Open Geospatial Consortium Inc.

Gazetteer Service
Profile of the Web Feature Service Implementation Specification

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.

This page left intentionally blank.

Contents

Figures

TBD

Tables

TBD

i.   Preface

This document describes a Gazetteer Service as a specialized Web Feature Service (WFS) that provides additional capabilities specific to a gazetteer-like feature collection. Therefore, within this context, a OpenGIS Gazetteer can be thought of as an application profile of WFS.

There is growing interest in the development of a common feature-based model for access to named features, often referred to as a gazetteer. Two major activities form the basis of this specification, an OGC Discussion paper [OGC 02-076r3] on gazetteers, and an ISO draft standard for geographic identifiers. The standardization process in the ISO TC 211 led to a separate mature draft standard defining "Spatial referencing by geographic identifiers" [ISO19112] that defines an abstract model to be implemented by a gazetteer service.

The Gazetteer Service is a specialized Web Feature Service that provides additional capabilities specific to a gazetteer-like feature collection. Instances within a collection of gazetteer features may be – as the terms in a thesaurus – related to each other and constitute a hierarchical vocabulary of geographic places. The overall information model is here implemented as a GML application schema that defines a general feature type to be served by a Gazetteer Service.

By using the capabilities of a Web Feature Server, the Gazetteer Service exposes the following interfaces to query location instances in a gazetteer database:

- Get or Query features based on thesaurus-specific properties (broader term (BT), narrower term (NT), related term (RT)

- Retrieve properties of the gazetteer database, such as the location type class definitions and the spatial reference system definitions

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

The changes made in this document version, relative to the previous version, are tracked by Microsoft Word, and can be viewed if desired. If you choose to submit suggested changes by editing this document, please first accept all the current changes, and then make your suggested changes with change tracking on.

ii.   Submitting organizations

The following organizations submitted this document to the Open Geospatial Consortium Inc.

a) lat/lon GmbH

b) US Federal Geographic Data Committee

c) GeoConnections / Natural Resources Canada (Environment Canada)

d) Social Change Online Pty Ltd

iii.   Document contributor contact points

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

Contact	Company	Email
Jens Fitzke	lat/lon GmbH	fitzke@lat-lon.de
Rob Atkinson	Social Change Online	rob@socialchange.net.au
Doug Nebert	US Federal Geographic Data Committee	ddnebert@fgdc.gov
Tom Kralidis	GeoConnections / Natural Resources Canada (Environment Canada)	tom.kralidis@ec.gc.ca

iv.   Revision history

Date	Release	Editor	Primary clauses modified	Description
2005-04-12				New Document structure according to 05-009
2005-10-11	0.9.1	Jens Fitzke	All	Complete revision.
2005-	0.9.1	Carl Reed	Numerous	Edits for consistency, grammar, etc.
2006-01-09	0.9.1	Jens Fitzke	GetFeature examples	Added more examples. Minor corrections on document and schema / example files.

v.   Changes to the OGC Abstract Specification

The OpenGIS® Abstract Specification does not require changes to accommodate this OpenGIS® standard. It is recommended however that the Abstract Specification be extended to explicitly incorporate the ISO 19112 standards to be consistent with current practice with regards to implementation of ISO TC211 standards.

vi.　Future work

Improvements in this document are desirable to provide examples that can be fully validated (affects other specifications and schemas, too).

An implementation guidance section will be added to explain the relationship between Feature Type and Location Type with respect to different gazetteer database designs.

In the future, Gazetteer Services may have transactional interfaces added to enable updates by ad-hoc authorities, in which case they could optionally implement transaction interfaces like those now specified for WFS.

Foreword

This document cancels and replaces OGC 02-076r3. It represents a complete revision of this former document version, especially with respect to WFS, Geography Markup Language (GML), and ISO 19139 (Geographic Metadata Implementation Model). The Gazetteer Service is considered a profile of the WFS specification. It is related to and makes use of the WFS, Filter Encoding, GML, and ISO 19139 specifications.

This document includes 4 annexes; Annexes A, B are normative, and Annexes C, D are informative. In this document version, the annexes are not yet completed.

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

Introduction

This document defines a Gazetteer Service profile of the OGC Web Feature Service Specification. The OGC Gazetteer Service allows a client to retrieve georeferenced well-known place-name vocabulary from a gazetteer database.

This profile extends the WFS interface in a way that a client is able to

- Determine if a WFS implementation is acting as a Gazetteer Service.

- Determine the structure within the place-name vocabulary.

- Query the Gazetteer Service in order to retrieve place-name features.

To ensure semantic interoperability this profile defines the response schema elements according to ISO 19112.

The overall design principle of this profile is to make gazetteer service setup as easy as possible – provided that a web feature service instance is available. The following list gives an overview of the specific characteristics of a gazetteer service in comparison to a web feature service:

- The service type is "WFS-G" (this allows a server instance to act both as a web feature service and a gazetteer service).

- The capabilities documents has an additional section which describes the structure of the gazetteer database

- Upon DescribeFeatureType request a gazetteer service returns a schema document defining a feature type derived from the well-known gazetteer feature type SI_LocationInstance.

- To support absolute URL references to single instances of a place-name database a gazetteer service is able to process KVP-encoded GetFeature requests issued by using HTTP GET.

- To support relationships among feature instances in a place-name database a gazettteer service uses may use XLinks and the *GetGmlObject* operation.

  –

Gazetteer Profile of the Web Feature Service Implementation Specification

1   Scope

This OGC document specifies the OpenGIS Gazetteer Service operations as a profile of the Web Feature Service (WFS-G). Services compliant with this specification shall provide Feature Types derived by extension from the well-known Feature Type `SI_LocationInstance` (see below). In addition, implementations may support queries based on the (parent/child) relationships of feature instances, as defined in ISO 19112.

