Web Map Context Documents

Contents

i.   Preface

This document is the result of work begun during the first and second OGC Web Mapping Testbeds in 1999 and 2000 by IONIC Software and the US National Aeronautics and Space Administration (NASA) and demonstrated by IONIC in September 1999.   At the OGC Technical Committee meeting in June 2002 work by GeoConnections / Natural Resources Canada and NASA was demonstrated. This demonstration showed a map comprising layers from several distinct servers being built up in one Viewer Client, the creation of a platform-independent description of that map, the retrieval of that description by an entirely different Client, and the display of the map in the second Client.   The ability to read and write Context documents has already been tested in many OGC Interoperability Program testbeds such as OWS, GISD, and CIPI.

ii.   Submitting Organizations

The OGC Web Map Context Documents Revision Working Group submits this Document to the OGC Technical Committee as Version 1.1.0 of the OGC® Web Map Context Documents Implementation Specification.

iii.   Submission Contact Points

All questions regarding this submission should be directed to the Editor:

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iv. Revision History

Date	Release	Editor	Description
2000-05-05	0.1.0	Jeff de La Beaujardière Dimitri Monie	First draft proposed to WMT mailing list.
2000-06-27	0.1.2	Jeff de La Beaujardière	Intermediate
2002-06-11	0.1.2	Jeff de La Beaujardière	Demonstration at OGC TC.
2002-06-25	0.1.3	Jean-Philippe Humblet	Intermediate
2002-08-19	0.1.4	Jean-Philippe Humblet	Discussion Paper
2002-12-12	0.1.5	Rob Atkinson	General review. Incorporated extensibility and standard GML elements.
2002-12-20	0.1.6	Tom Kralidis	Updates from previous draft and inclusion of context collection definitions
2003-01-13	0.1.6	Jérôme Sonnet	Preparation for RFC submission
2003-05-14	0.1.7	Jérôme Sonnet	Integrate RFC comments
2003-05-19	0.1.8	Tom Kralidis, Martin Daly, et al.	Review and addition of schemas and examples, final edits prior to submission as 1.0.0 candidate
2003-06-10	1.0.0	Tom Kralidis, Jerome Sonnet, Jeff Lansing	Fixed namespace issues in schemas. Deletion of xlink.xsd in lieu of leveraging OGC xlink schemas
2004-04-09	1.0.6	Jerome Sonnet	Integration of Change proposals 03-089
2005-01-19	1.1.0	Martin Daly, Tom Kralidis, et. al	Editorial changes (OpenGIS to Open Geospatial Consortium, etc.) to support submission as 1.1.0

v. Changes to the OGC Abstract Specification

The OGC™ Abstract Specification requires the following change to accommodate this OGC™ standard:

- The abstract concept of a persistent, reusable "context" for geospatial services should be added.

vi. Future work

This document directly supports only persistence of portrayed maps created by one or more Web Map Server bindings, but is intended to be reviewed to provide an extensibility mechanism for Web Feature Server and other types of service and persisted interface object states. It is expected that these will be developed and added to the formal schema in a backward compatible fashion.

Pending a formal extension mechanism, organisations wishing to extend the ViewContext to include non-WMS services should create a new schema that is consistent with this specification and be prepared to transform such ViewContext documents to this WMS only version if export capabilities are desired.

Foreword

This version of the specification cancels and replaces all previous versions.

Introduction

This document is a companion specification to the OGC Web Map Service Interface Implementation Specification version 1.1.1 [4], hereinafter "WMS 1.1.1."

WMS 1.1.1 specifies how individual map servers describe and provide their map content. The present Context specification states how a specific grouping of one or more maps from one or more map servers can be described in a portable, platform-independent format for storage in a repository or for transmission between clients. This description is known as a "Web Map Context Document," or simply a "Context." Presently, context documents are primarily designed for WMS bindings. However, extensibility is envisioned for binding to other services.

A Context document includes information about the server(s) providing layer(s) in the overall map, the bounding box and map projection shared by all the maps, sufficient operational metadata for Client software to reproduce the map, and ancillary metadata used to annotate or describe the maps and their provenance for the benefit of human viewers.

A Context document is structured using eXtensible Markup Language (XML). Annex A of this specification contains the XML Schema against which Context XML can be validated.

There are several possible uses for Context documents:

- The Context document can provide default startup views for particular classes of user. Such a document would have a long lifetime and public accessibility.

- The Context document can save the state of a viewer client as the user navigates and modifies map layers.

- The Context document can store not only the current settings but also additional information about each layer (e.g., available styles, formats, SRS, etc.) to avoid having to query the map server again once the user has selected a layer.

- The Context document could be saved from one client session and transferred to a different client application to start up with the same context.

Contexts could be cataloged and discovered, thus providing a level of granularity broader than individual layers.

Web Map Context Documents

1 Scope

This specification applies to the creation and use of documents which unambiguously describe the state, or "Context," of a WMS Client application in a manner that is independent of a particular client and that might be utilized by different clients to recreate the application state. This specification defines an encoding for the Context using eXtensible Markup Language [XML 1.0].

This specification is relevant to Clients of the OGC Web Map Service [WMS 1.0.0, WMS 1.1.0, WMS 1.1.1]. Reference is made to normative material from [WMS 1.1.1]. In some cases, reference is made to normative material from the Styled Layer Descriptor specification [SLD]

This specification does not address the archival, cataloging, discovery or retrieval of Context XML documents.

