

Open Geospatial Consortium Inc.

Date: 2007-11-16

Reference number of this OGC® project document: **OGC 07-099r1**

Version: 1.0.0

Category: OGC® Implementation Specification

Editor: Andreas Matheus

Geospatial eXtensible Access Control Markup Language (GeoXACML)

Extension B – GML3 Encoding

Version 1.0

Copyright notice

Copyright © 2007 Open Geospatial Consortium, Inc. All Rights Reserved.
To obtain additional rights of use, visit <http://www.opengeospatial.org/legal/>.

Document type: OGC® Publicly Available Standard
Document subtype: Encoding
Document stage: Approved
Document language: English

Disclaimer

Issues of absolute or relative accuracy of feature geometry and positioning data and the computational stability of finite precision arithmetic as used in all computers will affect results where distance measure, geometry or positional values are compared. For this reason, and the variety of statistically valid but different implementation approaches to these issues, Boolean criteria as used in XACML or GeoXACML policy statements will not always produce uniform results across geographic implementations. For these reasons, users of this technology should not ask for fine gradations of measures that their data or coordinate transformation cannot support, but should alternately allow a "tolerant" approach where feasible which might give access to slightly more data than would be given in a perfect computational, but impossible to implement, environment.

Contents

1	Scope.....	8
2	Conformance	8
3	Normative references.....	9
4	GeoXACML Data Type for GML3 Encoding (normative).....	10
Annex A	GeoXACML Conformance Tables (normative).....	11
Annex B	GML3 Geometry Encoding Examples (informative)	12
B.1	Point Geometry	12
B.2	LineString Geometry	12
B.3	Polygon Geometry.....	12
Annex C	GeoXACML Policy Construct Examples (informative).....	13
C.1	Polygon Geometry Attribute Value.....	13
C.2	MultiPoint Attribute Value.....	13
C.3	Creating a Bag of Geometries.....	14
C.4	Function	14
C.5	Condition	14
Annex D	Example for protecting a OWS using GeoXACML (informative).....	15
D.1	Condition encoding for the WMS example	15
D.2	Condition encoding for the WFS example.....	17

i. Preface

This document defines the normative encoding of geometries to be used in GeoXACML based on the GML3 Simple Features Profile.

ii. Submitting organizations

The following organizations submitted this Implementation Specification to the Open Geospatial Consortium Inc. as a Request For Comment (RFC):

Universität der Bundeswehr München

Andreas Matheus
Werner-Heisenberg-Weg 39
D-85579 Neubiberg
Germany
andreas.matheus(at)unibw.de

Galdos Systems Inc.

Ron Lake
1300-409 Granville St
Vancouver V6C 1T2
Canada
Rlake(at)galdosinc.com

iii. Submission and contribution contact points

All questions regarding this submission should be directed to the editor or the submitters:

CONTACT	COMPANY	EMAIL
Andreas Matheus	Universität der Bundeswehr München	Andreas.Matheus(at)unibw.de
Jan Herrmann	Ludwig-Maximilians-Universität München	jan.herrmann(at)lmu.de
Martin Kyle	Sierra Systems Group, Inc.	MartinKyle(at)SierraSystems.com

iv. Revision history

Date	Release	Author	Paragraph modified	Description
2007-08-10	0.1.0	Andreas Matheus	All	Initial Writing
2007-08-20	0.2.0	Andreas Matheus	4, Annex A	Insert Null geometry; make all definitions mandatory<
2007-08-22	0.3.0	Andreas Matheus	4, A.1	As suggested by Jan, GML geometry encoding shall be version aware
2007-08-24	0.4.0	Andreas Matheus	Annex C, D	Restructuring of examples
2007-09-07	0.5.0	Martin Kyle	All	Editorial corrections
2007-10-25	0.6.0	Andreas Matheus	All	Incorporation of comments and decisions from the TC meeting 17.-21.9.2007
2007-11-16	0.7.0	Andreas Matheus	p. 2 throughout throughout	Insert of disclaimer GeoXACML URN corrections final formatting

v. Changes to the OGC® Abstract Specification

The OpenGIS® Abstract Specification does not require changes to accommodate this standard.

Foreword

Normative Annex A provides the GeoXACML conformance tables.

Informative Annex B provides GML3 encoding examples.

Informative Annex C provides GeoXACML Policy construct examples.

Informative Annex D provides the GML3 specific encoding of the <Condition> element, used in the example of the core specification in Annex C.