Geographic Features: SI_LocationInstance

The following UML class diagram illustrates the concept of the base Feature Type `SI_LocationInstance` and its associated classes:
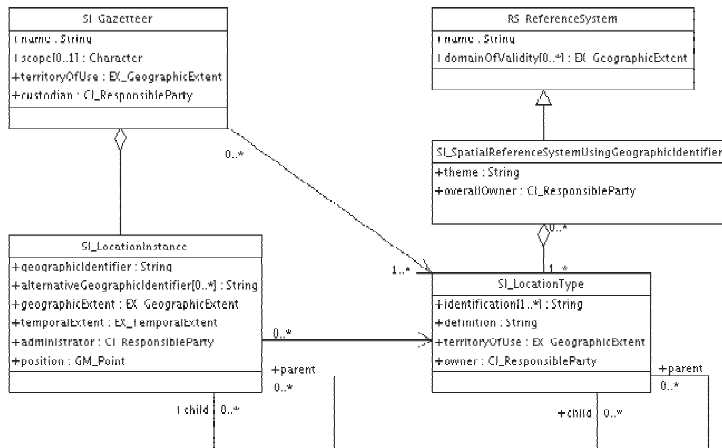
Gazetteer class diagram (ISO 19112, simplified)

Processing Requests

This section of the document outlines, in general terms, the protocol to be followed in order to process Gazetteer Service requests. Processing requests would proceed as follows:

1. A client application requests a capabilities document from the WFS-G. Such a document contains a description of all the operations that the WFS-G supports, a list of all feature types that it can service, and a description of the structure of the underlying gazetteer repository.

2. A client application (optionally) makes a request to a web feature service for the definition of one or more of the feature or element types that the WFS-G can service.

3. Based on the definition of the feature type(s), the client application generates a request as specified in [OGC 04-094]

4. The request is posted to a web server.

5. The WFS-G is invoked to read and service the request.

6. When the WFS has completed processing the request, it will generate a status report and hand it back to the client. In the event that an error has occurred, the status report will indicate that fact.

Note that "client application" may include Registries and other middleware, as well as conventionally understood "end-users".

Operations

To support query processing, a gazetteer service has the following operations:

GetCapabilities

As a web feature service, a gazetteer service must be able to describe its capabilities. Specifically, it must indicate which feature types it can service, what operations are supported on each feature type, and what the structure of the gazetteer database is like.

DescribeFeatureType

As a web feature service, a gazetteer service must be able, upon request, to describe the structure of any feature type it can service. Gazetteer service feature types are derived from the base type `SI_LocationInstance`.

GetFeature

As a web feature service, a gazetteer service must be able to service a request to retrieve feature instances. In addition, the client should be able to specify which feature properties to fetch and should be able to constrain the query spatially and non-spatially.

Additionally, a gazetteer service may implement the GetGMLObject operation:

GetGMLObject

> A gazetteer service may be able to service a request to retrieve element instances by traversing XLinks that refer to their XML Ids.

Based on the operation descriptions above, two classes of gazetteer services can be defined:

Basic WFS-G

> A basic WFS-G would implement the GetCapabilities, DescribeFeatureType and GetFeature operations.

XLink WFS-G

> An XLink WFS-G would support all the operations of a basic gazetteer service and in addition it would implement the GetGmlObject operation for local and/or remote XLinks, and offer the option for the GetGmlObject operation to be performed during GetFeature operations.

2   Conformance

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

3   Normative references

The following normative documents contain provisions that, through reference in this text, constitute provisions of 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.

ISO 19105:2000, *Geographic information — Conformance and Testing*

ISO 19112:2003, *Geographic information — Spatial Referencing by Geographic Identifiers*

OGC 05-008c1, *OGC Web Services Common Specification*

OGC 03-105r1, *Geography Markup Language (GML) Implementation Specification version 3.1.1*

OGC 04-094,*Web Feature Service Implementation Specification version 1.1*

OGC 04-095, *Filter Encoding Implementation Specification version 1.1*

This OWS Common Specification contains a list of normative references that are also applicable to this candidate Implementation Specification.

In addition to this document, this specification includes several normative XML Schema files. These are posted online at the URL http://schemas.opengis.net/gazetteer/1.0/. These XML Schema files are also bundled with the present document. In the event of a discrepancy between the bundled and online versions of the XML Schema files, the online files shall be considered authoritative.

4   Terms and definitions

For the purposes of this specification, the definitions specified in Clause 4 of the OWS Common Implementation Specification [OGC 05-008c1] and shall apply. In addition, the following terms and definitions apply.

Gazetteer: A database used to translate between different representations of geospatial references, such as place names and geographic coordinates

5   Conventions

5.1   Abbreviated terms

Most of the abbreviated terms listed in Subclause 5.1 of the OWS Common Implementation Specification [OGC 05-008c1] apply to this document, plus the following abbreviated terms.

5.2   UML notation

Most diagrams that appear in this specification are presented using the Unified Modeling Language (UML) static structure diagram, as described in Subclause 5.2 of [OGC 05-008c1].

5.3   Document terms and definitions

This document uses the specification terms defined in Subclause 5.3 of [OGC 05-008c1].

