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Gazetteer Service - Application Profile of the Web Feature Service Best Practice

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Contents		Page
1	Scope.....	13
2	Conformance.....	14
3	Normative references	14
4	Terms and definitions	15
5	Conventions	15
5.1	Abbreviated terms.....	15
5.2	UML notation.....	16
5.3	Document terms and definitions	16
6	Gazetteer Service overview	16
6.1	Processing Requests.....	16
7	Shared aspects.....	17
7.1	Introduction.....	17
7.2	Operation request encoding	17
8	GetCapabilities operation (required).....	18
8.1	Introduction.....	18
8.2	Operation request.....	18
8.3	GetCapabilities operation response.....	19
Normal response	19	
9	DescribeFeatureType operation (required).....	19
9.1	Introduction.....	19
9.2	Examples.....	19
10	GetFeature operation (required).....	22
10.1	Introduction.....	22
10.2	Examples.....	23
Example 1 - Get all entries in a gazetteer (empty filter).....	23	
Example 2 - Get an entry by name.....	23	
Example 3 - Get an entry by id.....	23	
Example 4 - Get entries within a BBOX	24	
11	Transaction operation (optional).....	29
11.1	Insert, Update and Delete Examples.....	29
Example: Insert	29	
Example: Update.....	31	
Example: Delete.....	32	
11.2	Response	33
11.3	Exceptions.....	33
Annex A:	Abstract test suite	34

A.1 Test module for general capabilities	34
A.1.1 General capabilities	34
A.1.2 Required capabilities	34
A.2 Test module for Accessible Content conformance	34
A.2.1 Gazetteer Service advertised	34
A.2.2 SI_Gazetteer Feature Type response conformance	35
A.2.2 Gazetteers refer to available feature types.....	35
A.2.2 SI_LocationInstance conformance	35
A.2.2 SI_LocationInstance extensions conformance	36
Annex B: XML schemas.....	37
Annex C: Dictionaries.....	52
Annex D: Use Cases	150
D.1 Parent-Child Navigation Use Case	150
D.2 Geographic Selection Use Case	150
D.3 Integrated Query Use Case	150
D.4 GeoSynchronization via Mobile Apps Use Case.....	151
D.5 “Geocoding” Use Case.....	151
D.6 Service Invocation Use Case.....	152
Annex E: Transliteration domains	153
Annex F: Language and Script domains.....	161
Annex G: Dialect domains.....	175

Figures

Figure 1 - WFS-G Profile update process.....	8
Figure 2 - Gazetteer class diagram (from ISO 19112).....	13

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i. Preface

This document represents the work of the OGC “WFS-G Standards Working Group”.

Access to consistent, reliable and local geographic names information is essential for understanding communities and geo-social dynamics. In many situations, geographic names provide one of the most important keys for referencing and accessing a variety of other information. And GeoNames databases, called Gazetteers, are an information resource for representing places, groups of people and cultures.

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 standard, an OGC Best Practice for Gazetteer Services – Application Profile of the Web Feature Service Implementation Standard, an OGC Discussion paper on gazetteers, and an ISO draft standard for geographic identifiers.

Since this resource is so important, there is growing global interest in sharing and updating geographic names across a standard web-based service interface that is not controlled by any one organization or group. OGC has met this need for open accessibility to geographic feature data via its creation of the Web Feature Service (WFS) standard. The WFS standard defines an interface for specifying requests for retrieving and updating geographic features across the Web using platform-independent calls. And of interest to the GeoNames community, members of the OGC have been actively developing a special profile of the WFS which is being designed specifically to support GeoNames.

The origin of the WFS-G profile can be traced to two activities that preceded its creation. In the OGC Geospatial Fusion Services (GFS) interoperability initiative, an OGC gazetteer interface was initially defined and implemented and eventually published as an OGC Discussion Paper. A separate effort in the ISO TC 211 working group led to a mature draft standard called “Spatial referencing by geographic identifiers” (ISO 19112) that defines an abstract model to be implemented by a gazetteer service. The discussion paper and ISO 19112 eventually inspired OGC to formalize a WFS-G profile into an OGC Best Practices Document (05-035r2).

The WFS-G web service allows a client to search and retrieve elements of a geo-referenced vocabulary of well-known place-names. The National Geospatial Intelligence Agency (NGA), the United States Geological Survey (USGS), the State of Montana and other members of the OGC (under an effort called the WFS-G Working Group) are actively making further improvements to the best practice WFS-G with the intent of moving it to a full OGC standard. As a result of the WFS-G Working Group effort an operational WFS-G implementing this profile has been deployed at the USGS in May 2011.

Advantages of the WFS-G web service include:

- Enables platform-neutral access to well known place name vocabularies via an open web standard.
- Enables collaborative maintenance of geographic names using the WFS. transaction interface and an optional GeoSynchronization gatekeeper web service
- Implements the ISO 19112 information model as a GMLSF Level 1 application schema.
- Facilitates the development of a variety of location-based applications (Geo-Apps).

The Gazetteer Service is a specialized Application Profile (hereafter referred to as “profile”) of a Web Feature Service that specifies a minimum set of Location Instances and operations required to support an instance of a gazetteer service. Instances within a collection of gazetteer features may be 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 as proposed here exposes the following interfaces to query location instances in a gazetteer database:

- Get or Query GeoNames as features.
- Retrieve properties of the gazetteer database, such as the location type class definitions and the spatial reference system definitions.
- Conduct transactional operations to enable updates by authoritative or ‘crowd-source’ communities. This is implemented using WFS Transactional (WFS-T) capabilities.

In reference to the previous version of this profile (05-035r2), this version:

- Implements more comprehensive set of elements from the ISO 19112 model to provide useful, standardized services.
- Provides methods to traverse parent/child relationships.
- Improves standardization related to the definition of Location Instances and the correspondence to SI_LocationType.
- Integrates comments from OGC WFS-G Change Request 08-051 which indicated the previous version of this profile (05-035r2) was not aligned properly with ISO 19112 and ISO 19139 v1.0. This version of the profile is now conceptually aligned with ISO 19112, especially in regard to definition and cardinality of attributes of SI_LocationInstance. Additionally, valid XML schemas were created that make use of ISO 19139 v1.0, WFS 1.1.0 and GML 3.1.1.
- Integrates comments from OGC WFS-G Change Request 08-052 which indicated the previous version of this profile (05-035r2) can be improved with respect to its alignment with ISO 19112, GML/ISO 19136, ISO/TS 19139 and SDI architectures. These comments were adapted for use in GMLsf Level 1 Schemas. For example, INSPIRE proposed the need for an internationalised string and this was implemented in the schemas using GMLSF Level 1.

- Integrates approximately 90% of the material from a review of EuroGeoNames. The main items to note in this category of include that in the original ISO 19112 of this profile there were several geometric columns. For example, ISO 19112 uses the GeographicExtent property, Position. However, an objective of the update was to use types in GMLsf Level 1 for this profile. To meet this objective, GeographicExtent was changed to GeometryProperty so a geographic name feature can now be a Point, Line, Polygon, Multipoint, Multisurface, etc.
- Adds extensions based on NGA and USGS requirements including: Transliteration domain (Annex E), Language and Script domains (Annex F), Dialect domain (Annex G), Designation domain (a value description where the main value is 'Historic'), Citation Code domain (a bibliographic reference that indicates where the name came from), Type domain (Official or Variant), and Partner domain (identifies the Partner, such as State of Montana, where the name of partner or null is used). The schema now also references the following dictionaries: ISO 639-3:2007, *Codes for the representation of names of languages*, ISO 3166-1, *Codes for the representation of names of countries and their subdivisions – Part 1: Country codes*, ISO 15924:2004, *Codes for the representation of names of scripts*.
- Updates the alternativeGeographicIdentifier so the domain values describe if the alternativeGeographicIdentifier value is an official or variant name. Valid values are "official" or "variant". This done so the schema can support multiple official and variant names. For example, Canada has two official languages so there may be two official names, one in English and one in French.
- Adds transactional interfaces based on WFS-T.

A summary of the schema development process for this update Best Practice is provided below.

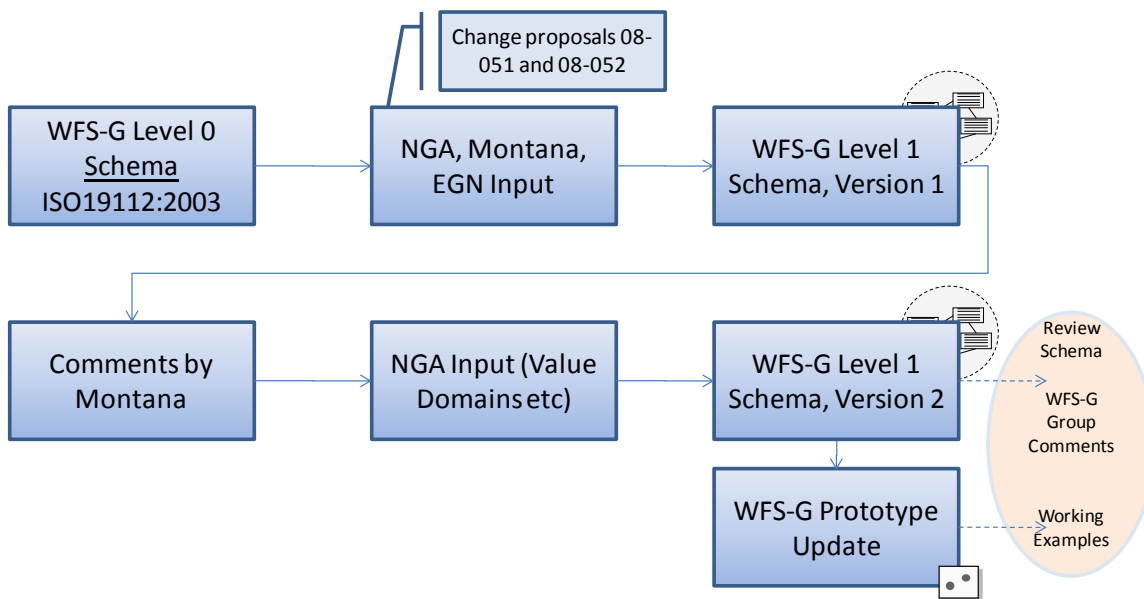


Figure 1 - WFS-G Profile update process

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.