Introduction

This specification is a normative extension to the GeoXACML core Implementation Specification ([2]). It defines the GML3 encoding for geometries.

OpenGIS® Geospatial eXtensible Access Control Markup Language (GeoXACML) Implementation Specification – Version 1.0

Extension B – GML3 Encoding

1 Scope

This document defines an extension to the GeoXACML Implementation Specification, Version 1.0 ([2]) for the GML3 geometry encoding as specified in the GML3 Specification ([3]) and the Simple Features Profile ([4]), level SF-2.

2 Conformance

In order to claim conformance with this extension of the GeoXACML specification, an implementation of a **PDP** MUST be conform with

- (i) the XACML specification as stated in [1], section 10 AND
- (ii) the GeoXACML specification as stated in [2], section 2 AND
- (iii) the data type encoding as provided in section 4 AND
- (iv) the conformance table provided in Annex A of this specification.

3 Normative references

- [1] OASIS, *eXtensible Access Control Markup Language (XACML) Version 2.0*, 1 Feb 2005, http://docs.oasis-open.org/xacml/2.0/access_control-xacml-2.0-core-spec-os.pdf
- [2] OGC, *OpenGIS® GeoXACML Implementation Specification, Version 1.0*, 2007-11-16
- [3] OGC, *OpenGIS® Geography Markup Language(GML) Implementation Specification, Version 3.1.1*, 2004-02-07, http://portal.opengeospatial.org/files/?artifact_id=4700
- [4] OGC, *Geography Markup Language (GML) simple features profile, Version 1.0*, Version 1.0, Date: 2006-04-25, http://portal.opengeospatial.org/files/?artifact_id=15201

4 GeoXACML Data Type for GML3 Encoding (normative)

The Geography Markup Language GML of Version 3 as specified in [3] and the Simple Features Profile – level SF-2 as specified in [4] defines – beside other aspects – the XML encoding for geometric data types.

In order to use GML3 geometric data type attribute values, this extension to the GeoXACML core specification supports the following GML3 data type URIs:

GML URI
http://www.opengis.net/gml#Point
http://www.opengis.net/gml#LineString
http://www.opengis.net/gml#Polygon
http://www.opengis.net/gml#LinearRing
http://www.opengis.net/gml#Envelope
http://www.opengis.net/gml#MultiPoint
http://www.opengis.net/gml#MultiCurve
http://www.opengis.net/gml#MultiSurface

Table 1 — GML3 data type URIs

Annex A GeoXACML Conformance Table (normative)

This Annex defines which GML data type definitions are mandatory to be implemented toward BASIC conformance.

In order to pass the BASIC conformance level, an implementation SHALL process ALL attribute URIs marked “T” for ALL test cases defined in [2], Annex B.4, B.5 and B.6.

GML URI	Conformance Class
http://www.opengis.net/gml#Point	I
http://www.opengis.net/gml#LineString	I
http://www.opengis.net/gml#Polygon	I
http://www.opengis.net/gml#LinearRing	I
http://www.opengis.net/gml#Envelope	I
http://www.opengis.net/gml#MultiPoint	I
http://www.opengis.net/gml#MultiCurve	I
http://www.opengis.net/gml#MultiSurface	I

Annex B GML3 Geometry Encoding Examples (informative)

B.1 Point Geometry

```
<gml:Point srsName="urn:ogc:def:crs:EPSG:6.6:4326">
  <gml:pos>45.256 -110.45</gml:pos>
</gml:Point>
```

Figure B.1 — GML3 Point Example

B.2 LineString Geometry

```
<gml:LineString srsName="urn:ogc:def:crs:EPSG:6.6:4326">
  <gml:pos>45.256 -110.45 50.4 -100.3</gml:pos>
</gml:LineString>
```

Figure B.2 — GML3 LineString Example

B.3 Polygon Geometry

```
<gml:Polygon id="Europe" srsName="urn:ogc:def:crs:EPSG:6.6:4326"
  xmlns:gml="http://www.opengis.net/gml">
  <gml:exterior>
    <gml:LinearRing>
      <gml:posList dimension="2">
        -11 55 -10 35 -5.5 36 -1 36 1 38 5 38 11 38 14 36 26 33 29 36
        26 39 29 46 39 47 40 49 27 56 27 60 25 60 20 58 21 56 19 55
        11 55 10 57 7 57 8 54 3 53 -2 60 -8 58 -11 55 -11 55
      </gml:posList>
    </gml:LinearRing>
  </gml:exterior>
</gml:Polygon>
```

Figure B.3 — GML3 Polygon Example

Annex C GeoXACML Policy Construct Examples (informative)

The following examples are based on the GML3 encoding for geometry types as specified in this part (Part B – GML3 Encoding), according to the underlying geometric model as introduced in the core specification of GeoXACML (see [2]).