6   Gazetteer Service overview

The Gazetteer Service interface specifies 4 operations that can be requested by a client and performed by a Gazetteer Service. Those operations are:

a)   GetCapabilities (required implementation by servers) – This operation allows a client to request and receive back service metadata (or Capabilities) documents that

describe the abilities of the specific server implementation. This operation also supports negotiation of the specification version being used for client-server interactions.

b) DescribeFeatureType (mandatory implementation by servers) – This operation allows a client to retrieve an XML schema document which describes the structure of any feature type the server can service. Gazetteer service feature types are derived from the base type `SI_LocationInstance`.

c) GetFeature (mandatory implementation by servers) – This operation allows a client to retrieve feature instances.

d) GetGMLObject (optional implementation by servers). This operation allows a client to retrieve element instances by traversing XLinks that refer to their XML Ids.

These operations have many similarities to other OGC Web Services, including the Web Map Service (WMS), WFS, and Web Coverage Service (WCS). Many of these interface aspects that are common with other OWSs are thus specified in the OGC Web Services Common Implementation Specification [OGC 05-008c1]. These common aspects are normatively referenced herein, instead of being repeated in this specification.

Each of the Gazetteer Service operations is described in more detail in subsequent clauses.

7   Shared aspects

7.1   Introduction

This clause specifies aspects of the Gazetteer Service behavior that are shared by several operations.

7.2   Operation request encoding

The encoding of operation requests shall use HTTP GET with KVP encoding and HTTP POST with XML and/or KVP encoding as specified in Clause 11 of [OGC 05-008c1]. Table 2 summarizes the Gazetteer Service operations and their encoding methods defined in this specification.

Table 2 — Operation Request Encoding

Operation	Request Encoding
GetCapabilities (required)	XML and optional KVP
DescribeFeatureType (required)	XML and optional KVP
GetFeature	XML and mandatory KVP

8   GetCapabilities operation (required)

8.1   Introduction

The mandatory GetCapabilities operation allows clients to retrieve service metadata from a Gazetteer server. The response to a GetCapabilities request shall be an XML document containing service metadata about the server, including specific information about the feature types it can service, the supported operations on each feature type, and the structure of the gazetteer database. This clause specifies the XML document that a Gazetteer server must return to describe its capabilities.

8.2   Operation request

The GetCapabilities operation request shall be as specified in Subclauses 7.2.2 through 7.2.4 of [OGC 05-008]. The "service", "request", and "AcceptVersions" parameters shall be implemented by all gazetteer servers. The "Sections" and "updateSequence" parameters are optional implementation by gazetteer servers. All gazetteer servers shall implement HTTP GET transfer of the GetCapabilities operation request, using KVP encoding. Servers can also implement HTTP POST transfer of the GetCapabilities operation request, using XML encoding only.

The value of the "service" parameter shall be "WFS-G". The allowed set of service metadata (or Capabilities) XML document section names and meanings shall be as specified in Tables 3 and 7 of [OGC 05-008], with the additions listed in Table 3 below.

Table 3 — Additional Section name values and meanings

Section name	Meaning
GazetteerContents	Return Gazetteer section in service metadata document

The XML Schema fragment for encoding a Gazetteer GetCapabilities operation request extends ows:GetCapabilitiesType in owsCommon.xsd from [OGC 05-008], and is:

```
<xsd:element name="GetCapabilities" type="wfs-g:GetCapabilitiesType"/>
<xsd:complexType name="GetCapabilitiesType">
  <xsd:annotation>
  <xsd:complexContent>
    <xsd:extension base="ows:GetCapabilitiesType">
      <xsd:attribute name="service"
        type="ows:ServiceType"
        use="optional" default="WFS-G"/>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
```

8.3   GetCapabilities operation response

8.3.1   Normal response

The service metadata document shall contain the 6 sections specified in Table 4. Depending on the values in the Sections parameter of the GetCapabilities operation request, any combination of these sections can be requested and returned.

Table 4 — Section name values and contents

Section name	Contents
ServiceIdentification	Metadata about this specific server. The schema of this section shall be the same as for all OWSs, as specified in Subclause 7.4.3 and owsServiceIdentification.xsd of [OGC 05-008c1].
ServiceProvider	Metadata about the organization operating this server. The schema of this section shall be the same for all OWSs, as specified in Subclause 7.4.4 and owsServiceProvider.xsd of [OGC 05-008c1].
OperationsMetadata	Metadata about the operations specified by this service and implemented by this server, including the URLs for operation requests. The basic contents and organization (TBR) of this section shall be the same as for all OWSs, as specified in Subclause 7.4.5 and owsOperationsMetadata.xsd of [OGC 05-008c1].
FeatureType list	This section defines the list of feature types (and operations on each feature type) that are available from a web feature service. In gazetteer capabilities this section has only one Feature Type.
Filter capabilities	The schema of the Filter Capabilities Section is defined in the Filter Encoding Implementation Specification [OGC 04-095]. This section is equivalent to the respective WFS capabilities section.
GazetteerContents	Metadata about the data served by this server. For the Gazetteer Service, this section shall contain data about the structure of the gazetteer datastore.

In addition to these sections, each service metadata document shall include the mandatory "version" and optional updateSequence parameters specified in Table 6 in Subclause 7.4.1 of [OGC 05-008c1].

8.3.2   Standard contents of the sections ServiceIdentification, ServiceProvider, OperationsMetadata, FeatureType list, and Filter capabilities

For the Gazetteer Service, these sections are equivalent to the respective WFS capabilities sections [OGC 04-094].

8.3.3   GazetteerContents section

The GazetteerContents section is an extension to the Contents section of [OGC 05-008c1]. A service metadata document contains metadata about the data served by this server. For the Gazetteer Service, this section shall contain data about the Gazetteer Service . The GazetteerContents section shall include the parameters specified in Table 7.

