of the recent OGC development of EO-WCS abstract test suites (ATS) and executable test suites (ETS). Coverage was one of three categories in of the Fusion Standards study. The EO-WCS architecture was designed to enable web-accessible earth observation coverages offered by a WCS 2.0 server through common interfaces and encodings. An Earth observation coverage is a coverage extended with EO Metadata [OGC 10-157r2] and bound to a location on the Earth. EO Coverages are a subtype of either `GMLCOV::RectifiedGridCoverage` or `GMLCOV::ReferenceableGridCoverage`. The purpose of the OGC EO-WCS framework is to provide interoperability among multidisciplinary earth observation coverages, as well as to serve as an interoperable bridge between earth sensors, models and simulations, networks, and decision support tools. The development of EO-WCS ATS and ETS continues the further refinement and extension of EO-WCS with an emphasis on Earth Observation tasks.

1.2 Document contributor contact points

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

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1.3 Revision history

Date	Release	Editor	Primary clauses modified	Description
2011/07/07	Draft	JY, PB		Draft submission, outline, some diagrams and models.

1.4 Foreword

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.

2 References

The following documents are referenced in this document. 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.

OGC 06-121r9. *OGC Web Services Common Standard*, version 2.0

OGC 10-140. OGC® Web Coverage Service 2.0 Interface Standard - Earth Observation Application Profile

In addition to this document, this report includes several test document files as specified in Annex A and Annex B.

3 Terms and definitions

For the purposes of this report, the definitions specified in Clause 4 of the OWS Common Implementation Specification [OGC 06-121r9] shall apply. In addition, the following terms and definitions apply.

4 Conventions

4.1 Abbreviated terms

OGC	Open Geospatial Consortium
OWS	Open Web Service
OWS-8	OGC Web Services Initiative, Phase 8
WCS	Web Coverage Service

EO-WCS OGC® Web Coverage Service 2.0 Interface Standard - Earth Observation Application Profile

ATS Abstract test suite

ETS Executable test suite

5 OGC® OWS-8 EO-WCS ATS and ETS Overview

The topic for this report addresses a need to explore the use of EO-WCS ATS and ETS to improve the EO-WCS implementations and evaluate how much the specification itself supports testing of these implementations. EO-WCS ATS is specified according to the requirements in the EO-WCS specification and provides a basis for developing requirement-consistent ETS. The ETS is specified in OGC Compliance Test Language (CTL). Currently, OGC Compliance & Interoperability Testing & Evaluation (CITE) program uses OGC's Test, Evaluation, and Measurement (TEAM) Engine, which is fed with the specified CTL scripts to test these implementations.

6 ATS

According to the standards studied, an EO-WCS implementation must satisfy the following system characteristics to be conformant with this specification:

- **EO Data Model**, see Table 1;
- **Service operations**, such as GetCapabilities, DescribeCoverage, GetCoverage and DescribeEOCoverageSet, see Table 2;
- **Service extensions**, see Ttable 3;
- **Service protocols**, see Table 4.

Table 1— EO Data Model

Name	ATS	Approach
EO data model	A.1.1-1.28	XML schema/schematron validation*.

NOTE * Tests on specific overage format encodings are stubbed because schema/schematron validation approach is not able to handle encodings other than xml.

Table 2— Service Operations

Name	ATS	Approach
GetCapabilities	A.1.29-1.37	Check according to the corresponding requirements

Describe Coverage	A.1.38-1.39	Check according to the corresponding requirements
GetCoverage	A.1.40-1.45	Depends on coverage format encodings*
DescribeEOCoverageSet	A.1.46-1.61	Check according to the corresponding requirements

NOTE * If the response is in a pure format other than GML, no XML schema/schematron validation applies. If the response is in a mixed-format, XML schema/schematron validation applies. In this case, testing on RangeSet is not available because the corresponding mapping mechanism is not provided. If the response is in GML, XML schema/schematron validation applies. However, the performance would be very poor in real practice.