- a) US Geological Survey (USGS)
- b) CubeWerx Inc.
- c) The Carbon Project
- d) US National Geospatial-Intelligence Agency (NGA)
- e) US Federal Geographic Data Committee

- f) Intergraph Government Solutions (Hexagon)
- g) State of Montana

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iv. Revision history

Date	Release	Editor	Primary clauses modified	Description
2011-08-18	0.9.4	Harrison Vretanos	all	Complete revision
2005-04-12				New Document structure according to 05-009
2005-10-11	0.9.1	Fitzke	all	Complete revision.
2005-2006-01-09	0.9.1	Carl Reed Jens Fitzke	Numerous GetFeature examples	Edits for consistency, grammar, etc. Added more examples. Minor corrections on document and schema / example files.
2006-03-16	0.9.2	Rob Atkinson	all	ISO 19112 data model conformance
2006-05-29	0.9.3	Rob Atkinson	All	Editorial revision filling in missing clauses. Added abstract conformance tests. Some reorganisation of order
2006-05-29	0.9.3	Jens Fitzke	All	Minor edits in contributors section and others. Added further examples.
2006-06-03	0.9.3	Rob Atkinson	Appendix C	Samples, formatting

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

This profile implements a complete set of elements from the ISO 19112 model with updates based on input from OGC WFS-G Change Requests 08-051 and 08-052, EuroGeoNames, and extensions based on USGS and NGA requirements to provide useful, standardized services, integrates representations of parent/child relationships, standardizes definition of Location Instances and adds transactional interfaces based on WFS-T.

Future work should include upgrading the schemas for the latest version of GMLSF which uses GML 3.2 and update the API to WFS 2.0.

Future extensions may include integration of OpenSearch, definition of additional output formats suitable for GeoNames interaction via WFS-G such as HTML, discussion of Point/Radius searches, discussion of GeoSynchronization Service (GSS) frameworks for collaborative update of GeoNames with validation.

Foreword

This document is intended to replace OGC 05-035r2. It represents a complete revision of this former document version, especially with respect to “Spatial referencing by geographic identifiers” (ISO 19112) that defines an abstract model to be implemented by a gazetteer service. The Gazetteer Service is considered a profile of the WFS standard. It is related to and makes use of the WFS, Filter Encoding, GMLSF, and ISO 19139 standards.

This document includes 7 annexes; Annexes A, B, C, E, F, G are normative, and Annex D is informative.

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

Introduction

This document defines a Gazetteer Service profile of the OGC Web Feature Service Standard. The OGC Gazetteer Service allows a client to search and retrieve elements of a georeferenced vocabulary of well-known place-names.

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.
- Query the Gazetteer Service in order to retrieve place-name features without closer examination of the feature type definitions
- Access metadata about the gazetteer(s) provided by the service
- Update place-name features using WFS transactions
- Fetch place-name features that have Parent-Child relationships and then follow those links

To ensure semantic interoperability this profile defines the response schema elements according to the gazetteer data model defined in ISO 19112 with updates based on input from OGC WFS-G Change Requests 08-051 and 08-052, EuroGeoNames, and extensions based on USGS and NGA requirements.

The overall design principle of this profile is to make gazetteer service behavior to be completely predictable, and allowing setup to be 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” (this allows a server instance to act both as a general web feature service and a gazetteer service).
- The gazetteers (collection of locations) are described by metadata objects of a well defined feature type (SI_Gazetteer). Presence of this feature type is sufficient to determine that a service acts a gazetteer for the Location Instances described by the collection of SI_Gazetteer objects.
- The Gazetteer WFS serves a feature type called SI_LocationInstance that contains the collections of geographic names.
- 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.

Gazetteer Profile of the Web Feature Service Candidate Implementation Standard

1 Scope

This OGC document specifies the OGC Gazetteer Service operations as a profile of the Web Feature Service (WFS-G). Services compliant with this standard **shall** provide Location Instances derived from SI_LocationInstance. In Addition, they **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 SI_Gazetteer and SI_LocationInstance:

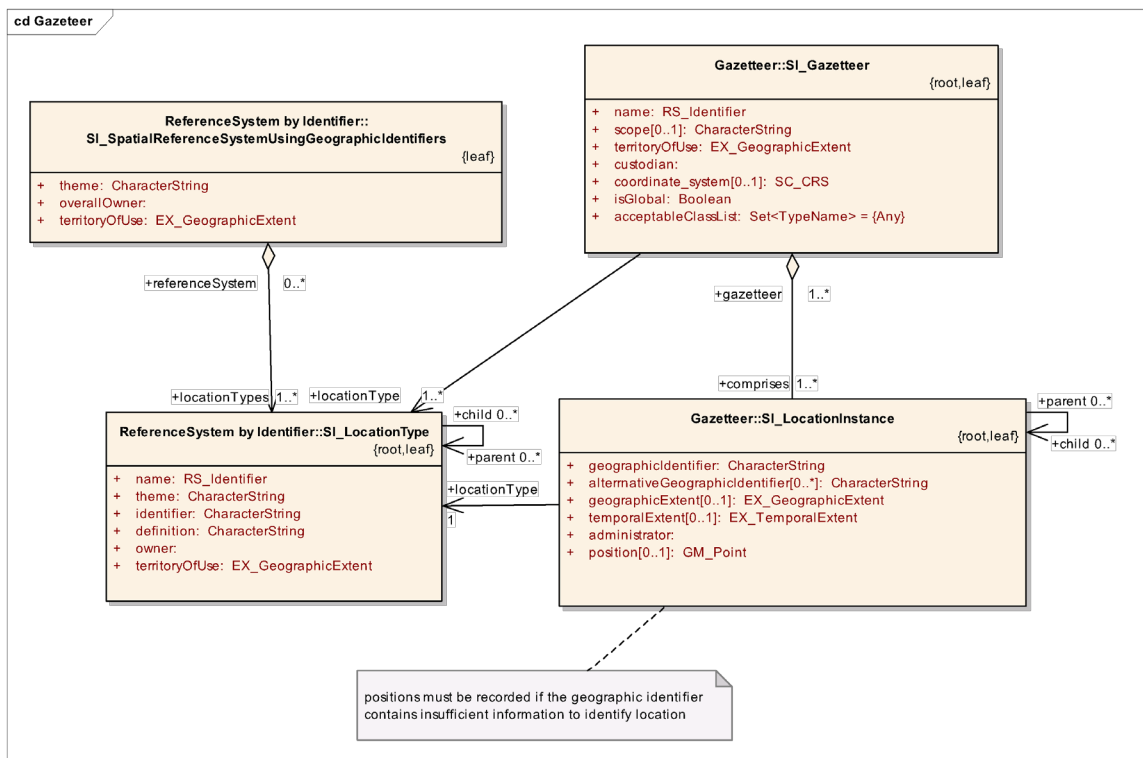


Figure 2 Gazetteer class diagram (from ISO 19112)

SI_LocationType Feature Types **may** be supported by a Gazetteer Service to describe the Gazetteer's internal organization.

Operations

To support query processing and updates, 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 SI_LocationInstance are supported by the service and what operations are supported.

DescribeFeatureType

As a web feature service, a gazetteer service must be able, upon request, to describe the structure of SI_LocationInstance it services.

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 must be able to constrain the query spatially and non-spatially.

Transaction

As a web feature service, a gazetteer service must be able to service transaction requests. A transaction request is composed of operations that modify features; that is create, update, and delete operations on geographic features.

2 Conformance

Conformance with this standard 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*

ISO 639-3:2007, *Codes for the representation of names of languages*

ISO 3166-1, *Codes for the representation of names of countries and their subdivisions – Part 1: Country codes*

ISO 15924:2004, *Codes for the representation of names of scripts*

OGC 05-008, *OGC Web Services Common Standard*

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

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

OGC 06-049r1, *GML 3.1.1 simple features profile version 1.0*

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

In addition to this document, this standard includes several normative XML Schema files. These XML Schema files are bundled with the present document.

4 Terms and definitions

For the purposes of this standard, the definitions specified in Clause 4 of the OWS Common Implementation Standard [OGC 05-008] 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 Standard [OGC 05-008] apply to this document, plus the following abbreviated terms.