Table 7 —Subsections included in GazetteerContents section

Name	Definition	Data type	Multiplicity and use
SI_Gazetteer	Information on the Gazetteer itself, its territory of use, custodian, available location types, etc.	see SI_Gazetteer class in ISO 19112	One (mandatory)
SI_SpatialReference System	Information on the structure of the location types	see SI_SpatialReference System class in ISO 19112	Zero or more (optional)
a TBD			

8.3.4   Capabilities document XML encoding

A XML Schema fragment for a gazetteer service metadata document extends ows:CapabilitiesBaseType in owsCommon.xsd of [OGC 05-008c1], and is:

```
<xsd:element name="WFS-G_Capabilities"
  type="wfs-g:WFS-G_CapabilitiesType"
  substitutionGroup="wfs:WFS_Capabilities"/>
<xsd:complexType name="WFS-G_CapabilitiesType">
  <xsd:complexContent>
    <xsd:extension base="wfs:WFS_CapabilitiesType">
      <xsd:sequence>
        <xsd:element name="GazetteerContents"
          type="wfs-g:GazetteerContentsType"/>
      </xsd:sequence>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
<xsd:complexType name="GazetteerContentsType">
  <xsd:sequence>
    <xsd:element ref="iso19112:SI_Gazetteer"/>
    <xsd:element ref="iso19112:SI_SpatialReferenceSystem"
      minOccurs="0" maxOccurs="unbounded"/>
  </xsd:sequence>
</xsd:complexType>
```

As indicated, this XML Schema uses the owsServiceIdentification.xsd, owsServiceProvider.xsd, and owsOperationsMetadata.xsd schemas specified in [OGC 05-008c1]. It also uses an XML Schema for the "GazetteerContents" section of the Gazetteer Service Capabilities XML document, which shall be as attached in the WFS-G_Capabilities.xsd file. All these XML Schemas contain documentation of the meaning of each element, attribute, and type, and this documentation shall be considered normative as specified in Subclause 11.6.3 of [OGC 05-008c1].

8.3.5   Exceptions

When a gazetteer server encounters an error while performing a GetCapabilities operation, it shall return an exception report message as specified in Clause 8 of [OGC 05-008c1]. The allowed exception codes shall include those listed in Table 5 of Subclause 7.4.1 of [OGC 05-008c1], if the updateSequence parameter is implemented by the server.

8.4   Examples

To request a capabilities document, a client could issue the following GetCapabilities operation request with minimum contents:

```
http://ogc.a-domain.org/wfs-g&service=WFS-G&request=GetCapabilities
```

The corrsponding minimum request encoded in XML is:

```
<?xml version="1.0" encoding="UTF-8"?>
<wfs-g:GetCapabilities xmlns="http://www.opengeospatial.net/wfs-g"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://www.opengeospatial.net/wfs-g ../Schemas/WFS-
G_Capabilities.xsd" service="WFS-G"/>
```