C.1 Polygon Geometry Attribute Value

```
<AttributeValue DataType="urn:ogc:def:dataType:geoxacml:1.0:geometry">
  <gml:Polygon id="Europe" srsName="urn:ogc:def:crs:EPSG:6.6:4326"
  xmlns:gml="http://www.opengis.net/gml">
    <gml:exterior>
      <gml:LinearRing>
        <gml:posList dimension="2">
          -11 55 -10 35 -5.5 36 -1 36 1 38 5 38 11 38 14 36 26 33 29 36
          26 39 29 46 39 47 40 49 27 56 27 60 25 60 20 58 21 56 19 55
          11 55 10 57 7 57 8 54 3 53 -2 60 -8 58 -11 55 -11 55
        </gml:posList>
      </gml:LinearRing>
    </gml:exterior>
  </gml:Polygon>
</AttributeValue>
```

Figure C.1 — GeoXACML Polygon <AttributeValue> Example

C.2 MultiPoint Attribute Value

```
<AttributeValue DataType="urn:ogc:def:dataType:geoxacml:1.0:geometry">
  <gml:MultiPoint xmlns:gml="http://www.opengis.net/gml"
  srsName="urn:EPSG:geographicCRS:4326">
    <geometryMember>
      <gml:Point srsName="urn:ogc:def:crs:EPSG:6.6:4326"
  xmlns:gml="http://www.opengis.net/gml">
        <gml:pos>0 0</gml:pos>
      </gml:Point>
    </geometryMember>
    <geometryMember>
      <gml:Point srsName="urn:ogc:def:crs:EPSG:6.6:4326"
  xmlns:gml="http://www.opengis.net/gml">
        <gml:pos>1 1</gml:pos>
      </gml:Point>
    </geometryMember>
  </gml:MultiPoint>
</AttributeValue>
```

Figure C.2 — GeoXACML MultiPoint <AttributeValue> Example

C.3 Creating a Bag of Geometries

```
<Function FunctionId="urn:ogc:def:function:geoxacml:1.0:geometry-bag"/>
<AttributeValue DataType="urn:ogc:def:dataType:geoxacml:1.0:geometry">
  <gml:Point srsName="urn:ogc:def:crs:EPSG:6.6:4326"
xmlns:gml="http://www.opengis.net/gml">
  <gml:pos>0 0</gml:pos>
  </gml:Point>
</AttributeValue>
<AttributeValue DataType="urn:ogc:def:dataType:geoxacml:1.0:geometry">
  <gml:Point srsName="urn:ogc:def:crs:EPSG:6.6:4326"
xmlns:gml="http://www.opengis.net/gml">
  <gml:pos>1 1</gml:pos>
  </gml:Point>
</AttributeValue>
```

Figure C.3 — GeoXACML Bag of Geometries Example

C.4 Function

```
<Function FunctionId="urn:ogc:def:function:geoxacml:1.0:geometry-
within"/>
```

Figure C.4 — GeoXACML <Function> Example

C.5 Condition

```
<Condition FunctionId="urn:oasis:names:tc:xacml:1.0:function:all-of">
  <Function FunctionId="urn:ogc:def:function:geoxacml:1.0:geometry-
contains"/>
  <AttributeValue
DataType="urn:ogc:def:dataType:geoxacml:1.0:geometry">
    <gml:Polygon id="Europe" srsName="urn:ogc:def:crs:EPSG:6.6:4326"
xmlns:gml="http://www.opengis.net/gml">
      <gml:exterior>
        <gml:LinearRing>
          <gml:posList dimension="2">
            -11 55 -10 35 -5.5 36 -1 36 1 38 5 38 11 38 14 36 26 33 29 36
            26 39 29 46 39 47 40 49 27 56 27 60 25 60 20 58 21 56 19 55
            11 55 10 57 7 57 8 54 3 53 -2 60 -8 58 -11 55 -11 55
          </gml:posList>
        </gml:LinearRing>
      </gml:exterior>
    </gml:Polygon>
  </AttributeValue>
  <AttributeSelector
DataType="urn:ogc:def:dataType:geoxacml:1.0:geometry"
RequestContextPath="//ogc:BBOX/gml:Envelope"/>
</Condition>
```

Figure C.5 — GeoXACML Condition Example

Annex D Example for protecting a OWS using GeoXACML (informative)

This Annex contains the encodings of GeoXACML condition elements to be used for the WMS and WFS protection example, presented in Annex C of the core specification.