Table 3— Service extensions

Name	ATS	Approach
Service extensions*	A.1.62-66	Determine the list of supported extensions via a valid GetCapabilities request; check that the extension required is listed. Invoke extension test if it exists.

NOTE * Service extension test is stubbed if the corresponding specification is not available.

Table 4— Service protocols

Name	ATS	Approach
Service protocols *	A.2-A.3	Determine the list of supported protocols and send requests as defined. Check that proper responses are returned.

7 ETS

The currently available test functionality includes:

- *GetCapabilities* request contains a `sections` element
- *GetCapabilities* response structure
- *GetCapabilities* response `WCSEO::DatasetSeriesSummary` element
- *GetCapabilities* response `WCS::CoverageSummary` element

- *GetCapabilities* response `WCS::CoverageSubtype` element
- *DescribeCoverage* response `WCSEO::EOMetadata` element
- *DescribeCoverage* response `WCS::CoverageSubtype` element
- *DescribeEOCoverageSet* request structure
- *DescribeEOCoverageSet* request contains a `sections` element and the response
- *DescribeEOCoverageSet* request contains an `eoId` parameter and the response
- *DescribeEOCoverageSet* request contains a `containment` parameter and the response
- *DescribeEOCoverageSet* request contains `dimensionTrim` elements with `dimension parameters` and the response
- *DescribeEOCoverageSet* request contains `crs` and the response
- Get/KVP and SOAP protocol-bindings
- Service extension supports

The test suite can be downloaded from: https://svn.opengeospatial.org/ogc-projects/cite/scripts/wcseo/1.0/.

8 Issues found

8.1 Consistency

Should the EO-WCS be consistent with WCS 2.0? Semantically, the answer is yes. That is because the WCS 2.0 defines the abstract interfaces and the abstract data model and the EO-WCS defines the profile based on these abstract models. Specifically, the EO-WCS is inherited from the WCS 2.0.

Syntactically, the answer is yes. However, the EO-WCS adds specific domain knowledge based on WCS 2.0 and create some mandatory ingredients. These extra ingredients are not recognized by the WCS 2.0. Therefore, EO-WCS implementations will not pass the WCS 2.0 test by the schema validation unless these extra ingredients are added to XML Schema *any* element in WCS 2.0.

8.2 Extra test

Should WCS 2.0 soap extension (OGC 09-149r1 req8) test the service WSDL, which is a W3C service description language and contains duplicate information in the GetCapabilities response? Obviously, CITE TEAMENGINE does not know this WSDL. However, both W3C WSDL file and OGC GetCapabilities response should contain some consistent information on the service description. Therefore, an extra test is needed to test such a phenomenon. Then, the question is how to invoke this extra test on WSDL and build the connection between W3C and OGC.

8.3 Inconclusive result

In face of a bad Internet connection the following error will always be reported back:

```
Cannot resolve the name 'xml:lang' to a(n) 'attribute
declaration' component
```

Although the implementation may be correct, TEAM Engine treats this as a test fail. However, this should be an "inconclusive result due to failed server connection".

8.4 Can not test invalid requests in SOAP

Invalid requests, which are needed to test the service, are not supported. For example,

OGC 10-140 A.1.46	/conf/eowcs/describeEOCoverageSet-request-structure
Test method:	Send *DescribeEOCoverageSet* requests with valid and invalid request structure. Pass test if appropriate valid results or exceptions, resp., are delivered.

Whenever an invalid request is sent by SOAP, an error "`DOMSender: no start node defined`" will be reported.

OGC 06-126r2 Subclause 9.3.3.10 states that "*Body: The <body> element contains the data to be included in the SOAP body. The element should contain XML compliant with the web service interface.*" Note the "should".

Annex A

EO-WCS ATS

The ATS is included in OGC 10-140 Annex A.

Annex B

EO-WCS ETS

The test suite is available from:
https://svn.opengeospatial.org/ogc-projects/cite/scripts/wcseo/1.0/