In response to such a request, the gazetteer server might generate a document that looks like:

```
<?xml version="1.0" encoding="UTF-8"?>
<wfs-g:WFS-G_Capabilities updateSequence="0" version="1.0.0"
    xmlns:gml="http://www.opengis.net/gml"
    xmlns:ogc="http://www.opengis.net/ogc"
    xmlns:ows="http://www.opengis.net/ows"
    xmlns:wfs="http://www.opengis.net/wfs"
    xmlns:wfs-g="http://www.opengis.net/wfs-g"
    xmlns:iso19112="http://www.opengis.net/iso19112"
    xmlns:smXML="http://metadata.dgiwg.org/smXML"
    xmlns:xlink="http://www.w3.org/1999/xlink"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="http://www.opengis.net/wfs-g
    ../schemas/gazetteer/0.9.1/WFS-G_Capabilities.xsd">
  <ows:ServiceIdentification>
    <ows:ServiceType>WFS-G</ows:ServiceType>
    <ows:ServiceTypeVersion>1.0.0</ows:ServiceTypeVersion>
    <ows:Title>deegree2 WFS-G service</ows:Title>
```

```
      <ows:Abstract>Test Gazetteer Service</ows:Abstract>
      <ows:Keywords>
        <ows:Keyword>a keyword</ows:Keyword>
        <ows:Keyword>another keyword</ows:Keyword>
        <ows:Type>String</ows:Type>
      </ows:Keywords>
      <ows:Fees>None</ows:Fees>
      <ows:AccessConstraints>None</ows:AccessConstraints>
   </ows:ServiceIdentification>
   <ows:ServiceProvider>
      <!-- contents of WFS service provider section goes here-->
   </ows:ServiceProvider>
   <ows:OperationsMetadata>
      <!-- contents of WFS operations metadata section goes here-->
   </ows:OperationsMetadata>
   <wfs:FeatureTypeList>
      <wfs:FeatureType>
        <wfs:Name>SI_LocationInstance</wfs:Name>
        <wfs:Title/>
        <wfs:DefaultSRS>EPSG:4326</wfs:DefaultSRS>
        <wfs:Operations>
           <wfs:Operation>Query</wfs:Operation>
        </wfs:Operations>
        <wfs:OutputFormats>
           <wfs:Format>text/xml; subtype=gml/3.1.1</wfs:Format>
        </wfs:OutputFormats>
        <ows:WGS84BoundingBox>
           <ows:LowerCorner>-180.0 -90.0</ows:LowerCorner>
           <ows:UpperCorner>180.0 90.0</ows:UpperCorner>
        </ows:WGS84BoundingBox>
      </wfs:FeatureType>
   </wfs:FeatureTypeList>
   <ogc:Filter_Capabilities>
      <!-- contents of WFS filter capabilities section goes here-->
   </ogc:Filter_Capabilities>
   <wfs-g:GazetteerContents>
      <iso19112:SI_Gazetteer>
        <iso19112:identifier>
           Test Gazetteer hosted by Bonn University
        </iso19112:identifier>
        <iso19112:territoryOfUse>
           <smXML:EX_GeographicBoundingBox>
              <smXML:westBoundLongitude>
                 <smXML:approximateLongitude>
                    5.0
                 </smXML:approximateLongitude>
              </smXML:westBoundLongitude>
              <smXML:eastBoundLongitude>
                 <smXML:approximateLongitude>
                    16.0
                 </smXML:approximateLongitude>
              </smXML:eastBoundLongitude>
              <smXML:southBoundLatitude>
                 <smXML:approximateLatitude>
                    47.0
```

```
          </smXML:approximateLatitude>
        </smXML:southBoundLatitude>
        <smXML:northBoundLatitude>
          <smXML:approximateLatitude>
            56.0
          </smXML:approximateLatitude>
        </smXML:northBoundLatitude>
      </smXML:EX_GeographicBoundingBox>
  </iso19112:territoryOfUse>
  <iso19112:custodian>
    <smXML:organisationName>
      <smXML:CharacterString>
        Bonn University
      </smXML:CharacterString>
    </smXML:organisationName>
    <smXML:role>
      <smXML:CI_RoleCode
        codeList="http://www.example.com"
        codeListValue="distributor"/>
    </smXML:role>
  </iso19112:custodian>
  <iso19112:locationType gml:id="ADM1">
    <iso19112:name>
      FIRST-ORDER ADMINISTRATIVE DIVISION
    </iso19112:name>
    <iso19112:theme>
      Administrative Boundary Features
    </iso19112:theme>
    <iso19112:identification>name</iso19112:identification>
    <iso19112:definition/>
    <iso19112:owner>
      <smXML:organisationName>
        <smXML:CharacterString>NGA</smXML:CharacterString>
      </smXML:organisationName>
      <smXML:role>
        <smXML:CI_RoleCode
          codeList="http://www.example.com"
          codeListValue="owner"/>
      </smXML:role>
    </iso19112:owner>
    <iso19112:territoryOfUse>
      <smXML:EX_GeographicBoundingBox>
        <smXML:westBoundLongitude>
          <smXML:approximateLongitude>
            -180.00
          </smXML:approximateLongitude>
        </smXML:westBoundLongitude>
        <smXML:eastBoundLongitude>
          <smXML:approximateLongitude>
            180.00
          </smXML:approximateLongitude>
        </smXML:eastBoundLongitude>
        <smXML:southBoundLatitude>
          <smXML:approximateLatitude>
            -90.00
```

```
            </smXML:approximateLatitude>
          </smXML:southBoundLatitude>
          <smXML:northBoundLatitude>
            <smXML:approximateLatitude>
              90.00
            </smXML:approximateLatitude>
          </smXML:northBoundLatitude>
        </smXML:EX_GeographicBoundingBox>
      </iso19112:territoryOfUse>
    </iso19112:locationType>
  </iso19112:SI_Gazetteer>
  <iso19112:SI_SpatialReferenceSystem>
    <iso19112:name></iso19112:name>
    <iso19112:domainOfValidity>
      <smXML:westBoundLongitude>
        <smXML:approximateLongitude>
          -180.00
        </smXML:approximateLongitude>
      </smXML:westBoundLongitude>
      <smXML:eastBoundLongitude>
        <smXML:approximateLongitude>
          180.00
        </smXML:approximateLongitude>
      </smXML:eastBoundLongitude>
      <smXML:southBoundLatitude>
        <smXML:approximateLatitude>
          -90.00
        </smXML:approximateLatitude>
      </smXML:southBoundLatitude>
      <smXML:northBoundLatitude>
        <smXML:approximateLatitude>
          90.00
        </smXML:approximateLatitude>
      </smXML:northBoundLatitude>
    </iso19112:domainOfValidity>
    <iso19112:theme>
      Administrative Boundary Features
    </iso19112:theme>
    <iso19112:overallOwner>
      <smXML:organisationName>
        <smXML:CharacterString>NGA</smXML:CharacterString>
      </smXML:organisationName>
      <smXML:role>
        <smXML:CI_RoleCode
          codeList="http://www.example.com"
          codeListValue="owner"/>
      </smXML:role>
    </iso19112:overallOwner>
    <iso19112:SI_LocationType>
      <iso19112:locationTypeRef
        xlink:type="locator"
        xlink:href="#ADM1"/>
    </iso19112:SI_LocationType>
  </iso19112:SI_SpatialReferenceSystem>
</wfs-g:GazetteerContents>
```

```
</wfs-g:WFS-G_Capabilities>
```

9   DescribeFeatureType operation (required)

9.1   Introduction

The DescribeFeatureType operation allows gazetteer clients to retrieve schema descriptions which define, how the gazetteer server will be generate feature instances on output (in response to GetFeature requests).

This profile makes no further changes to this WFS operation except that it defines a base schema for DescribeFeatureType responses.