FTC: Feature Type Catalog

5.2 UML notation

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

5.3 Document terms and definitions

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

6 Gazetteer Service overview

A Gazetteer defines a set of *location instances*, each of which provides a binding between representations of a location within a CRS and as an identifier. Each location instance is a *Feature*, and is a (possibly one of many) representation of a “real-world” object. The representation of the real-world object within the Gazetteer is designed to be used to perform this translation, and to allow the set of such Features to be discovered, searched, accessed and updated.

The gazetteer service is thus WFS serving a predictably structured set of features representing Gazetteers and the sets of location instances they contain.

6.1 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 for query would proceed as follows:

1. A client application would request a capabilities document from the WFS-G. Such a document contains a description of all the operations that the WFS-G supports, and a list of the feature types that the service offers. If the list of feature types includes SI_Gazetteer and SI_LocationInstance, then the service is acting as a Gazetteer.
2. A client application (optionally) makes a request to a web feature service for the definition of one or more of the feature types that the WFS-G can service. (This is optional, and may be used to discover additional elements).
3. Based on the definition of the SI_LocationInstance Feature Type the client application generates a request as specified in the WFS interface [OGC 04-094]
4. The WFS-G is invoked to read and service the request and generate a response document containing zero or more location instances.

5. In the event that an error has occurred, the WFS-G will generate an exception report to indicate that fact.

Processing requests for transaction would proceed as follows:

1. The client application requests a capabilities document from the web feature service to verify that the service is acting as a gazetteer (i.e. the feature types SI_Gazetteer and SI_LocationInstance exist) and that the server support the WFS Transaction operation.
2. A client application (optionally) makes a request to a web feature service for the definition of the SI_LocationInstance feature type. (This is optional, and may be used to discover additional elements).
3. A client application submits a Transaction request to a web feature service. The Transaction request may contain zero or more Insert, Update or Delete actions that create, modify or delete one or more instances of SI_LocationInstance.
4. When the WFS-G has completed processing the transaction 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”.

Note also that a client may be “bound” to the Gazetteer service content by configuration, or discover the implementing SI_LocationInstance through a services registry and may thus be able to skip steps 1,2 and 3.

The definition of the WFS-G profile is intended to make the discovery and invocation of WFS-G services possible through service registries.

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 05-008]. Table 1 summarizes the Gazetteer Service operations and their encoding methods defined in this standard.

Table 1 — Operation Request Encoding

Operation	Request Encoding
GetCapabilities (required)	Mandatory KVP-GET
DescribeFeatureType (required)	Mandatory KVP-GET
GetFeature (required)	Mandatory XML-POST and KVP-GET
Transaction (optional)	Mandatory XML-POST

8 GetCapabilities operation (required)

8.1 Introduction

This is a standard WFS requirement, with both the request and response requirements unchanged by the WFS-G profile.

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, and the supported operations on each feature type. 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 services. The “Sections” and “updateSequence” parameters are optional implementation by gazetteer services. All gazetteer services shall implement HTTP GET transfer of the GetCapabilities operation request, using KVP encoding. Services can also implement HTTP POST transfer of the GetCapabilities operation request, using XML encoding only.

The value of the “service” parameter shall be “WFS”. 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].

8.3 GetCapabilities operation response

Normal response

The WFS-G profile creates no additional requirements of the WFS GetCapabilities operation beyond the ability to serve the nominated SI_Gazetteer and SI_LocationInstance.

9 DescribeFeatureType operation (required)

9.1 Introduction

The DescribeFeatureType operation allows gazetteer clients to retrieve schema descriptions which define, how the gazetteer server will 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 certain feature types.

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  
  &request=DescribeFeatureType  
  &typename=iso19112:SI_LocationInstance  
  &namespace=xmlns(iso19112=http://www.isotc211.org/iso19112)
```

The corresponding minimum request encoded in XML is:

```
<?xml version="1.0" ?>  
<wfs:DescribeFeatureType  
  version="1.1.0"  
  service="WFS"  
  xmlns:iso19112="http://www.isotc211.org /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 the following example:

```
<?xml version="1.0" encoding="UTF-8" ?>
```

```

<xs:schema targetNamespace="http://www.isotc211.org/19112"
xmlns:iso19112="http://www.isotc211.org/19112"
xmlns:xs="http://www.w3.org/2001/XMLSchema"
xmlns:gml="http://www.opengis.net/gml"
xmlns:gmdsf1="http://www.isotc211.org/2005/gmdsf1"
elementFormDefault="qualified" version="1.0">
  <xs:import namespace="http://www.opengis.net/gml"
schemaLocation="http://www.cubewerx.com/schemas/gml/3.1.1/base/gml.xsd"
/>
  <xs:import namespace="http://www.w3.org/XML/1998/namespace"
schemaLocation="http://www.w3.org/2001/xml.xsd" />
  <xs:import namespace="http://www.isotc211.org/2005/gmdsf1"
schemaLocation="http://www.cubewerx.com/schemas/gazetteer/1.0.0/gmlsf1/f
ull/gmd.xsd" />
  <xs:complexType name="LanguageStringType">
    <xs:simpleContent>
      <xs:extension base="xs:string">
        <xs:attribute ref="xml:lang" />
        <xs:attribute name="transliterationDomain" type="xs:string" />
      </xs:extension>
    </xs:simpleContent>
  </xs:complexType>
  <!--
=====
-->
- <!-- === PROP TYPE: AlternativeGeographicIdentifiersPropertyType
=====
-->
- <!--
=====
-->
<xs:complexType name="AlternativeGeographicIdentifiersPropertyType">
  <xs:sequence>
    <xs:element ref="iso19112:alternativeGeographicIdentifier"
maxOccurs="unbounded" />
  </xs:sequence>
</xs:complexType>
<xs:element name="alternativeGeographicIdentifier">
  <xs:complexType>
    <xs:sequence>
      <xs:element name="partner" type="xs:string" minOccurs="0" />
      <xs:element name="name" type="iso19112:LanguageStringType" />
      <xs:element name="nameID" type="xs:string" minOccurs="0" />
      <xs:element name="type" type="xs:string" minOccurs="0" />
      <xs:element name="dateCommitted" type="xs:dateTime" minOccurs="0" />
      <xs:element name="primary" type="xs:boolean" minOccurs="0" />
      <xs:element name="citationCode" minOccurs="0">
        <xs:complexType>
          <xs:simpleContent>
            <xs:restriction base="gml:CodeType">
              <xs:attribute name="codeSpace" type="xs:anyURI" use="optional" />
            </xs:restriction>
          </xs:simpleContent>
        </xs:complexType>
      </xs:element>
    </xs:sequence>
  </xs:complexType>

```

```

    </xs:complexType>
  </xs:element>
</xs:sequence>
</xs:complexType>
</xs:element>
<!--
=====
-->
- <!-- === FEATURE TYPE: SI_LocationInstance
=====
-->
- <!--
=====
-->
<xs:element name="SI_LocationInstance"
type="isol9112:SI_LocationInstanceType" substitutionGroup="gml:_Feature"
/>
<xs:complexType name="SI_LocationInstanceType">
  <xs:complexContent>
    <xs:extension base="gml:AbstractFeatureType">
      <xs:sequence>
        <xs:element name="guid" type="xs:anyURI" minOccurs="0" />
        <xs:element name="geographicIdentifier" type="xs:string" />
        <xs:element name="alternativeGeographicIdentifiers"
type="isol9112:AlternativeGeographicIdentifiersPropertyType"
minOccurs="0" />
        <xs:element name="position" type="gml:PointPropertyType" />
        <xs:element name="geographicExtent" type="gml:GeometryPropertyType"
minOccurs="0" maxOccurs="unbounded" />
        <xs:element name="dateOfCreation" type="xs:date" minOccurs="0" />
        <xs:element name="dateModified" type="xs:date" minOccurs="0" />
        <xs:element name="administrator"
type="gmdsf1:CI_ResponsiblePartyPropertyType" />
        <xs:element name="spatialObject" type="xs:anyURI" minOccurs="0" />
        <xs:element name="designation" minOccurs="0" maxOccurs="unbounded">
          <xs:complexType>
            <xs:simpleContent>
              <xs:restriction base="gml:CodeType">
                <xs:attribute name="codeSpace" type="xs:anyURI" use="optional"
/>
            </xs:restriction>
          </xs:simpleContent>
        </xs:complexType>
      </xs:element>
      <xs:element name="history" type="xs:string" minOccurs="0" />
      <xs:element name="description" type="xs:string" minOccurs="0" />
      <xs:element name="parent" type="gml:ReferenceType" minOccurs="0"
maxOccurs="unbounded">
        <xs:annotation>
          <xs:appinfo source="urn:x-
gml:targetElement">isol9112:SI_LocationInstance/geographicIdentifier</xs
:appinfo>
        </xs:annotation>

```

```
    </xs:element>
    <xs:element name="child" type="gml:ReferenceType" minOccurs="0"
maxOccurs="unbounded">
      <xs:annotation>
        <xs:appinfo source="urn:x-
gml:targetElement">isol19112:SI_LocationInstance/geographicIdentifier</xs
:appinfo>
      </xs:annotation>
    </xs:element>
    <xs:element name="locationType" type="gml:ReferenceType">
      <xs:annotation>
        <xs:appinfo source="urn:x-
gml:targetElement">isol19112:SI_LocationType/name</xs:appinfo>
      </xs:annotation>
    </xs:element>
  </xs:sequence>
</xs:extension>
</xs:complexContent>
</xs:complexType>
</xs: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 changes to this WFS operation.

The GetFeature operation **must** support the following behaviour:

1. get all entries in a gazetteer (empty filter)
2. get entry by name
3. get entry by id
4. get entries within a bounding box
5. get entries within a polygon geometry
6. get all entries up to a max feature threshold

10.2 Examples

Example 1 – Get all entries in a gazetteer (empty filter)

```
<?xml version="1.0" encoding="UTF-8"?>
<GetFeature xmlns="http://www.opengis.net/wfs"
  xmlns:iso19112="http://www.isotc211.org/19112"
  xmlns:ogc="http://www.opengis.net/ogc"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:gml="http://www.opengis.net/gml" service="WFS" version="1.1.0"
  outputFormat="text/xml; subtype=gml/3.1.1">
  <Query typeName="iso19112:SI_LocationInstance" srsName="EPSG:4326"/>
</GetFeature>
```

Example 2 - Get an entry by name.