2 Conformance

Conformance with this specification shall be checked using all the relevant tests specified in Annex B (normative).

3 Normative references

The following normative documents 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. However, parties to agreements based on this specification are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies.

EPSG, *European Petroleum Survey Group Geodesy Parameters*, Lott, R., Ravanas, B., Cain, J., Girbig, J.-P., and Nicolai, R., eds., <http://www.epsg.org/>

IETF RFC 2045 (November 1996), *Multipurpose Internet Mail Extensions (MIME) Part One: Format of Internet Message Bodies*, Freed, N. and Borenstein N., eds., <http://www.ietf.org/rfc/rfc2045.txt>

IETF RFC 2119 (March 1997), *Key words for use in RFCs to Indicate Requirement Levels*, Bradner, S., ed., <http://www.ietf.org/rfc/rfc2119.txt>.

SLD 1.0.0 (September 2002), *Styled Layer Description (SLD) 1.0.0*, OGC Proposed Implementation Specification, William Lalonde, <http://www.opengeospatial.org/techno/specs/02-070.pdf>

XML 1.0 (October 2000), *eXtensible Markup Language (XML) 1.0* (*2nd edition)*, World Wide Web Consortium Recommendation, Bray, T., Paoli, J., Sperberg-McQueen, C.M., and Maler, E., eds., <http://www.w3.org/TR/2000/REC-xml>

4 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

4.1 operation

specification of a transformation or query that an object may be called to execute [OGC AS 12]

4.2 interface

named set of **operations** that characterize the behavior of an entity [OGC AS 12]

4.3 service

distinct part of the functionality that is provided by an entity through **interfaces** [OGC AS 12]

4.4 service instance

4.5 server

actual implementation of a **service**

4.6 client

software component that can invoke an **operation** from a **server**

4.7 request

invocation of an **operation** by a **client**

4.8 response

result of an **operation** returned from a **server** to a **client**

4.9 map

pictorial representation of geographic data.

4.10 spatial reference system

a projected or geographic coordinate reference system

4.11 Capabilities

service-level metadata describing the **operations** and content available at a **service instance**.

5 Conventions

5.1 Normative verbs

In the sections labeled as normative, the key words "**required**", "**shall**", "**shall not**", "**should**", "**should not**", "**recommended**", "**may**," and "**optional**" in this document are to be interpreted as described in [IETF RFC 2119].

The verb "**deprecate**" provides notice that the referenced portion of the specification is being retained for backwards compatibility with earlier versions but may be removed from a future version of the specification without further notice.

5.2 Abbreviated Terms

CGI	Common Gateway Interface
EPSG	European Petroleum Survey Group
GIF	Graphics Interchange Format
GIS	Geographic Information System
HTTP	Hypertext Transfer Protocol
IETF	Internet Engineering Task Force
JPEG	Joint Photographic Experts Group
MIME	Multipurpose Internet Mail Extensions
OGC	Open Geospatial Consortium
OWS	OGC Web Service
PNG	Portable Network Graphics
RFC	Request for Comments
SLD	Styled Layer Descriptor
URL	Uniform Resource Locator
WCS	Web Coverage Service
WFS	Web Feature Service
WMS	Web Map Service
XML	Extensible Markup Language

6 Elements of a Context Document

The parent element of the ViewContext document includes as children a "General" element for layer-independent context and a **sequential** "LayerList" with specific details about each layer in

use. The 'version' attribute specifies the Viewer Context specification revision to which this XML Schema applies.

The General element provides layer independent context information. It states the bounding box in units of a particular Spatial Reference System that represent the geographic extent of the map and a dimension as a pair of integers that represents the suggested pixel size of the map. This element also contains some metadata about this particular WMS Context as a title, abstract, keywords, and other information.

The LayerList element encapsulates all the layers in the current context. One or more of those layers may be retained in the context but can be hidden from the display. LayerList contains a series of one or more Layer elements.

Each Layer element is nearly identical to that in WMS Capabilities. It contains layer metadata such as a title, an abstract and a legend that **may** reflect what is advertised by the server the layer is issued from. But, it is clear that a very common use of Context is to change the name and the description to allow either internationalization, user refinement, or eventually, a completely user defined description.

Some information concerning the current state of the layer within the WMS Context is also held there. The layer element contains a binary attribute "hidden" which, if nonzero, instructs the client that despite the layer being within the Context it **must** not be displayed. A client **should** also provide a means for the user to know that such a Layer exists and a means to make that layer visible.

The Layer element also contains information about the server it is issued from and some information about the format in which that layer **may** be asked for by the client. It also contains several styles that **should** be presented to the user to allow different presentations of the map, one of these styles being advertised as the currently selected one.

6.1   XML Encoding

The eXtensible Markup Language (XML) [XML 1.0] encoding of a Context document **shall** be valid according to the XML Schema in annex A.1 of this document.   This XML Schema specifies the required and optional content of the Context document and how this document is formatted.

A Context document **may** reference an exact copy of the XML Schema in annex A.1 of this document.   The XML Schema **shall** be located at a fully-qualified and accessible URL to permit an XML validating process to retrieve it.

A specified filename extension such as .cml and .ccml is suggested for Contexts and Context Collections.