9.2   Examples

To request a feature type schema document, a client could issue the following DescribeFeatureType operation request with minimum contents:

```
http://ogc.a-domain.org/wfs-g?
   service=WFS-G
   &request=DescribeFeatureType
   &typename=iso19112:SI_LocationInstance
```

The corrsponding minimum request encoded in XML is:

```
<?xml version="1.0" ?>
<wfs:DescribeFeatureType
   version="1.0.0"
   service="WFS-G"
   xmlns="http://www.opengis.net/wfs-g"
   xmlns:iso19112="http://www.opengis.net/iso19112"
   xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
   xsi:schemaLocation="http://www.opengis.net/wfs
../wfs/1.1.0/WFS.xsd">
   <TypeName>iso19112:SI_LocationInstance</TypeName>
</wfs:DescribeFeatureType>
```

In response to such a request, the gazetteer server might generate a document that looks like:

```
<xsd:schema targetNamespace="http://www.example.com/myns"
    xmlns:iso19112="http://www.opengis.net/iso19112"
    xmlns:smXML="http://metadata.dgiwg.org/smXML"
    xmlns:myNS="http://www.example.com/myns"
    xmlns:xsd="http://www.w3.org/2001/XMLSchema"
    xmlns:gml="http://www.opengis.net/gml"
    xmlns:wfs="http://www.opengis.net/wfs"
    xmlns:xlink="http://www.w3.org/1999/xlink">
  <xsd:import namespace="http://www.opengis.net/gml"
```

```
      schemaLocation="../schemas/gml/3.1.1/base/feature.xsd"/>
    <xsd:import namespace="http://metadata.dgiwg.org/smXML"
      schemaLocation="../schemas/smXMLv09/smXML/metadataEntity.xsd"/>
    <xsd:import namespace="http://www.opengis.net/wfs"
      schemaLocation="../schemas/wfs/1.1.0/wfs.xsd"/>
    <xsd:import namespace="http://www.w3.org/1999/xlink"
      schemaLocation="../schemas/gml/3.1.1/xlink/xlinks.xsd"/>
    <xsd:import namespace="http://www.opengis.net/iso19112"
      schemaLocation="../schemas/gazetteer/0.9.1/iso19112.xsd"/>
    <xsd:element name="SI_LocationInstance"
      type="iso19112:SI_LocationInstanceType"
      substitutionGroup="gml:_Feature"/>
    <xsd:element name="GazetteerResponse"
      type="wfs:FeatureCollectionType"
      substitutionGroup="gml:_FeatureCollection"/>
    <xsd:element name="GazetteerMember" type="gml:FeaturePropertyType"
      substitutionGroup="gml:featureMember"/>
</xsd:schema>
```

10   GetFeature operation (required)

10.1   Introduction

The GetFeature operation allows retrieval of features from a gazetteer service. A GetFeature request is processed by a WFS-G and when the value of the outputFormat attribute is set to text/gml; subtype=gml/3.1.1, a GML instance document, containing the result set, is returned to the client.

This profile makes no further changes to this WFS operation.

10.2   Examples

Example 1

To fetch all instances of the feature type SI_LocationInstance, a client could issue the following GetFeature operation request with minimum contents:

```
http://ogc.a-domain.org/wfs-g?
    service=WFS-G
    &request=GetFeature
    &typename=SI_LocationInstance
    &namespace=xmlns(myns=http://www.example.com/myns)
```

The corrsponding minimum request encoded in XML is:

```
<?xml version="1.0" ?>
<wfs:GetFeature
    version="1.0.0"
    service="WFS-G"
```

```
   outputFormat="text/xml; subtype=gml/3.1.1"
   xmlns:myns="http://www.example.com/myns"
   xmlns:wfs="http://www.opengis.net/wfs"
   xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
   xsi:schemaLocation="http://www.opengis.net/wfs
../wfs/1.1.0/WFS.xsd">
   <wfs:Query typeName="myns:SI_LocationInstance"/>
</wfs:GetFeature>
```