```
<?xml version="1.0" encoding="UTF-8"?>
<GetFeature xmlns="http://www.opengis.net/wfs"
  xmlns:iso19112="http://www.usgs.gov/gnis"
  xmlns:ogc="http://www.opengis.net/ogc"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:gml="http://www.opengis.net/gml" service="WFS" version="1.1.0"
  outputFormat="text/xml; subtype=gml/3.1.1" maxFeatures="100"
  handle="">
  <Query typeName="iso19112:SI_LocationInstance" srsName="EPSG:4326">
    <ogc:Filter>
      <ogc:PropertyIsEqualTo>
        <ogc:PropertyName>iso19112:SI_LocationInstance/alternativeGeographicId
entifiers/alternativeGeographicIdentifier/name</ogc:PropertyName>
          <ogc:Literal>Hawaii</ogc:Literal>
        </ogc:PropertyIsEqualTo>
      </ogc:Filter>
    </Query>
  </GetFeature>
```

Example 3 - Get an entry by id.

```
<?xml version="1.0" encoding="UTF-8"?>
<GetFeature xmlns="http://www.opengis.net/wfs"
  xmlns:gnis="http://www.usgs.gov/gnis"
  xmlns:ogc="http://www.opengis.net/ogc"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:gml="http://www.opengis.net/gml" service="WFS" version="1.1.0"
  outputFormat="text/xml; subtype=gml/3.1.1" maxFeatures="100"
  handle="">
  <Query typeName="gnis:SI_LocationInstance" srsName="EPSG:4326">
    <Filter>
      <FeatureId fid="434791DB6C5BBB0D002324020000"/>
    </Filter>
  </Query>
</GetFeature>
```

Example 4 – Get entries within a BBOX

A client would start to retrieve gazetteer metadata from SI_Gazetteer feature instances:

```
<?xml version="1.0" encoding="UTF-8"?>
<GetFeature xmlns="http://www.opengis.net/wfs"
  xmlns:iso19112="http://www.isotc211.org/19112"
  xmlns:ogc="http://www.opengis.net/ogc"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:gml="http://www.opengis.net/gml" service="WFS" version="1.1.0"
  outputFormat="text/xml; subtype=gml/3.1.1" maxFeatures="100"
  handle="">
  <Query typeName="iso19112:SI_LocationInstance" srsName="EPSG:4326">
    <ogc:Filter>
      <ogc:BBOX>
        <ogc:PropertyName>position</ogc:PropertyName>
        <gml:Envelope srsName="EPSG:4326"
          xmlns:gml="http://www.opengis.net/gml">
          <gml:lowerCorner>-122.424727851308
37.8255919861654</gml:lowerCorner>
          <gml:upperCorner>-122.420793831551
37.8277556970318</gml:upperCorner>
          </gml:Envelope>
        </ogc:BBOX>
      </ogc:Filter>
    </Query>
  </GetFeature>
```

The server returns a feature collection with SI_Gazetteer feature instances:

```
<?xml version="1.0" encoding="UTF-8"?>
<wfs:FeatureCollection xmlns:wfs="http://www.opengis.net/wfs"
  xmlns:gml="http://www.opengis.net/gml"
  xmlns="http://www.isotc211.org/19112"
  xmlns:gmdsf1="http://www.isotc211.org/2005/gmdsf1">
  <gml:featureMember>
    <SI_LocationInstance
  id="CWFID.SI_LOCINST.0.76207.4D91FA5285742EC8202324020000">
      <guid>{865C52A6-53D9-45A6-832E-35425357253E}</guid>
      <geographicIdentifier>218080</geographicIdentifier>
      <alternativeGeographicIdentifiers>
        <alternativeGeographicIdentifier>
          <name>Alcatraz Island</name>
          <nameID>{769EBACE-F39A-478F-E044-00144F233E68}</nameID>
          <type>official</type>
          <primary>>true</primary>
        </alternativeGeographicIdentifier>
        <alternativeGeographicIdentifier>
          <name>Pelican Island</name>
          <nameID>{769EBACE-F3A0-478F-E044-00144F233E68}</nameID>
          <type>variant</type>
          <primary>>false</primary>
        </alternativeGeographicIdentifier>
      </alternativeGeographicIdentifiers>
    </SI_LocationInstance>
  </gml:featureMember>
</wfs:FeatureCollection>
```



```
<alternativeGeographicIdentifier>
  <name>Alcatrazes Island</name>
  <nameID>{769EBACE-F39B-478F-E044-00144F233E68}</nameID>
  <type>variant</type>
  <primary>>false</primary>
</alternativeGeographicIdentifier>
<alternativeGeographicIdentifier>
  <name>Bird Island</name>
  <nameID>{769EBACE-F39C-478F-E044-00144F233E68}</nameID>
  <type>variant</type>
  <primary>>false</primary>
</alternativeGeographicIdentifier>
<alternativeGeographicIdentifier>
  <name>Yerba Buena</name>
  <nameID>{769EBACE-F3A2-478F-E044-00144F233E68}</nameID>
  <type>variant</type>
  <primary>>false</primary>
</alternativeGeographicIdentifier>
<alternativeGeographicIdentifier>
  <name>Isla De Los Alcatrazes</name>
  <nameID>{769EBACE-F39E-478F-E044-00144F233E68}</nameID>
  <type>variant</type>
  <primary>>false</primary>
</alternativeGeographicIdentifier>
<alternativeGeographicIdentifier>
  <name>Isla De Alcatrazes</name>
  <nameID>{769EBACE-F39D-478F-E044-00144F233E68}</nameID>
  <type>variant</type>
  <primary>>false</primary>
</alternativeGeographicIdentifier>
<alternativeGeographicIdentifier>
  <name>Los Alcatrasses</name>
  <nameID>{769EBACE-F39F-478F-E044-00144F233E68}</nameID>
  <type>variant</type>
  <primary>>false</primary>
</alternativeGeographicIdentifier>
<alternativeGeographicIdentifier>
  <name>The Rock</name>
  <nameID>{769EBACE-F3A1-478F-E044-00144F233E68}</nameID>
  <type>variant</type>
  <primary>>false</primary>
</alternativeGeographicIdentifier>
</alternativeGeographicIdentifiers>
<position>
  <gml:Point srsName="EPSG:4326">
    <gml:pos srsName="EPSG:4326" srsDimension="3">-122.4233048
37.8265946 0</gml:pos>
  </gml:Point>
</position>
<dateOfCreation>1981-01-19</dateOfCreation>
<dateModified>2010-03-02</dateModified>
<administrator>
  <gmdsf1:CI_ResponsibleParty>
```

```

        <gmdsf1:individualName>USGS</gmdsf1:individualName>
        <gmdsf1:voice>303-236-5900</gmdsf1:voice>
        <gmdsf1:deliveryPoint>Box 25046 Denver Federal
Center</gmdsf1:deliveryPoint>
        <gmdsf1:city>Denver</gmdsf1:city>