6.2   ViewContext

The root element of the Context, this element **must** contain the version number of the Context Specification which the current Context document complies with.

The ViewContext element is composed of two elements, one for general information described in section 6.3 and another defining a list of layers described in section 6.4.

6.2.1   Version Number

An attribute "version" representing the published specification version number, contains three positive integers, separated by decimal points, in the form "x.y.z". Each context specification is numbered independently. This attribute is required.

6.2.2   Id

An attribute "id" which **should** be unique and that represents a unique identifier of the Context. This attribute is required.

6.3   General section

An element "General" that contains layer-independent information about the current Context document such as the bounding box and the spatial reference system and also some information describing the Context document itself such as title, abstract, etc. This element is required.

6.3.1   Bounding Box and Spatial Reference System

An element "BoundingBox" formatted as defined in the WMS 1.1.1 Specification. It represents the geographic extent that **should** be presented by the client[1]. This element is required.

6.3.2   Window Size

An element "Window" presenting the size in pixels of the map the Context document describes. Negotiation between Context defined aspect ratio and typical client aspect ratio (according to the client's vendor) is left to the client. This element is optional.

6.3.3   Title

An element "Title" that contains a human readable title of the Context. This element is required.

6.3.4   Abstract

An element "Abstract" that contains a description for the Context document describing its content. This element is optional.

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[1] Regarding the ratio aspect, the box may change across different clients, but should remain globally the same.

6.3.5 Keywords

An element "KeywordList" that contains one or more Keyword elements which allow search across context collections. This element is optional.

6.3.6 Contact Information

An element "ContactInformation" that presents contact information of the creator of the Context document. Contact is described as defined in WMS 1.1.1 Specification. This element is optional.

6.3.7 LogoURL

A reference to an image that might be attached to the Context document. It can be, for instance, the logo of the project for which the context has been setup, or an overview of the map the context describes. This element contains a link to the image as well as the dimension of the image (in pixels) and its format. This element is optional.

6.3.8 DescriptionURL

A URL reference to a webpage which contains relevant information to the view. This element is optional.

6.3.9 Extension

The Extension element is a container tag in which arbitrary vendor specific information can be included without compromising the ability of other clients to enforce schema validation.

This tag **should not** be used to introduce new candidate elements that are intended to promote interoperability. Content in an <Extension> element **should not** be expected to be preserved in transfers of ViewContext documents between different systems.

See section vi: Future Work for more information.

6.4 LayerList

A Context document contains one map defined within a LayerList. This element describes the list of all layers to build a required view (map). The Layers are presented in a bottom to top approach.

Each layer is defined in a <Layer> element in the Context document XML. If desired, Layers may be repeated with different attributes (e.g. different styles).

6.4.1 Layer

Layers attributes are

- **hidden** : contains true if the layer should be hidden in the client result map (required)

- **queryable** : contains true if the layer is set queryable (required)

The <Layer> element **must** enclose one or more child elements providing information about the Layer.   The meaning of these elements is defined hereunder.

6.4.1.1   Server

The element defining the service from which the named Layer may be requested

Attributes are:

- **Service** : the type of the service according to OGC interfaces, such as WMS, WFS. (required)
- **Version** : Version number of the OGC interface specification which corresponds to the service (required)
- **Title** : the title of the service (extracted from the Capabilities by the Context document creator) (optional)
- **Online Resource** element: the link to the online resource (required)

This element is required.

6.4.1.2   Name

The name of the selected layer (extracted from Capabilities by the Context document creator). This element is required.

6.4.1.3   Title

The title of the selected layer (extracted from Capabilities by the Context document creator). This element is required.

6.4.1.4   Abstract

The abstract of the selected layer (extracted from Capabilities by the Context document creator). This element is optional.

6.4.1.5   Spatial Reference System

A list of available SRS for the enclosing layer.   One of the listed SRS's must be the SRS mentioned in the ViewerContext/General/BoundingBox@SRS element. This element is optional.

6.4.1.6   DimensionList

A list of Dimension constraints that shall be used to request this layer. The Dimension elements it contains are similar to those defined in the Web Map Service specification [WMS], but adds an additional attribute to record the currently-selected value.

6.4.1.6.1 Dimension

This element is defined in the the Web Map Service specification [WMS]. One more attribute is defined to specify the current Dimension constraint. The attribute "current" defines the Dimension that **must** be used to request this layer.

6.4.1.7 DataURL

This element contains a link to an online resource where data corresponding to the layer can be found. This element is optional.

6.4.1.8 MetadataURL

This element contains a link to an online resource where descriptive metadata corresponding to the layer can be found. This element is optional.

6.4.1.9 FormatList

The parent element containing the list of available image format for this layer. Image formats should be expressed with MIME types as described in WMS 1.1.1 Specification.

Each image format is defined in a <Format>. A <FormatList> **shall** include at least one <Format> element.

6.4.1.9.1 Format

Describe one output image format for the Layer.

Format attributes are:
- **current** : contains 1 if the current image format is selected.

6.4.1.10 StyleList

The parent element containing the list of available styles for this layer.

Each style is defined in a <Style> element. A <StyleList> **shall** include at least one <Style> element.

6.4.1.10.1 Style

Style attributes are :

- **current**: contains 1 if the current style is selected.

A <Style> element may be composed in two different ways: named style or SLD.