In response to such a request, the gazetteer server might generate a document that looks like:

```
<GazetteerResponse
   xmlns:wfs="http://www.opengis.net/wfs"
   xmlns:gml="http://www.opengis.net/gml"
   xmlns="http://www.example.com/myns"
   xmlns:iso19112="http://www.opengis.net/iso19112"
   xmlns:smXML="http://metadata.dgiwg.org/smXML"
   xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
   xsi:schemaLocation="http://www.example.com/myns
   /WFS-G_DescribeFeatureType_Response.xsd">
   <gml:description>Example WFS-G Response</gml:description>
   <gml:name>wfs-g response</gml:name>
   <gml:boundedBy>
      <gml:Envelope srsName="EPSG:4326">
         <gml:coord>
            <gml:X>7</gml:X>
            <gml:Y>50.5</gml:Y>
         </gml:coord>
         <gml:coord>
            <gml:X>7.3</gml:X>
            <gml:Y>51</gml:Y>
         </gml:coord>
      </gml:Envelope>
   </gml:boundedBy>
   <!-- more GazetteerMember elements ... -->
   <GazetteerMember>
      <SI_LocationInstance>
         <gml:description>
            Sample Location Instance from NGA GNS
         </gml:description>
         <iso19112:geographicIdentifier>
            Bonn
         </iso19112:geographicIdentifier>
         <iso19112:geographicExtent>
            <smXML:EX_GeographicBoundingBox>
               <smXML:westBoundLongitude>

   <smXML:approximateLongitude>7.0</smXML:approximateLongitude>
               </smXML:westBoundLongitude>
               <smXML:eastBoundLongitude>

   <smXML:approximateLongitude>7.2</smXML:approximateLongitude>
               </smXML:eastBoundLongitude>
```

```
                <smXML:southBoundLatitude>

    <smXML:approximateLatitude>50.5</smXML:approximateLatitude>
                </smXML:southBoundLatitude>
                <smXML:northBoundLatitude>

    <smXML:approximateLatitude>51.2</smXML:approximateLatitude>
                </smXML:northBoundLatitude>
            </smXML:EX_GeographicBoundingBox>
        </iso19112:geographicExtent>
        <iso19112:position>
            <gml:Point>
                <gml:coord>
                    <gml:X>7.1</gml:X>
                    <gml:Y>50.7333333</gml:Y>
                </gml:coord>
            </gml:Point>
        </iso19112:position>
        <iso19112:administrator>
            <smXML:CI_ResponsibleParty>
                <smXML:organisationName>
                    <smXML:CharacterString>NGA</smXML:CharacterString>
                </smXML:organisationName>
                <smXML:role>
                    <smXML:CI_RoleCode
                        codeList="http://www.example.com"
                        codeListValue="owner"/>
                </smXML:role>
            </smXML:CI_ResponsibleParty>
        </iso19112:administrator>
        <iso19112:SI_LocationType gml:id="PPL">
            <iso19112:name>Populated Place</iso19112:name>
            <iso19112:theme>Populated Place Features</iso19112:theme>
            <iso19112:identification>name</iso19112:identification>
            <iso19112:definition/>
            <iso19112:owner>
                <smXML:organisationName>
                    <smXML:CharacterString>NGA</smXML:CharacterString>
                </smXML:organisationName>
                <smXML:role>
                    <smXML:CI_RoleCode
                        codeList="http://www.example.com"
                        codeListValue="owner"/>
                </smXML:role>
            </iso19112:owner>
            <iso19112:territoryOfUse>
                <smXML:EX_GeographicBoundingBox>
                    <smXML:westBoundLongitude>
                        <smXML:approximateLongitude>
                            -180.00
                        </smXML:approximateLongitude>
                    </smXML:westBoundLongitude>
                    <smXML:eastBoundLongitude>
                        <smXML:approximateLongitude>
                            180.00
```

```
            </smXML:approximateLongitude>
          </smXML:eastBoundLongitude>
          <smXML:southBoundLatitude>
            <smXML:approximateLatitude>
              -90.00
            </smXML:approximateLatitude>
          </smXML:southBoundLatitude>
          <smXML:northBoundLatitude>
            <smXML:approximateLatitude>
              90.00
            </smXML:approximateLatitude>
          </smXML:northBoundLatitude>
        </smXML:EX_GeographicBoundingBox>
      </iso19112:SI_LocationType>
    </SI_LocationInstance>
  </GazetteerMember>
  <!-- more GazetteerMember elements ... -->
</GazetteerResponse>
```

Example 2

This example fetches a subset of properties of the feature type SI_LocationInstance. The feature instances that are retrieved by the request are identified by a substring of the place-name property "geographicIdentifier".

```
<?xml version="1.0" encoding="UTF-8"?>
<wfs:GetFeature
    version="1.0.0"
    service="WFS-G"
    outputFormat="text/xml; subtype=gml/3.1.1"
    xmlns:myns="http://www.example.com/myns"
    xmlns:wfs-g="http://www.opengis.net/wfs-g"
    xmlns:ogc="http://www.opengis.net/ogc"
    xmlns:wfs="http://www.opengis.net/wfs"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="http://www.opengis.net/wfs
../schemas/wfs/1.1.0/wfs.xsd">
  <wfs:Query typeName="myns:SI_LocationInstance">
    <ogc:PropertyName>geographicIdentifier</ogc:PropertyName>
    <ogc:PropertyName>SI_LocationType/name</ogc:PropertyName>
    <ogc:Filter>
      <ogc:PropertyIsLike wildCard="%" singleChar="#" escapeChar="!">
        <ogc:PropertyName>geographicIdentifier</ogc:PropertyName>
        <ogc:Literal>Bonn%</ogc:Literal>
      </ogc:PropertyIsLike>
    </ogc:Filter>
  </wfs:Query>
</wfs:GetFeature>
```

Example 3

This example fetches a subset of properties of the feature type Address which is derived by extension from iso:19112:SI_LocationInstance. The feature instances that are

retrieved by the request are identified by a substring of the place-name property "geographicIdentifier" and the name of the parent feature – which in this case is a postal code.

```xml
<?xml version="1.0" encoding="UTF-8"?>
<wfs:GetFeature
     version="1.0.0"
     service="WFS-G"
     outputFormat="text/xml; subtype=gml/3.1.1"
     xmlns:myns="http://www.example.com/myns"
     xmlns:wfs-g="http://www.opengis.net/wfs-g"
     xmlns:ogc="http://www.opengis.net/ogc"
     xmlns:wfs="http://www.opengis.net/wfs"
     xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
     xsi:schemaLocation="http://www.opengis.net/wfs
../schemas/wfs/1.1.0/wfs.xsd">
  <wfs:Query typeName="myns:Address">
    <ogc:PropertyName>geographicIdentifier</ogc:PropertyName>
    <ogc:PropertyName>SI_LocationType/name</ogc:PropertyName>
    <ogc:Filter>
    <ogc:And>
      <ogc:PropertyIsLike wildCard="%" singleChar="#" escapeChar="!">
        <ogc:PropertyName>geographicIdentifier</ogc:PropertyName>
        <ogc:Literal>Bahnhof%</ogc:Literal>
      </ogc:PropertyIsLike>
      <ogc:PropertyIsEqualTo>

  <ogc:PropertyName>parent/geographicIdentifier</ogc:PropertyName>
        <ogc:Literal>53123</ogc:Literal>
      </ogc:PropertyIsEqualTo>
      </ogc:And>
    </ogc:Filter>
  </wfs:Query>
</wfs:GetFeature>
```

11 GetGMLObject operation (optional)

11.1 Introduction

The GetGMLObject operation allows gazetteer clients to TBD

This profile makes no further changes to this WFS operation.