D.1 Condition encoding for the WMS example

For the full example see [2], Annex C.

```

<Condition>
  <Apply FunctionId="urn:oasis:names:tc:xacml:1.0:function:and">
    <Apply FunctionId="urn:ogc:def:function:geoxacml:1.0:all-of">
      <Function FunctionId="urn:oasis:names:tc:xacml:1.0:function:string-
equal"/>
      <AttributeSelector
RequestContextPath="//wms:GetMap/*/sld:NamedLayer/sld:Name"
DataType="http://www.w3.org/2001/XMLSchema#string"/>
      <AttributeValue
DataType="http://www.w3.org/2001/XMLSchema#string">Capitals</AttributeValue>
    </Apply>
    <Apply FunctionId="urn:oasis:names:tc:xacml:1.0:function:not">
      <Apply FunctionId="urn:oasis:names:tc:xacml:1.0:function:any-of">
        <Function
FunctionId="urn:ogc:def:function:geoxacml:1.0:geometry-contains"/>
        <AttributeValue
DataType="urn:ogc:def:dataType:geoxacml:1.0:geometry">
          <gml:Polygon id="North and South America"
srsName="urn:ogc:def:crs:EPSG:6.6:4326"
xmlns:gml="http://www.opengis.net/gml">
            <gml:exterior>
              <gml:LinearRing>
                <gml:posList dimension="2">-180 60 -180 47 -137
55 -125 35 -110 17 -80 5 -87 -5 -74 22 -78 -53 -67 -58 -60 -48 -35 -23 -27 -3
-55 12 -60 22 -75 30 -67 42 -50 45 -60 85 -60 85 -85 85 -120 80 -130 75 -160
75 -168 70 -180 60</gml:posList>
              </gml:LinearRing>
            </gml:exterior>
          </gml:Polygon>
        </AttributeValue>
      </Apply>
      <AttributeSelector
RequestContextPath="//gml:boundedBy/gml:Envelope"
DataType="urn:ogc:def:dataType:geoxacml:1.0:geometry"/>
    </Apply>
  </Apply>
  <Apply FunctionId="urn:oasis:names:tc:xacml:1.0:function:all-of">
    <Function FunctionId="urn:ogc:def:function:geoxacml:1.0:geometry-
disjoint"/>
    <AttributeValue
DataType="urn:ogc:def:dataType:geoxacml:1.0:geometry">
      <gml:Polygon id="North and South America"
srsName="urn:ogc:def:crs:EPSG:6.6:4326"
xmlns:gml="http://www.opengis.net/gml">
        <gml:exterior>
          <gml:LinearRing>
            <gml:posList dimension="2">-180 60 -180 47 -137
55 -125 35 -110 17 -80 5 -87 -5 -74 22 -78 -53 -67 -58 -60 -48 -35 -23 -27 -3
-55 12 -60 22 -75 30 -67 42 -50 45 -60 85 -60 85 -85 85 -120 80 -130 75 -160
75 -168 70 -180 60</gml:posList>
          </gml:LinearRing>
        </gml:exterior>
      </gml:Polygon>
    </AttributeValue>
  </Apply>

```

```

        </gml:exterior>
        </gml:Polygon>
      </AttributeValue>
      <AttributeSelector
RequestContextPath="//gml:boundedBy/gml:Envelope"
DataType="urn:ogc:def:dataType:geoxacml:1.0:geometry"/>
    </Apply>
  </Apply>
</Condition>