6.4.1.10.2 Named Style description

Each <Style> element **shall** have <Name> and <Title> elements.   The style name is used in the map request STYLE parameter.   The title is a human-readable string.

Each <Style> element **may** also contain an <Abstract> element, that provides a narrative description, and a <LegendURL> element that contains the location of an image of a map legend appropriate to the enclosing Style.

6.4.1.10.3 Name

The name of the style (extracted from Capabilities by the Context document creator). This element is required.

6.4.1.10.4 Title

The human-readable title of the style (extracted from Capabilities by the Context document creator). This element is required.

6.4.1.10.5 LegendURL

The location of an image of a map legend describing the current style (extracted from Capabilities by the Context document creator). This element is optional.

6.4.1.10.6 Abstract

A narrative description of the current style (extracted from Capabilities by the Context document creator). This element is optional.

6.4.1.10.7 SLD

Each <Style> element **may** alternatively define the style(s) of the layer with a <SLD> element.

The <SLD> element **must** contain required <Name> and optional <Title> elements which identify the particular element of a Styled Layer Descriptor to be used for this style. The <SLD> element **must** then contain one of three alternative sources of description of a layer style:

1. an <OnlineResource> element describing a link to the specified SLD document.

    ```
    <OnlineResource
        xmlns:xlink="http://www.w3.org/TR/xlink"
        xlink:type="simple"
        xlink:href="http://example.org/this/is/an/example/link/to/the/sld">
    ```

    This reference may be to a separately referenced SLD document or to an inline <StyledLayerDescriptor> in the same context document (which may define the styles for multiple layers within the Web Map Context)

2. <StyledLayerDescriptor> element containing inline the namedStyle or userStyle named in the enclosing <Style> element

3. <FeatureTypeStyle> element containing inline the specific feature styling instructions for the enclosing <Style> element

6.4.1.11   sld:MinScaleDenominator

This element defines the minimum scale from wich this layer **should** be displayed by a client application. The exact definition of this element is presented in detail in the SLD implementation specification [SLD].

6.4.1.12   sld:MaxScaleDenominator

This element defines the minimum scale from wich this layer **should not** be displayed by a client application. The exact definition of this element is presented in detail in the SLD implementation specification [SLD].

6.4.1.13   Extension

The Extension element is a container tag in which arbitrary vendor specific information can be included without compromising the ability of other clients to enforce schema validation.

This tag **should not** be used to introduce new candidate elements that are intended to promote interoperability. Content in an <Extension> element **should not** be expected to be preserved in transfers of ViewContext documents between different systems.

See section vi: Future Work for more information

7   Description of a Context Collection

Context Collections represent a list of context documents. Context collections could be used in several ways:

- A particular Viewer Client could use a Collection to construct a menu of default start-up views.

- A Collection of related contexts could serve as a script for a demonstration.

- A user could create a Collection to "bookmark" public or user-specific contexts. The creation of such a Collection might be managed by the Viewer Client itself.

7.1   ViewContextCollection

This element is the root element of the context collection. This element must also contain the version number of the Context Collection which the current document complies with. One or more child ViewContextReference elements must exist.

7.1.1 Version Number

The published specification version number contains three positive integers, separated by decimal point, in the form "x.y.z". Each context collection specification is numbered independently. This attribute is required.

7.1.2 ViewContextReference

This element provides reference information for a given context document.

7.1.3 Id

The "id" attribute **should** be unique and represent a unique identifier of the Context. This attribute is required

7.1.4 Title

An element "Title" that contains a human readable title of the Context. This element is required

7.1.5   ContextURL

This element provides an online resource for the context document, accessible via HTTP

8   Annex

Annex A   Context Document XML Schema (Normative)

This annex contains the normative XML Schema definition for a Context document corresponding to this version of the specification. The XML schema document is published by the Open Geospatial Consortium within a public schema repository at http://schemas.opengeospatial.net/context/1.1.0/context.xsd