Annex A
(normative)

Abstract test suite

11.2 A.1 General

TBD.

In each Implementation Specification document, Annex A shall specify the Abstract Test Suite, as specified in Clause 9 and Annex A of ISO 19105. That Clause and Annex specify the ISO/TC 211 requirements for Abstract Test Suites. Examples of Abstract Test Suites are available in an annex of most ISO 191XX documents, one of the more useful is in ISO 191TBD. Note that this guidance may be more abstract than needed in an OGC Implementation Specification.

Annex B

(normative)

XML schemas

XML schemas are attached to this draft specification in a zip file.

In addition to this document, this specification includes several normative XML Schema files. These are posted online at the URL http://schemas.opengeospatial.net/(TBD) where a lower level directory is used for this Version TBD. These XML Schema files are also bundled in a zip file with the present document. In the event of a discrepancy between the bundled and online versions of the XML Schema files, the online files shall be considered authoritative.

The TBD abilities now specified in this document use TBD specified XML Schemas included in the zip file with this document. These XML Schemas combine the XML Schema fragments listed in various subclauses of this document, eliminating duplications. These XML Schema files roughly match the TBD UML packages described in Annex B, and are named:

    TBD.xsd

    TBD.xsd

These XML Schemas use and build on the OWS common XML Schemas specified [OGC 05-008], named:

    owsServiceIdentification.xsd

    ows19115subset.xsd

    owsServiceProvider.xsd

    owsOperationsMetadata.xsd

    owsExceptionReport.xsd

    owsBoundingBox.xsd

    owsGetCapabilities.xsd

All these XML Schemas contain documentation of the meaning of each element and attribute, and this documentation shall be considered normative as specified in Subclause 11.6.3 of [OGC 05-008].

Annex C
(informative)

Example XML documents

11.3   C.1   Introduction

This annex provides more example XML documents than given in the body of this document. TBD

11.4   C.2   TBD

<div align="center">

Annex D

(informative)

Use Cases

</div>

Navigation Use Case

In this use case, a viewer client application wishes to give the user the ability to navigate through a spatially organised information service using place names. This can be done by either allowing structured searches or by browsing a hierarchy of gazetteer terms to narrow down search requirements. The browse tree view of such a hierarchy is the general portrayal case, and gazetteer service searches return sub-trees of varying complexity.

Although this provides a framework for rich functionality, a simple Gazetteer Service can return an unstructured list that is either the child nodes of a query term, or possibly a complete list of nodes generated by walking the tree. In the most trivial case, the tree depth is one and there is no hierarchy.

The user can then select a geographic feature of interest for a variety of actions, for example:

e)   Zoom a map or otherwise run a query relating to the feature;

f)   Refine navigation choices with a new list of features within the feature specified; and

g)   Focus a locator map on a new scale, to show position of bottom most (target) term.

The interface would either build such a tree through recursive calls to the Gazetteer Service, or be able to extract a fully formed tree from a single call.

"Geocoding" Use Case

This Use Case pertains to a Geocoder Service that invokes a Gazetteer Service to extract a particular set of geometries that pertain to a given set of identifiers, which are derived from arbitrary resources.

The use of a network-accessible Gazetteer Service by a Geocoder Service may have the following advantages:

−   The target vocabulary might be huge

−   The target vocabulary may be highly specialized

– The target vocabulary may be partitioned across multiple nodes (e.g. use Australian Gazetteer Service to get Australian place names)

– The geometry of the Gazetteer Service may be inconvenient for the Geocoder Service to manage internally (e.g. size, multiple equivalents, on-the-fly generalization and re-projection required)

Other uses may include:

– Acquisition of a vocabulary for re-use (i.e. a generic Geoparser Service is pointed at documents containing names of water features in Uzbekhistan – it might load the relevant Gazetteer Service out-of-band and cache it for some period). In this case consideration should be given to a "Gazetteer Content Standard" such as the Alexandria Digital Library Gazetteer Content Standard.

– A set of terms may be sent as a batch and a single response retrieved for improved efficiency. (Note this may simply replace the need for a Geocoder Service to remember common terms – although its own encoding of the geocoded output should re-use features.)

Service Invocation Use Case

A client or agent application performing service chaining may wish to exploit a Gazetteer Service to broaden particular search queries at run-time. For example, if the application is looking for information relevant to a particular suburb, it may wish to invoke a Gazetteer Service to find the city that contains the suburb in order to invoke a service organized by city names.

Consider the case of a tool to help locate relevant information – given a term, it might search for all synonyms of the term, thus making the term broader until a suitable result set is found. In this way, today's rather primitive Web search collections could possibly be exploited to harvest related content.

Geographic Selection Use Case

A simple use of such an interface is to access a feature collection that acts as a non-hierarchical collection of named features. A request by a client or agent may be to return all named features of a given feature type or types that fall within a specific bounding geometry. This essentially general WFS request would return features that may not have the associations present in other use cases, and are therefore all "root" nodes. This interface would be easiest to realize against spatial data sets that have no explicit relationships among features, allowing the client to use and build filters to select different sets of features.

There may be no a-priori knowledge of a desired Gazetteer Service. This knowledge may be derived at run time according to other metadata from the source feature or document. Accordingly, the client should not need to store all possible instances of Gazetteer Services, but rather needs to be able to discover them at run time, as needed.

Bibliography

[1]   ISO 31 (all parts), Quantities and units.

[2]   IEC 60027 (all parts), Letter symbols to be used in electrical technology.

[3]   ISO 1000, SI units and recommendations for the use of their multiples and of certain other units.

[4]   Guidelines for Successful OGC Interface Specifications, OGC document 00-014r1