<gmdsf1:administrativeArea>Colorado</gmdsf1:administrativeArea>
        <gmdsf1:postalCode>80225</gmdsf1:postalCode>
        <gmdsf1:country>USA</gmdsf1:country>
        <gmdsf1:hoursOfService>8:00am to
4:00pm</gmdsf1:hoursOfService>
        <gmdsf1:role>custodian</gmdsf1:role>
        </gmdsf1:CI_ResponsibleParty>
    </administrator>
    <history>Begun as a military fortification and the site of the
first U.S. lighthouse on the Pacific Coast (1854), Alcatraz was the
first official Army prison in the nation. In 1934, the facility was
transferred to civilian authority and it became the repository for the
most hardened criminals. Alcatraz represents the far end of the
penological spectrum, designed for punishment and incarceration only,
rather than rehabilitation. The prison was closed in 1963, and ten
years later the island was opened to the public as the first unit of
the Golden Gate National Recreation Area.</history>
    <description>National Historic Landmark open to the
public</description>
    <parent title="San Francisco" role="in_county"
href="http://wfsg.usgs.gov/cubewerx/cubeserv.cgi?config=full&datastore=full&service=WFS&request=GetFeature&typeName=iso19112:SI_LocationInstance&FILTER=&ogc:Filter&&ogc:PropertyIsEqualTo&&ogc:PropertyName&geographicIdentifier&/ogc:PropertyName&&ogc:Literal&277302&/ogc:Literal&&/ogc:PropertyIsEqualTo&&ogc:Filter&" />
    <parent title="California" role="in_state"
href="http://wfsg.usgs.gov/cubewerx/cubeserv.cgi?config=full&datastore=full&service=WFS&request=GetFeature&typeName=iso19112:SI_LocationInstance&FILTER=&ogc:Filter&&ogc:PropertyIsEqualTo&&ogc:PropertyName&geographicIdentifier&/ogc:PropertyName&&ogc:Literal&1779778&/ogc:Literal&&/ogc:PropertyIsEqualTo&&ogc:Filter&" />
    <locationType title="Island"
href="http://wfsg.usgs.gov/cubewerx/cubeserv.cgi?config=full&datastore=full&service=WFS&request=GetFeature&typeName=iso19112:SI_LocationType&FILTER=&ogc:Filter&&ogc:PropertyIsEqualTo&&ogc:PropertyName&name&/ogc:PropertyName&&ogc:Literal&Island&/ogc:Literal&&/ogc:PropertyIsEqualTo&&ogc:Filter&" />
    </SI_LocationInstance>
  </gml:featureMember>
  <gml:featureMember>
    <SI_LocationInstance
id="CWFID.SI_LOCINST.0.76208.4D91FA5293E822E68C232402000">
      <guid>{C5B96EE3-C3DB-11DE-9C20-00144F233E68}</guid>
      <geographicIdentifier>1657175</geographicIdentifier>

```

```
<alternativeGeographicIdentifiers>
  <alternativeGeographicIdentifier>
    <name>Alcatraz</name>
    <nameID>{769EBAE8-64A3-478F-E044-00144F233E68}</nameID>
    <type>official</type>
    <primary>true</primary>
  </alternativeGeographicIdentifier>
</alternativeGeographicIdentifiers>
<position>
  <gml:Point srsName="EPSG:4326">
    <gml:pos srsName="EPSG:4326" srsDimension="3">-122.4227493
37.8268723 0</gml:pos>
  </gml:Point>
</position>
<dateOfCreation>1995-01-01</dateOfCreation>
<administrator>
  <gmdsf1:CI_ResponsibleParty>
    <gmdsf1:individualName>USGS</gmdsf1:individualName>
    <gmdsf1:voice>303-236-5900</gmdsf1:voice>
    <gmdsf1:deliveryPoint>Box 25046 Denver Federal
Center</gmdsf1:deliveryPoint>
    <gmdsf1:city>Denver</gmdsf1:city>

<gmdsf1:administrativeArea>Colorado</gmdsf1:administrativeArea>
  <gmdsf1:postalCode>80225</gmdsf1:postalCode>
  <gmdsf1:country>USA</gmdsf1:country>
  <gmdsf1:hoursOfService>8:00am to
4:00pm</gmdsf1:hoursOfService>
  <gmdsf1:role>custodian</gmdsf1:role>
</gmdsf1:CI_ResponsibleParty>
</administrator>
<designation>Administered Federal</designation>
<description>National Historical Landmark</description>
<parent title="San Francisco" role="in_county"
href="http://wfsg.usgs.gov/cubewerx/cubeserv.cgi?config=full&datastore=full&service=WFS&request=GetFeature&typeName=iso19112:SI_LocationInstance&FILTER=<ogc:Filter>&<ogc:PropertyIsEqualTo>&<ogc:PropertyName>geographicIdentifier</ogc:PropertyName>&&<ogc:Literal>277302</ogc:Literal>&&</ogc:PropertyIsEqualTo>&&</ogc:Filter>" />
  <parent title="California" role="in_state"
href="http://wfsg.usgs.gov/cubewerx/cubeserv.cgi?config=full&datastore=full&service=WFS&request=GetFeature&typeName=iso19112:SI_LocationInstance&FILTER=<ogc:Filter>&<ogc:PropertyIsEqualTo>&<ogc:PropertyName>geographicIdentifier</ogc:PropertyName>&&<ogc:Literal>1779778</ogc:Literal>&&</ogc:PropertyIsEqualTo>&&</ogc:Filter>" />
```

```
<locationType title="Building"
href="http://wfsg.usgs.gov/cubewerx/cubeserv.cgi?config=full&datastore=full&service=WFS&request=GetFeature&typeName=iso19112:SI_LocationType&FILTER=<ogc:Filter>&<ogc:PropertyIsEqualTo>&<ogc:PropertyName>name</ogc:PropertyName>&<ogc:Literal>Building</ogc:Literal>&<ogc:PropertyIsEqualTo>&<ogc:Filter>" />
</SI_LocationInstance>
</gml:featureMember>
<gml:featureMember>
  <SI_LocationInstance
id="CWFID.SI_LOCINST.0.76209.4D91FA52A0661B747E2324020000">
  <guid>{32CE40C6-C3DC-11DE-9C20-00144F233E68}</guid>
  <geographicIdentifier>1809338</geographicIdentifier>
  <alternativeGeographicIdentifiers>
    <alternativeGeographicIdentifier>
      <name>Alcatraz Island Lighthouse</name>
      <nameID>{769EBAEA-CA3E-478F-E044-00144F233E68}</nameID>
      <type>official</type>
      <primary>true</primary>
    </alternativeGeographicIdentifier>
  </alternativeGeographicIdentifiers>
  <position>
    <gml:Point srsName="EPSG:4326">
      <gml:pos srsName="EPSG:4326" srsDimension="3">-122.4219159
37.826039 0</gml:pos>
    </gml:Point>
  </position>
  <dateOfCreation>1999-03-15</dateOfCreation>
  <administrator>
    <gmdsf1:CI_ResponsibleParty>
      <gmdsf1:individualName>USGS</gmdsf1:individualName>
      <gmdsf1:voice>303-236-5900</gmdsf1:voice>
      <gmdsf1:deliveryPoint>Box 25046 Denver Federal
Center</gmdsf1:deliveryPoint>
      <gmdsf1:city>Denver</gmdsf1:city>
    </gmdsf1:administrativeArea>Colorado</gmdsf1:administrativeArea>
      <gmdsf1:postalCode>80225</gmdsf1:postalCode>
      <gmdsf1:country>USA</gmdsf1:country>
      <gmdsf1:hoursOfService>8:00am to
4:00pm</gmdsf1:hoursOfService>
      <gmdsf1:role>custodian</gmdsf1:role>
    </gmdsf1:CI_ResponsibleParty>
  </administrator>
  <history>Built in 1909.</history>
  <parent title="San Francisco" role="in_county"
href="http://wfsg.usgs.gov/cubewerx/cubeserv.cgi?config=full&datastore=full&service=WFS&request=GetFeature&typeName=iso19112:SI_LocationInstance&FILTER=<ogc:Filter>&<ogc:PropertyIsEqualTo>&<ogc:PropertyName>geographicIdentifier</ogc:PropertyName>&<ogc:Literal>277302</ogc:Literal>&<ogc:PropertyIsEqualTo>&<ogc:Filter>" />
```

```
<parent title="California" role="in_state"
href="http://wfsg.usgs.gov/cubewerx/cubeserv.cgi?config=full&datastore=full&service=WFS&request=GetFeature&typeName=iso19112:SI_LocationInstance&FILTER=<ogc:Filter>&<ogc:PropertyIsEqualTo>&<ogc:PropertyName>geographicIdentifier</ogc:PropertyName>&<ogc:Literal>1779778</ogc:Literal>&</ogc:PropertyIsEqualTo>&</ogc:Filter>" />
<locationType title="Locale"
href="http://wfsg.usgs.gov/cubewerx/cubeserv.cgi?config=full&datastore=full&service=WFS&request=GetFeature&typeName=iso19112:SI_LocationType&FILTER=<ogc:Filter>&<ogc:PropertyIsEqualTo>&<ogc:PropertyName>name</ogc:PropertyName>&<ogc:Literal>Locale</ogc:Literal>&</ogc:PropertyIsEqualTo>&</ogc:Filter>" />
</SI_LocationInstance>
</gml:featureMember>
</wfs:FeatureCollection>
```

11 Transaction operation (optional)

The **Transaction** operation is used to describe data Insert, Update and Delete operations that are to be applied to gazetteer services. When the transaction has been completed, a gazetteer service will generate an XML response document indicating the completion status of the transaction.

This profile makes no changes to this WFS operation.

11.1 Insert, Update and Delete Examples

Example: Insert

The **<Insert>** element is used to create new feature instances.

Example

```
<?xml version="1.0" encoding="UTF-8" ?>
<wfs:Transaction service="WFS" version="1.1.0"
xmlns="http://www.isotc211.org/19112"
xmlns:gmdsf1="http://www.isotc211.org/2005/gmdsf1"
xmlns:gml="http://www.opengis.net/gml"
xmlns:wfs="http://www.opengis.net/wfs"
xmlns:xlink="http://www.w3.org/1999/xlink"
```