Comments are informative; in case of conflict with the main body of this specification the main body takes precedence.

```xml
<?xml version="1.0" encoding="utf-8"?>
<xs:schema version="1.1.0"
           xmlns:xs="http://www.w3.org/2001/XMLSchema"
           targetNamespace="http://www.opengeospatial.net/context"
           xmlns:context="http://www.opengeospatial.net/context"
           xmlns:sld="http://www.opengeospatial.net/sld"
           xmlns:xlink="http://www.w3.org/1999/xlink"
           elementFormDefault="qualified">
    <xs:import namespace="http://www.opengeospatial.net/sld"
schemaLocation="http://schemas.opengeospatial.net/sld/1.0.0/sld.xsd"/>
    <xs:element name="ViewContext" type="context:ViewContextType"/>
    <xs:complexType name="ViewContextType">
        <xs:sequence>
            <xs:element name="General" type="context:GeneralType" minOccurs="1" maxOccurs="1"/>
            <xs:element name="LayerList" type="context:LayerListType" minOccurs="1" maxOccurs="1"/>
        </xs:sequence>
        <xs:attribute name="version" type="xs:string" use="required" fixed="1.1.0"/>
        <xs:attribute name="id" type="xs:string" use="required"/>
    </xs:complexType>
    <xs:complexType name="GeneralType">
        <xs:sequence>
            <xs:element name="Window" type="context:WindowType" minOccurs="0" maxOccurs="1"/>
            <xs:element name="BoundingBox" type="context:BoundingBoxType" minOccurs="1" maxOccurs="1"/>
            <xs:element name="Title" type="xs:string" minOccurs="1" maxOccurs="1"/>
            <xs:element name="KeywordList" type="context:KeywordListType" minOccurs="0" maxOccurs="1"/>
            <xs:element name="Abstract" type="xs:string" minOccurs="0" maxOccurs="1"/>
            <xs:element name="LogoURL" type="context:URLType" minOccurs="0" maxOccurs="1"/>
            <xs:element name="DescriptionURL" type="context:URLType" minOccurs="0" maxOccurs="1"/>
            <xs:element name="ContactInformation" type="context:ContactInformationType" minOccurs="0"
maxOccurs="1"/>
            <xs:element name="Extension" type="context:ExtensionType" minOccurs="0" maxOccurs="1"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="WindowType">
        <xs:attribute name="width" type="xs:integer" use="required"/>
        <xs:attribute name="height" type="xs:integer" use="required"/>
    </xs:complexType>
    <xs:complexType name="BoundingBoxType">
        <xs:attribute name="SRS" type="xs:string" use="required"/>
        <xs:attribute name="minx" type="xs:decimal" use="required"/>
        <xs:attribute name="miny" type="xs:decimal" use="required"/>
        <xs:attribute name="maxx" type="xs:decimal" use="required"/>
```

```
                    <xs:attribute name="maxy" type="xs:decimal" use="required"/>
            </xs:complexType>
        <xs:complexType name="KeywordListType">
            <xs:sequence>
                    <xs:element name="Keyword" type="xs:string" minOccurs="1" maxOccurs="unbounded"/>
            </xs:sequence>        </xs:complexType>
        <xs:complexType name="URLType">
            <xs:sequence>
                    <xs:element name="OnlineResource" type="context:OnlineResourceType" minOccurs="1" maxOccurs="1"/>
            </xs:sequence>
            <xs:attribute name="width" type="xs:integer" use="optional"/>
            <xs:attribute name="height" type="xs:integer" use="optional"/>
            <xs:attribute name="format" type="xs:string" use="optional"/>
        </xs:complexType>
        <xs:complexType name="ContactInformationType">
            <xs:sequence>
                    <xs:element name="ContactPersonPrimary" type="context:ContactPersonPrimaryType" minOccurs="1"
maxOccurs="1"/>
                    <xs:element name="ContactPosition" type="xs:string" minOccurs="1" maxOccurs="1"/>
                    <xs:element name="ContactAddress" type="context:AddressType" minOccurs="1" maxOccurs="1"/>
                    <xs:element name="ContactVoiceTelephone" type="xs:string" minOccurs="1" maxOccurs="1"/>
                    <xs:element name="ContactFacsimileTelephone" type="xs:string" minOccurs="1" maxOccurs="1"/>
                    <xs:element name="ContactElectronicMailAddress" type="xs:string" minOccurs="1" maxOccurs="1"/>
            </xs:sequence>
        </xs:complexType>
        <xs:complexType name="ContactPersonPrimaryType">
            <xs:sequence>
                    <xs:element name="ContactPerson" type="xs:string" minOccurs="1" maxOccurs="1"/>
                    <xs:element name="ContactOrganization" type="xs:string" minOccurs="1" maxOccurs="1"/>
            </xs:sequence>
        </xs:complexType>
        <xs:complexType name="AddressType">
            <xs:sequence>
                    <xs:element name="AddressType" type="xs:string" minOccurs="1" maxOccurs="1"/>
                    <xs:element name="Address" type="xs:string" minOccurs="1" maxOccurs="1"/>
                    <xs:element name="City" type="xs:string" minOccurs="1" maxOccurs="1"/>
                    <xs:element name="StateOrProvince" type="xs:string" minOccurs="1" maxOccurs="1"/>
                    <xs:element name="PostCode" type="xs:string" minOccurs="1" maxOccurs="1"/>
                    <xs:element name="Country" type="xs:string" minOccurs="1" maxOccurs="1"/>
            </xs:sequence>
        </xs:complexType>
        <xs:complexType name="LayerListType">
            <xs:sequence>
                    <xs:element name="Layer" type="context:LayerType" minOccurs="1" maxOccurs="unbounded"/>