```

Figure D.1 — GeoXACML Condition using GML3 geometry encoding

```

<Condition>
  <Apply FunctionId="urn:oasis:names:tc:xacml:1.0:function:and">
    <Apply FunctionId="urn:oasis:names:tc:xacml:1.0:function:all-of">
      <Function FunctionId="urn:oasis:names:tc:xacml:1.0:function:string-
equal"/>
      <AttributeValue
DataType="http://www.w3.org/2001/XMLSchema#string">Capitals</AttributeValue>
      <AttributeSelector
RequestContextPath="//wms:GetMap/*/sld:NamedLayer/sld:Name"
DataType="http://www.w3.org/2001/XMLSchema#string"/>
    </Apply>
    <Apply FunctionId="urn:oasis:names:tc:xacml:1.0:function:all-of">
      <Function FunctionId="urn:ogc:def:function:geoxacml:1.0:geometry-
contains"/>
      <AttributeValue
DataType="urn:ogc:def:dataType:geoxacml:1.0:geometry">
        <gml:Polygon id="Europe" srsName="urn:ogc:def:crs:EPSG:6.6:4326"
xmlns:gml="http://www.opengis.net/gml">
          <gml:exterior>
            <gml:LinearRing>
              <gml:posList dimension="2">-11 55 -10 35 -5.5 36 -1
36 1 38 5 38 11 38 14 36 26 33 29 36 26 39 29 46 39 47 40 49 27 56 27 60 25 60
20 58 21 56 19 55 11 55 10 57 7 57 8 54 3 53 -2 60 -8 58 -11 55 -11
55</gml:posList>
            </gml:LinearRing>
          </gml:exterior>
        </gml:Polygon>
      </AttributeValue>
      <AttributeSelector
RequestContextPath="//gml:boundedBy/gml:Envelope"
DataType="urn:ogc:def:dataType:geoxacml:1.0:geometry"/>
    </Apply>
  </Apply>
</Condition>

```

Figure D.2 — GeoXACML Condition using GML3 geometry encoding

D.2 Condition encoding for the WFS example

For the full example see [2], Annex C.

```

<Condition>
  <Apply FunctionId="urn:oasis:names:tc:xacml:1.0:function:all-of">
    <Function FunctionId="urn:ogc:def:function:geoxacml:1.0:geometry-
contains"/>
    <AttributeValue DataType="urn:ogc:def:dataType:geoxacml:1.0:geometry">
      <gml:Polygon id="P" srsName="urn:ogc:def:crs:EPSG:6.6:4326"
xmlns:gml="http://www.opengis.net/gml">
        <gml:exterior>
          <gml:LinearRing>
            <gml:posList dimension="2">
-74.28798767828596 40.72400955310945 -74.12552621736093 40.722605998371435 -
74.12552621736093 40.614883172228936 -74.28939123302396 40.61558494959794 -
74.28798767828596 40.72400955310945 -74.28798767828596 40.72400955310945 -
74.28798767828596 40.72400955310945
            </gml:posList>
          </gml:LinearRing>
        </gml:exterior>
      </gml:Polygon>
    </AttributeValue>
    <AttributeSelector
RequestContextPath="//wfs:Transaction/wfs:Insert/ows4:HeliPad_P2/ows4:the_geom/
gml:Point" DataType="urn:ogc:def:dataType:geoxacml:1.0:geometry"/>
  </Apply>
</Condition>

```

Figure D.3 — GeoXACML Condition using GML3 geometry encoding

Bibliography

- [5] OASIS, *Core and hierarchical role based access control (RBAC) profile of XACML v2.0*, 2005-02-01, http://docs.oasis-open.org/xacml/2.0/access_control-xacml-2.0-rbac-profile1-spec-os.pdf
- [6] OASIS, *SAML 2.0 profile of XACML v2.0*, 2005-02-01, http://docs.oasis-open.org/xacml/2.0/access_control-xacml-2.0-saml-profile-spec-os.pdf
- [7] Cover Pages, Extensible Access Control Markup Language (XACML), <http://xml.coverpages.org/xacml.html>
- [8] OGC, *The OpenGIS® Abstract Specification Topic 18: Geospatial Digital Rights Management Reference Model (GeoDRM RM), Version: 1.0.0*, 2006-12-29, http://portal.opengeospatial.org/files/?artifact_id=17802
- [9] Vivid Solutions, *JTS Topology Suite Technical Specifications, Version 1.4*, <http://www.vividsolutions.com/JTS/bin/JTS%20Technical%20Specs.pdf>
- [10] OGC, *OpenGIS® Web Service Common Implementation Specification, Version 1.0.0*, 2005-11-22, http://portal.opengeospatial.org/files/?artifact_id=8798
- [11] OGC, *OpenGIS® Web Map Service Implementation Specification, Version 1.3.0*, 2004-01-20, http://portal.opengeospatial.org/files/?artifact_id=4756
- [12] OGC, *OpenGIS® Web Feature Service Implementation Specification, Version 1.1.0*, 2005-05-03, http://portal.opengeospatial.org/files/?artifact_id=8339