```

</gml:LinearRing>
</gml:exterior>
</gml:Polygon>
</geographicExtent>
<dateOfCreation>1970-01-01</dateOfCreation>
<dateModified>2010-06-08</dateModified>
<administrator>
<gmdsf1:CI_ResponsibleParty>
<gmdsf1:individualName>Joe Skule</gmdsf1:individualName>
<gmdsf1:organizationName>U.S. Board on Geographic
Names</gmdsf1:organizationName>
<gmdsf1:positionName>Keeper of Names</gmdsf1:positionName>
<gmdsf1:voice>+1-703-648-4552</gmdsf1:voice>
<gmdsf1:facsimile>+1-703-648-4549</gmdsf1:facsimile>
<gmdsf1:deliveryPoint>12201 Sunrise Value Drive</gmdsf1:deliveryPoint>
<gmdsf1:city>Reston</gmdsf1:city>
<gmdsf1:administrativeArea>Virginia</gmdsf1:administrativeArea>
<gmdsf1:postalCode>20192-0523</gmdsf1:postalCode>
<gmdsf1:country>USA</gmdsf1:country>

<gmdsf1:electronicMailAddress>BGNEEXEC@usgs.gov</gmdsf1:electronicMailAdd
ress>
  <gmdsf1:role>custodian</gmdsf1:role>
  </gmdsf1:CI_ResponsibleParty>
</administrator>

<spatialObject>http://demo.cubewerx.com/demo/cubeserv.cgi?datastore=Foun
dation&service=WFS&request=GetFeature&typeName=BUILTUPA_1M&featureId=CWF
ID.BUILTUPA_1M.0.33724</spatialObject>
  <designation codeSpace="">...</designation>
  <history>Some text.</history>
  <description>Some other text.</description>
  <parent
xlink:href="http://frameworkwfs.usgs.gov/framework/wfs/wfs.cgi?datastore
=GNIS&service=WFS&version=1.1.0&request=GetFeature&typeName=SI_LocationI
nstance&featureId=CWFID.SI_LOCATIONINSTANCE.0.1746871.65208FB6CC3DF4BE1F
20020000" />
  <locationType xlink:href="urn-x:ogc:def:locationType:USGS:Building" />
</SI_LocationInstance>
</wfs:Insert>
</wfs:Transaction>

```

Example: Update

The **<Update>** element is used to modify feature instances.

Example

```

<?xml version="1.0" encoding="UTF-8" ?>
<wfs:Transaction service="WFS" version="1.1.0"
xmlns="http://www.isotc211.org/19112"
xmlns:gmd="http://www.isotc211.org/2005/gmd"

```

```

xmlns:gml="http://www.opengis.net/gml"
xmlns:wfs="http://www.opengis.net/wfs"
xmlns:fes="http://www.opengis.net/ogc"
xmlns:xlink="http://www.w3.org/1999/xlink"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://www.isotc211.org/19112 ../iso19112.xsd
http://www.opengis.net/wfs ../../../../../wfs/1.1.0/wfs.xsd
http://www.opengis.net/gml ../../../../../gml/3.1.1/base/gml.xsd">
  <wfs:Update typeName="SI_LocationInstance">
    <wfs:Property>
      <wfs:Name>alternativeGeographicIdentifiers</wfs:Name>
      <wfs:Value>
        <alternativeGeographicIdentifier>
          <name xml:lang="el">Αναμάρχειο Αθήνα</name>
          <nameID>ID03</nameID>
          <type>variant</type>
          <dateCommitted>2010-06-08</dateCommitted>
          <primary>>false</primary>
        </alternativeGeographicIdentifier>
      </wfs:Value>
    </wfs:Property>
    <fes:Filter>
      <fes:FeatureId
fid="CWFID.SI_LOCATIONINSTANCE.0.1747273.65209A72B2501BA41F20020000" />
    </fes:Filter>
  </wfs:Update>
</wfs:Transaction>

```

Example: Delete

The **<Delete>** element is used to indicate that one or more feature instances should be deleted.

Example

```

<?xml version="1.0" encoding="UTF-8" ?>
<wfs:Transaction service="WFS" version="1.1.0"
xmlns="http://www.isotc211.org/19112"
xmlns:gmd="http://www.isotc211.org/2005/gmd"
xmlns:gml="http://www.opengis.net/gml"
xmlns:wfs="http://www.opengis.net/wfs"
xmlns:fes="http://www.opengis.net/ogc"
xmlns:xlink="http://www.w3.org/1999/xlink"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://www.isotc211.org/19112 ../iso19112.xsd
http://www.opengis.net/wfs ../../../../../wfs/1.1.0/wfs.xsd
http://www.opengis.net/gml ../../../../../gml/3.1.1/base/gml.xsd">
  <wfs:Delete typeName="SI_LocationInstance">
    <fes:Filter>
      <fes:FeatureId
fid="CWFID.SI_LOCATIONINSTANCE.0.1747273.65209A72B2501BA41F20020000" />
    </fes:Filter>
  </wfs:Delete>
</wfs:Transaction>

```



```
</fes:Filter>
</wfs:Delete>
</wfs:Transaction>
```

11.2 Response

In response to a transaction request, a web feature service shall generate an XML document indicating the termination status of the transaction. This profile makes no changes to standard WFS operation and implements the **<TransactionResponse>** element containing a **<TransactionSummary>** element, and optional **<TransactionResult>** and **<InsertResults>** elements.

11.3 Exceptions

In the event that a web feature service gazetteer encounters an error parsing a **Transaction** request, it shall raise an exception as described in the web feature service standard.

Annex A: Abstract test suite

(normative)

A.1 Test module for general capabilities

A.1.1 General capabilities

7. Test purpose: Confirm that the Gazetteer Service satisfies conformance requirements that generally apply to all service interactions.
8. Test method: Falsification testing of HTTP response.
9. Reference: OGC 05-025r1
10. Test type: Capability

A.1.2 Required capabilities

1. Test purpose: Confirm that the Gazetteer Service satisfies profile specific requirements in terms of supported operations.
2. Test method: Inspection of GetCapabilities response: verify that mandatory operations are support for all required invocation (DCP) methods.
3. Reference: Clause 7.2
4. Test type: Capability

A.2 Test module for Accessible Content conformance

A.2.1 Gazetteer Service advertised

Test case identifier:

urn:ogc:specification:wfs-g:atc:content: AdvertiseSIGazetteerSchema

Test purpose: Confirm that the service satisfies conformance requirement that a gazetteer service is available.

Test method: Check SI_Gazetteer Feature Type is advertised in the GetCapabilities response.

Reference: Clause 8.3.1

Test type: Capability

A.2.2 SI_Gazetteer Feature Type response conformance

Test case identifier:

urn:ogc:specification:wfs-g:atc:content:ValidateSIGazetteerSchema

Test purpose(s): Confirm that GetFeatures response is well structured for type SI_Gazetteer

Test method: Invoke GetFeature operation to return all records of type SI_Gazetteer. Check response validates against published schema.

Reference: Clause 8.3.1, Annex B.

Test type: Basic

A.2.2 Gazetteers refer to available feature types

Test case identifier:

urn:ogc:specification:wfs-g:atc:content:GazetteerLocationTypesAvailable

Test purpose(s): Confirm that the feature types advertised in available gazetteers are provided.

Test method: Invoke GetFeature operation to return all records of type SI_Gazetteer. Check that each of the feature types referenced in the *SI_Gazetteer/featureType* property of the result set are advertised in the capabilities document

Reference: Clause 8.3.1,

Test type: Basic

A.2.2 SI_LocationInstance conformance

Test case identifier:

urn:ogc:specification:wfs-g:atc:content:SILocationTypesConformant

Test purpose(s): Confirm that the gazetteer will correctly respond to requests based on the SI_LocationInstance featureType

Test method: Invoke GetFeatures on SI_LocationInstance feature type and validate response against SI_LocationInstanceType schema. Invoke GetFeatures using queries that specify name and location and check that a valid subset is returned for these queries.

Reference: Clause 10.1

Test type: Basic

A.2.2 SI_LocationInstance extensions conformance

Test case identifier:

urn:ogc:specification:wfs-g:atc:content:GazetteerLocationTypesConformant

Test purpose(s): Confirm that the feature types advertised in available gazetteers are specified as conformant extensions of SI_LocationInstance

Test method: Invoke DescribeFeatureType operation to for all featureTypes referenced in SI_Gazetteer records. Check that each of the feature types is derived from SI_LocationInstanceType or is declared as substitutable for the SI_LocationInstance element.

Reference: Clause 9

Test type: Basic

Annex B: XML schemas

(normative)

XML schemas are attached to this draft specification and included below.