            </xs:sequence>
        </xs:complexType>
        <xs:complexType name="LayerType">
            <xs:sequence>
                    <xs:element name="Server" type="context:ServerType" minOccurs="1" maxOccurs="1"/>
                    <xs:element name="Name" type="xs:string" minOccurs="1" maxOccurs="1"/>
                    <xs:element name="Title" type="xs:string" minOccurs="1" maxOccurs="1"/>
                    <xs:element name="Abstract" type="xs:string" minOccurs="0" maxOccurs="1"/>
                    <xs:element name="DataURL" type="context:URLType" minOccurs="0" maxOccurs="1"/>
                    <xs:element name="MetadataURL" type="context:URLType" minOccurs="0" maxOccurs="1"/>
                    <xs:element name="SRS" type="xs:string" minOccurs="0" maxOccurs="1"/>
                    <xs:element name="DimensionList" type="context:DimensionListType" minOccurs="0" maxOccurs="1"/>
                    <xs:element name="FormatList" type="context:FormatListType" minOccurs="0" maxOccurs="1"/>
                    <xs:element name="StyleList" type="context:StyleListType" minOccurs="0" maxOccurs="1"/>
                <xs:element ref="sld:MinScaleDenominator" minOccurs="0" maxOccurs="1"/>
                <xs:element ref="sld:MaxScaleDenominator" minOccurs="0" maxOccurs="1"/>
                    <xs:element name="Extension" type="context:ExtensionType" minOccurs="0" maxOccurs="1"/>
            </xs:sequence>
            <xs:attribute name="queryable" type="xs:boolean" use="required"/>
```

```
            <xs:attribute name="hidden" type="xs:boolean" use="required"/>
        </xs:complexType>
        <xs:complexType name="ServerType">
            <xs:sequence>
                <xs:element name="OnlineResource" type="context:OnlineResourceType"/>
            </xs:sequence>
            <xs:attribute name="service" type="xs:string" use="required"/>
            <xs:attribute name="version" type="xs:string" use="required"/>
            <xs:attribute name="title" type="xs:string" use="optional"/>
        </xs:complexType>
        <xs:complexType name="DimensionListType">
            <xs:sequence>
                <xs:element name="Dimension" type="context:DimensionType" minOccurs="1" maxOccurs="unbounded"/>
            </xs:sequence>
        </xs:complexType>
        <xs:complexType name="DimensionType">
          <xs:simpleContent>
            <xs:extension base="xs:string">
              <xs:attribute name="name" type="xs:string" use="required"/>
              <xs:attribute name="units" type="xs:string" use="required"/>
              <xs:attribute name="unitSymbol" type="xs:string" use="required"/>
              <xs:attribute name="userValue" type="xs:string" use="required"/>
              <xs:attribute name="default" type="xs:string"/>
              <xs:attribute name="multipleValues" type="xs:boolean" />
              <xs:attribute name="nearestValue" type="xs:boolean" />
              <xs:attribute name="current" type="xs:boolean" />
            </xs:extension>
          </xs:simpleContent>
        </complexType>
        <xs:complexType name="FormatListType">
            <xs:sequence>
                <xs:element name="Format" type="context:FormatType" minOccurs="1" maxOccurs="unbounded"/>
            </xs:sequence>
        </xs:complexType>
        <xs:complexType name="FormatType">
            <xs:simpleContent>
                <xs:extension base="xs:string">
                    <xs:attribute name="current" type="xs:boolean"/>
                </xs:extension>
            </xs:simpleContent>
        </xs:complexType>
        <xs:complexType name="StyleListType">
            <xs:sequence>
                <xs:element name="Style" type="context:StyleType" minOccurs="1" maxOccurs="unbounded"/>
            </xs:sequence>
        </xs:complexType>
        <xs:complexType name="StyleType">
            <xs:choice>
                <xs:sequence>
                    <xs:element name="Name" type="xs:string" minOccurs="1" maxOccurs="1"/>
                    <xs:element name="Title" type="xs:string" minOccurs="1" maxOccurs="1"/>
                    <xs:element name="Abstract" type="xs:string" minOccurs="0" maxOccurs="1"/>
                    <xs:element name="LegendURL" type="context:URLType" minOccurs="0" maxOccurs="1"/>
                </xs:sequence>
                <xs:element name="SLD" type="context:SLDType" minOccurs="0" maxOccurs="1"/>
            </xs:choice>
            <xs:attribute name="current" type="xs:boolean"/>
        </xs:complexType>
        <xs:complexType name="SLDType">
            <xs:sequence>
                <xs:element name="Name" type="xs:string" minOccurs="0" maxOccurs="1"/>
                <xs:element name="Title" type="xs:string" minOccurs="0" maxOccurs="1"/>
                <xs:choice>
```

```
            <xs:element name="OnlineResource" type="context:OnlineResourceType"/>
            <xs:element ref="sld:StyledLayerDescriptor"/>
            <xs:element ref="sld:FeatureTypeStyle"/>
         </xs:choice>
      </xs:sequence>
   </xs:complexType>
   <xs:complexType name="OnlineResourceType">
      <xs:attributeGroup ref="xlink:simpleLink"/>
   </xs:complexType>
   <xs:complexType name="ExtensionType">
      <xs:annotation>
         <xs:documentation>This allows additional elements to be added to support non WMS Layer
services.</xs:documentation>
      </xs:annotation>
      <xs:sequence>
         <xs:any namespace="##any"/>
      </xs:sequence>
   </xs:complexType>
</xs:schema>
```

Annex B   Context XML Example (Informative)

This annex contains a *sample* Context XML document. This example is published by the Open Geospatial Consortium within a public schema repository at http://schemas.opengeospatial.net/context/1.1.0/context.cml

```
<?xml version="1.0" encoding="utf-8" standalone="no" ?>
<ViewContext version="1.1.0"
            id="eos_data_gateways"
            xmlns="http://www.opengeospatial.net/context"
            xmlns:xlink="http://www.w3.org/1999/xlink"
            xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
            xsi:schemaLocation="http://www.opengeospatial.net/context context.xsd">
   <General>
      <Window width="500" height="300" />
      <BoundingBox SRS="EPSG:4326" minx="-180.000000" miny="-90.000000" maxx="180.000000"
maxy="90.000000"/>
      <Title>EOS Data Gateways</Title>
      <KeywordList>
         <Keyword>EOS</Keyword>
         <Keyword>EOSDIS</Keyword>
         <Keyword>NASA</Keyword>
         <Keyword>CCRS</Keyword>
         <Keyword>CEOS</Keyword>
         <Keyword>OGC</Keyword>
      </KeywordList>
      <Abstract>Map View of EOSDIS partners locations</Abstract>
      <LogoURL width="130" height="74" format="image/gif">
         <OnlineResource xlink:type="simple" xlink:href="http://redhook.gsfc.nasa.gov/~imswww/pub/icons/logo.gif"/>
      </LogoURL>
      <DescriptionURL format="text/html">
         <OnlineResource xlink:type="simple" xlink:href="http://eos.nasa.gov/imswelcome"/>
      </DescriptionURL>
      <ContactInformation>
         <ContactPersonPrimary>
            <ContactPerson>Tom Kralidis</ContactPerson>
            <ContactOrganization>Canada Centre for Remote Sensing</ContactOrganization>
         </ContactPersonPrimary>
```

```xml
                <ContactPosition>Systems Scientist</ContactPosition>
                <ContactAddress>
                    <AddressType>postal</AddressType>
                    <Address>615 Booth Street, room 650</Address>
                    <City>Ottawa</City>
                    <StateOrProvince>Ontario</StateOrProvince>
                    <PostCode>K1A 0E9</PostCode>
                    <Country>Canada</Country>
                </ContactAddress>
                <ContactVoiceTelephone>+01 613 947 1828</ContactVoiceTelephone>
                <ContactFacsimileTelephone>+01 613 947 2410</ContactFacsimileTelephone>
                <ContactElectronicMailAddress>tom.kralidis@ccrs.nrcan.gc.ca</ContactElectronicMailAddress>
            </ContactInformation>
        </General>
        <LayerList>
            <Layer queryable="1" hidden="0">
                <Server service="OGC:WMS" version="1.1.0" title="ESA CubeSERV">
                    <OnlineResource xlink:type="simple"
xlink:href="http://mapserv2.esrin.esa.it/cubestor/cubeserv/cubeserv.cgi"/>
                </Server>
                <Name>WORLD_MODIS_1KM:MapAdmin</Name>
                <Title>WORLD_MODIS_1KM</Title>
                <Abstract>Global maps derived from various Earth Observation sensors /
WORLD_MODIS_1KM:MapAdmin</Abstract>
                <SRS>EPSG:4326</SRS>
                <FormatList>
                    <Format current="1">image/png</Format>
                </FormatList>
                <StyleList>
                    <Style current="1">
                        <Name>default</Name>
                        <Title>default</Title>
                        <LegendURL width="16" height="16" format="image/gif">
                            <OnlineResource xlink:type="simple"
xlink:href="http://mapserv2.esrin.esa.it/cubestor/cubeserv/cubeserv.cgi?VERSION=1.1.0&amp;REQUEST=GetLegendIcon
&amp;LAYER=WORLD_MODIS_1KM:MapAdmin&amp;SPATIAL_TYPE=RASTER&amp;STYLE=default&amp;FORMAT=i
mage/gif"/>
                        </LegendURL>
                    </Style>
                </StyleList>
            </Layer>
            <Layer queryable="0" hidden="0">
                <Server service="OGC:WMS" version="1.0.7" title="The GLOBE Program Visualization Server">
                    <OnlineResource xlink:type="simple" xlink:href="http://globe.digitalearth.gov/viz-bin/wmt.cgi"/>
                </Server>
                <Name>COASTLINES</Name>
                <Title>Coastlines</Title>
                <Abstract>Context layer: Coastlines</Abstract>
                <SRS>EPSG:4326</SRS>
                <FormatList>
                    <Format current="1">GIF</Format>
                </FormatList>
                <StyleList>
                    <Style current="1">
                        <Name>default</Name>
                        <Title>Default</Title>
                        <LegendURL width="180" format="image/gif" height="50">
                            <OnlineResource xlink:type="simple"
xlink:href="http://globe.digitalearth.gov/globe/en/icons/colorbars/COASTLINES.gif"/>
                        </LegendURL>
                    </Style>
                </StyleList>
            </Layer>
```

```xml
        <Layer queryable="1" hidden="0">
            <Server service="OGC:WMS" version="1.0.7" title="The GLOBE Program Visualization Server">
                <OnlineResource xlink:type="simple" xlink:href="http://globe.digitalearth.gov/viz-bin/wmt.cgi"/>
            </Server>
            <Name>NATIONAL</Name>
            <Title>National Boundaries</Title>
            <Abstract>Context layer: National Boundaries</Abstract>
            <SRS>EPSG:4326</SRS>
            <FormatList>
                <Format current="1">GIF</Format>
            </FormatList>
            <StyleList>
                <Style current="1">
                    <Name>default</Name>
                    <Title>Default</Title>
                    <LegendURL width="180" format="image/gif" height="50">
                        <OnlineResource xlink:type="simple"
xlink:href="http://globe.digitalearth.gov/globe/en/icons/colorbars/NATIONAL.gif"/>
                    </LegendURL>
                </Style>
            </StyleList>
        </Layer>
        <Layer queryable="1" hidden="0">
            <Server service="OGC:WMS" version="1.1.0" title="CCRS Spatial Data Warehouse">
                <OnlineResource xlink:type="simple"
xlink:href="http://ceoware2.ccrs.nrcan.gc.ca/cubewerx/cubeserv/cubeserv.cgi"/>
            </Server>
            <Name>EOS_DATA_GATEWAYS:CEOWARE2</Name>
            <Title>EOS Data Gateways</Title>
            <Abstract>Locations of EOS Data Gateway Locations. The same services and data are available through each
gateway location.</Abstract>
            <SRS>EPSG:4326</SRS>
            <FormatList>
                <Format current="1">image/gif</Format>
            </FormatList>
            <StyleList>
                <Style current="1">
                    <Name>default</Name>
                    <Title>default</Title>
                    <LegendURL width="16" height="16" format="image/gif">
                        <OnlineResource xlink:type="simple"
xlink:href="http://ceoware2.ccrs.nrcan.gc.ca/cubewerx/cubeserv/cubeserv.cgi?VERSION=1.1.0&amp;REQUEST=GetLege
ndIcon&amp;LAYER=EOS_DATA_GATEWAYS:CEOWARE2&amp;SPATIAL_TYPE=POINT&amp;STYLE=default&amp;F
ORMAT=image/gif"/>
                    </LegendURL>
                </Style>
            </StyleList>
        </Layer>
    </LayerList>
</ViewContext>
```