```
<?xml version="1.0" encoding="UTF-8"?>

<!-- File: iso19112.xsd,
      last edited: 2009-09-27 by Panagiotis (Peter) A, Vretanos
(PAV),
      CubeWerx Inc.
      - change PT_FreeText to a localised string element that
        uses xml:lang which allows most of the languages attributes
        that USGS/NGA want to be able to express (e.g. language,
        script, dialect)
      - reorganized alternative geographic identifier structure
-->
<!-- File: iso19112.xsd,
      last edited: 2009-08-13 by Panagiotis (Peter) A, Vretanos
(PAV),
      CubeWerx Inc.
      - updated comments
      - validated using Xerces-C 3.0.1 and Altova XML Spy
Enterprise
      Edition 2009 sp1
-->
<!-- File: iso19112.xsd,
      last edited: 2009-08-13 by Panagiotis (Peter) A, Vretanos
(PAV),
      CubeWerx Inc.
      - updated GNIS_Schema_iso19112modified.xsd to comply with
        GMLSF Level 1
      - added in most of the changes suggested in 08-051/08-052
        (the specific changes are noted in annotations in the
schema)
      - reorganized elements to make it easier to read
      - dropped the 'agi' prefix from the additional fields added to
        the alternativeGeographicProperty
      - renamed file to iso19112.xsd
-->
<!-- File: GNIS_Schema_iso19112modified.xsd,
      last edited: 2009-07-02 by David Rosinger, Intergraph Corporation -
->
<!-- File: GNIS_Schema_iso19112modified.xsd,
      last edited: 2009-05-06 by Lee Macholz, NCLFA -->
<!-- NOTE: Adapted from File: iso19112.xsd,
      last edited: 2005-04-12 by Markus Müller -->
<!-- NOTE: last changes (to orig iso19112.xsd): adjusted to GML 3.1.1
```

(same GML version as used by WFS 1.1 (04-094) adjusted to ISO 19139
-->

```

<xsd:schema
  targetNamespace="http://www.isotc211.org/19112"
  xmlns:iso19112="http://www.isotc211.org/19112"
  xmlns:gmdsf1="http://www.isotc211.org/2005/gmdsf1"
  xmlns:gml="http://www.opengis.net/gml"
  xmlns:gmlsf="http://www.opengis.net/gmlsf"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema"
  elementFormDefault="qualified"
  version="19112_2003">

  <xsd:annotation>
    <xsd:appinfo
source="../../../../gml/3.1.1/profiles/gmlsfProfile/1.0.0/gmlsfLevels.xsd"
d">
      <gmlsf:ComplianceLevel>1</gmlsf:ComplianceLevel>

<gmlsf:GMLProfileSchema>../../../../gml/3.1.1/profiles/gmlsfProfile/1.0.0/gmlsf.xsd</gmlsf:GMLProfileSchema>
    </xsd:appinfo>
  </xsd:annotation>

  <xsd:import namespace="http://www.opengis.net/gml"
    schemaLocation="../../../../gml/3.1.1/base/gml.xsd"/>

  <xsd:import namespace="http://www.opengis.net/gmlsf"
schemaLocation="../../../../gml/3.1.1/profiles/gmlsfProfile/1.0.0/gmlsfLevels.xsd"/>

  <xsd:import namespace="http://www.isotc211.org/2005/gmdsf1"
    schemaLocation="./gmd.xsd"/>

  <xsd:import namespace="http://www.w3.org/XML/1998/namespace"/>

  <!--
===== -->
  <!-- Generic response collection.
-->
  <!--
===== -->
  <xsd:element name="SI_Collection"
    type="iso19112:SI_CollectionType"
    substitutionGroup="gml:_GML"/>
  <xsd:complexType name="SI_CollectionType">
    <xsd:complexContent>
      <xsd:extension base="gml:AbstractFeatureType">
        <xsd:sequence minOccurs="0" maxOccurs="unbounded">
          <xsd:element name="featureMember">
            <xsd:complexType>
              <xsd:sequence>

```

```

        <xsd:element ref="gml:_Feature"/>
      </xsd:sequence>
    </xsd:complexType>
  </xsd:element>
</xsd:sequence>
</xsd:extension>
</xsd:complexContent>
</xsd:complexType>

<!--
===== -->
<!-- SI_SpatialReferenceSystemUsingGeographicIdentifiers
-->
<!--
===== -->
  <xsd:element
name="SI_SpatialReferenceSystemUsingGeographicIdentifiers"
type="iso19112:SI_SpatialReferenceSystemUsingGeographicIdentifiersType"
  substitutionGroup="gml:_Feature"/>
  <xsd:complexType
    name="SI_SpatialReferenceSystemUsingGeographicIdentifiersType">
    <xsd:complexContent>
      <xsd:extension base="gml:AbstractFeatureType">
        <xsd:sequence>
          <xsd:element name="name">
            <xsd:annotation>
              <xsd:documentation>
                </xsd:documentation>
            </xsd:annotation>
          <xsd:complexType>
            <xsd:simpleContent>
              <xsd:extension base="xsd:string">
                <xsd:attribute ref="xml:lang"/>
                <xsd:attribute name="transliterationDomain"
                  type="xsd:string"/>
              </xsd:extension>
            </xsd:simpleContent>
          </xsd:complexType>
        </xsd:element>
        <xsd:element name="domainOfValidity"
          type="gml:GeometryPropertyType">
          <xsd:annotation>
            <xsd:documentation>
              PAV - as per 08-052 changed EX_GeographicExtent
to gml:GeometryPropertyType to allow extent to be expressed using any of
the geometric types supported by GMLSFL1.
            </xsd:documentation>
            <xsd:documentation>
              PAV - the geometry types supported by GMLSFL1
are Point, Curve, Surface, MultiPoint, MultiCurve, MultiSurface and
Geometry. Geometry means that the value can be any of the other types.
            </xsd:documentation>
          </xsd:annotation>
        </xsd:element>
      </xsd:extension>
    </xsd:complexContent>
  </xsd:complexType>

```

```

        </xsd:annotation>
      </xsd:element>
      <xsd:element name="theme" type="xsd:anyURI">
        <xsd:annotation>
          <xsd:documentation>
            PAV - as per 08-052 implemented as anyURI to
reference a definition in a registered feature catalogue.
          </xsd:documentation>
        </xsd:annotation>
      </xsd:element>
      <xsd:element name="overallOwner"
type="gmdsfl:CI_ResponsiblePartyPropertyType"/>
      <xsd:element name="locationType"
        type="gml:ReferenceType"
        minOccurs="1" maxOccurs="unbounded">
        <xsd:annotation>
          <xsd:appinfo source="urn:x-
gml:targetElement">isol9112:SI_LocationType</xsd:appinfo>
        </xsd:annotation>
      </xsd:element>
    </xsd:sequence>
  </xsd:extension>
</xsd:complexContent>
</xsd:complexType>

<!--
===== -->
  <!-- SI_LocationType
-->
  <!--
===== -->
  <xsd:element name="SI_LocationType"
    type="isol9112:SI_LocationTypeType"
    substitutionGroup="gml:_Feature"/>
  <xsd:complexType name="SI_LocationTypeType">
    <xsd:complexContent>
      <xsd:extension base="gml:AbstractFeatureType">
        <xsd:sequence>
          <xsd:element name="name">
            <xsd:annotation>
              <xsd:documentation>
                PAV - as per 08-052 redefined this from
xsd:string to handle localisation.
              </xsd:documentation>
            </xsd:annotation>
          <xsd:complexType>
            <xsd:simpleContent>
              <xsd:extension base="xsd:string">
                <xsd:attribute ref="xml:lang"/>
                <xsd:attribute name="transliterationDomain"
type="xsd:string"/>
              </xsd:extension>
            </xsd:simpleContent>
          </xsd:complexType>
        </xsd:sequence>
      </xsd:extension>
    </xsd:complexContent>
  </xsd:complexType>

```



```

        </xsd:simpleContent>
    </xsd:complexType>
</xsd:element>
<xsd:element name="identification"
    minOccurs="1" maxOccurs="unbounded">
    <xsd:annotation>
        <xsd:documentation>
            PAV - as per 08-052 this have been changed to a
code list which will need to be defined. I stubbed in a dummy called
"locationTypes.xml" as the default. A default may not be in order since
each gazetteer would need to define the location types if serves.
        </xsd:documentation>
    </xsd:annotation>
    <xsd:complexType>
        <xsd:simpleContent>
            <xsd:restriction base="gml:CodeType">
                <xsd:attribute name="codeSpace"
type="xsd:anyURI"
default="dictionaries/locationTypes.xml"/>
            </xsd:restriction>
        </xsd:simpleContent>
    </xsd:complexType>
</xsd:element>
<xsd:element name="definition">
    <xsd:annotation>
        <xsd:documentation>
            PAV - as per 08-052 redefined this from d:string
to handle localisation.
        </xsd:documentation>
    </xsd:annotation>
    <xsd:complexType>
        <xsd:simpleContent>
            <xsd:extension base="xsd:string">
                <xsd:attribute ref="xml:lang"/>
                <xsd:attribute name="transliterationDomain"
type="xsd:string"/>
            </xsd:extension>
        </xsd:simpleContent>
    </xsd:complexType>
</xsd:element>
<xsd:element name="territoryOfUse"
    type="gml:GeometryPropertyType">
    <xsd:annotation>
        <xsd:documentation>
            PAV - as per 08-052 changed EX_GeographicExtent
to gml:GeometryPropertyType to allow extent to be expressed using any of
the geometric types supported by GMLSFL1.
        </xsd:documentation>
    </xsd:annotation>
</xsd:element>
<xsd:element name="owner"

```