Annex C   Context Collection Document XML Schema (Normative)

This annex contains the normative XML Schema definition for a Context Collection document corresponding to this version of the specification. The XML schema document is published by the Open Geospatial Consortium within a public schema repository at http://schemas.opengeospatial.net/context/1.1.0/collection.xsd.

Comments are informative; in case of conflict with the main body of this specification the main body takes precedence.

```xml
<?xml version="1.0" encoding="utf-8"?>
<xs:schema version="1.1.0"
            xmlns:xs="http://www.w3.org/2001/XMLSchema"
            targetNamespace="http://www.opengeospatial.net/context"
            xmlns:context="http://www.opengeospatial.net/context"
            xmlns:xlink="http://www.w3.org/1999/xlink"
            elementFormDefault="qualified">
    <xs:import namespace="http://www.w3.org/1999/xlink"
schemaLocation="http://schemas.opengeospatial.net/gml/2.1.2/xlinks.xsd"/>
    <xs:element name="ViewContextCollection" type="context:ViewContextCollectionType"/>
    <xs:complexType name="ViewContextCollectionType">
        <xs:sequence>
            <xs:element name="ViewContextReference" type="context:ViewContextReferenceType" minOccurs="1"
maxOccurs="unbounded"/>
        </xs:sequence>
        <xs:attribute name="version" type="xs:string" use="required" fixed="1.1.0"/>
    </xs:complexType>
    <xs:complexType name="ViewContextReferenceType">
        <xs:sequence>
            <xs:element name="Title" type="xs:string" minOccurs="1" maxOccurs="1"/>
            <xs:element name="ContextURL" type="context:ContextURLType" minOccurs="1" maxOccurs="1"/>
        </xs:sequence>
        <xs:attribute name="version" use="required"/>
        <xs:attribute name="id" use="required"/>
    </xs:complexType>
    <xs:complexType name="ContextURLType">
        <xs:sequence>
            <xs:element name="OnlineResource" type="context:OnlineResourceType" minOccurs="1" maxOccurs="1"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="OnlineResourceType">
        <xs:attributeGroup ref="xlink:simpleLink"/>
    </xs:complexType>
</xs:schema>
```

Annex D   Context Collection XML Example (Informative)

This annex contains a *sample* Context Collection XML document. This example is published by the Open Geospatial Consortium within a public schema repository at
http://schemas.opengeospatial.net/context/1.1.0/collection.ccml

```xml
<?xml version="1.0" encoding="utf-8" standalone="no"?>
<ViewContextCollection version="1.1.0" xmlns="http://www.opengeospatial.net/context"
xmlns:xlink="http://www.w3.org/1999/xlink" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://www.opengeospatial.net collection.xsd">
    <!-- List of context XML URLs -->
    <ViewContextReference version="1.0.0" id="eos_data_gateways">
```

```xml
        <!-- Human readable title for pick list / select box -->
        <Title>EOS Data Gateways</Title>
        <!-- URL location -->
        <ContextURL>
            <OnlineResource xlink:type="simple" xlink:href="http://cgdi-
dev.geoconnections.org/prototypes/contexts/eos_data_gateways_1_0_0.xml"/>
        </ContextURL>
    </ViewContextReference>
    <ViewContextReference version="0.1.2" id="world_topo_0_1_2">
        <Title>World Topography</Title>
        <ContextURL>
            <OnlineResource xlink:type="simple"
xlink:href="http://sunrise.gsfc.nasa.gov/de/viewer/context_perm/world_topo_0_1_2.xml"/>
        </ContextURL>
    </ViewContextReference>
</ViewContextCollection>
```

Bibliography

[WMS] Jeff de la Beaujardiere, W. (ed.), *OGC Web Map Service Interface 1.3.0,*OGC Document # 01-109r1 , 2004-01-20. Available at <http://www.opengeospatial.org/techno/specs/>

[SLD] LALONDE, W. (ed.), *Styled Layer Descriptor Implementation Specification 1.0.0*, OGC Document #02-070, August 2002. Available at <http://www.opengeospatial.org/techno/specs/>