```

type="gmdsf1:CI_ResponsiblePartyPropertyType"/>
  <xsd:element name="spatialObjectType"
    type="xsd:anyURI" minOccurs="0">
    <xsd:annotation>
      <xsd:documentation>
        PAV - renamed as per 08-05. Was called "theme" but
is now implemented as a reference to a definition in a registered
feature catalogue.
      </xsd:documentation>
    </xsd:annotation>
  </xsd:element>
  <xsd:element name="parent"
    type="gml:ReferenceType"
    minOccurs="0" maxOccurs="unbounded">
    <xsd:annotation>
      <xsd:appinfo source="urn:x-
gml:targetElement">iso19112:SI_LocationType</xsd:appinfo>
    </xsd:annotation>
  </xsd:element>
  <xsd:element name="child"
    type="gml:ReferenceType"
    minOccurs="0" maxOccurs="unbounded">
    <xsd:annotation>
      <xsd:appinfo source="urn:x-
gml:targetElement">iso19112:SI_LocationType</xsd:appinfo>
    </xsd:annotation>
  </xsd:element>
</xsd:sequence>
</xsd:extension>
</xsd:complexContent>
</xsd:complexType>

<!--
===== -->
<!-- SI_Gazetteer
-->
<!--
===== -->
  <xsd:element name="SI_Gazetteer"
    type="iso19112:SI_GazetteerType"
    substitutionGroup="gml:_Feature"/>
  <xsd:complexType name="SI_GazetteerType">
    <xsd:complexContent>
      <xsd:extension base="gml:AbstractFeatureType">
        <xsd:sequence>
          <xsd:element name="name">
            <xsd:annotation>
              <xsd:documentation>
                PAV - as per 08-052 redefined this from
xsd:string to handle localisation.
              </xsd:documentation>
            </xsd:annotation>
          </xsd:element>

```

```

    <xsd:complexType>
      <xsd:simpleContent>
        <xsd:extension base="xsd:string">
          <xsd:attribute ref="xml:lang"/>
          <xsd:attribute name="transliterationDomain"
            type="xsd:string"/>
        </xsd:extension>
      </xsd:simpleContent>
    </xsd:complexType>
  </xsd:element>
  <xsd:element name="scope">
    <xsd:annotation>
      <xsd:documentation>
        PAV - as per 08-052 redefined this from
xsd:string to handle localisation.
      </xsd:documentation>
    </xsd:annotation>
    <xsd:complexType>
      <xsd:simpleContent>
        <xsd:extension base="xsd:string">
          <xsd:attribute ref="xml:lang"/>
          <xsd:attribute name="transliterationDomain"
            type="xsd:string"/>
        </xsd:extension>
      </xsd:simpleContent>
    </xsd:complexType>
  </xsd:element>
  <xsd:element name="territoryOfUse"
    type="gml:GeometryPropertyType">
    <xsd:annotation>
      <xsd:documentation>
        PAV - as per 08-052 changed EX_GeographicExtent
to gml:GeometryPropertyType to allow extent to be expressed using any of
the geometric types supported by GMLSFL1.
      </xsd:documentation>
    </xsd:annotation>
  </xsd:element>
  <xsd:element name="custodian"
type="gmdsf1:CI_ResponsiblePartyPropertyType"/>
  <xsd:element name="coordinateSystem"
    type="xsd:anyURI" minOccurs="0"/>
  <xsd:element name="locationType"
    type="gml:ReferenceType"
    minOccurs="1" maxOccurs="unbounded">
    <xsd:annotation>
      <xsd:appinfo source="urn:x-
gml:targetElement">isol9112:SI_LocationType</xsd:appinfo>
    </xsd:annotation>
  </xsd:element>
</xsd:sequence>
</xsd:extension>
</xsd:complexContent>

```

```

</xsd:complexType>

<!--
===== -->
<!-- SI_LocationInstance
-->
<!--
===== -->
<xsd:element name="SI_LocationInstance"
              type="iso19112:SI_LocationInstanceType"
              substitutionGroup="gml:_Feature"/>
<xsd:complexType name="SI_LocationInstanceType">
  <xsd:complexContent>
    <xsd:extension base="gml:AbstractFeatureType">
      <xsd:sequence>
        <xsd:element name="guid" type="xsd:anyURI"
minOccurs="0"/>
        <xsd:element name="geographicIdentifier"
type="xsd:string"/>
        <xsd:element name="alternativeGeographicIdentifiers"
type="iso19112:AlternativeGeographicIdentifiersPropertyType"
              minOccurs="0"/>
        <xsd:element name="position"
              type="gml:PointPropertyType"/>
        <xsd:element name="geographicExtent"
              type="gml:GeometryPropertyType"
              minOccurs="0" maxOccurs="unbounded">
          <xsd:annotation>
            <xsd:documentation>
              PAV - as per 08-052 changed EX_GeographicExtent
to gml:GeometryPropertyType to allow extent to be expressed using any of
the geometric types supported by GMLSFL1.
            </xsd:documentation>
            <xsd:documentation>
              PAV - also removed the "iso19112:position"
element since gml:GeometryPropertyType can encode point location as
well.
            </xsd:documentation>
          </xsd:annotation>
        </xsd:element>
        <xsd:element name="dateOfCreation" type="xsd:date"
minOccurs="0">
          <xsd:annotation>
            <xsd:documentation>
              PAV - as per 08-052 renamed and redefined
original iso19112:temporalExtent element to align with the actual text
description in ISO 19112.
            </xsd:documentation>
          </xsd:annotation>
        </xsd:element>
        <xsd:element name="dateModified" type="xsd:date"
minOccurs="0">

```

```

        <xsd:annotation>
          <xsd:documentation>
            PAV - as per USGS requirement to maintain the
last time the record was changed
          </xsd:documentation>
        </xsd:annotation>
      </xsd:element>
    <xsd:element name="administrator"
type="gmdsf1:CI_ResponsiblePartyPropertyType"/>
    <xsd:element name="spatialObject" type="xsd:anyURI"
      minOccurs="0">
      <xsd:annotation>
        <xsd:documentation>
          PAV - added as per 08-052 to reference the
feature being identified by this instance
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:element name="designation"
      minOccurs="0" maxOccurs="unbounded">
      <xsd:annotation>
        <xsd:documentation>
          Domain value for feature designation from USGS
          (e.g. historical) (txt50)
        </xsd:documentation>
      </xsd:annotation>
      <xsd:complexType>
        <xsd:simpleContent>
          <xsd:restriction base="gml:CodeType">
            <xsd:attribute name="codeSpace"
type="xsd:anyURI"
default="dictionaries/designationTypes.xml"/>
          </xsd:restriction>
        </xsd:simpleContent>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="history" type="xsd:string"
minOccurs="0">
      <xsd:annotation>
        <xsd:documentation>
          USGS field for feature history (txt3000)
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:element name="description" type="xsd:string"
minOccurs="0">
      <xsd:annotation>
        <xsd:documentation>
          USGS field for feature description (txt3000)
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>

```

```

        </xsd:element>
        <xsd:element name="parent"
            type="gml:ReferenceType"
            minOccurs="0" maxOccurs="unbounded">
            <xsd:annotation>
                <xsd:appinfo source="urn:x-
gml:targetElement">iso19112:SI_LocationInstance</xsd:appinfo>
            </xsd:annotation>
        </xsd:element>
        <xsd:element name="child"
            type="gml:ReferenceType"
            minOccurs="0" maxOccurs="unbounded">
            <xsd:annotation>
                <xsd:appinfo source="urn:x-
gml:targetElement">iso19112:SI_LocationInstance</xsd:appinfo>
            </xsd:annotation>
        </xsd:element>
        <xsd:element name="locationType"
            type="gml:ReferenceType">
            <xsd:annotation>
                <xsd:appinfo source="urn:x-
gml:targetElement">iso19112:SI_LocationType</xsd:appinfo>
            </xsd:annotation>
        </xsd:element>
    </xsd:sequence>
</xsd:extension>
</xsd:complexContent>
</xsd:complexType>

<!--
===== -->
<!-- Complex Types
-->
<!--
===== -->
<xsd:complexType name="AlternativeGeographicIdentifiersPropertyType">
    <xsd:sequence>
        <xsd:element ref="iso19112:alternativeGeographicIdentifier"
            maxOccurs="unbounded"/>
    </xsd:sequence>
</xsd:complexType>
<xsd:element name="alternativeGeographicIdentifier">
    <xsd:complexType>
        <xsd:sequence>
            <xsd:element name="partner"
                type="xsd:string" minOccurs="0"/>
            <xsd:element name="name">
                <xsd:annotation>
                    <xsd:documentation>
                        PAV - as per 08-052 redefined this from xsd:string
                        to handle localisation.
                    </xsd:documentation>
                </xsd:annotation>
            </xsd:element>
        </xsd:sequence>
    </xsd:complexType>

```

```

    <xsd:complexType>
      <xsd:simpleContent>
        <xsd:extension base="xsd:string">
          <xsd:attribute ref="xml:lang"/>
          <xsd:attribute name="transliterationDomain"
            type="xsd:string"/>
        </xsd:extension>
      </xsd:simpleContent>
    </xsd:complexType>
  </xsd:element>
  <xsd:element name="nameID" type="xsd:string" minOccurs="0">
    <xsd:annotation>
      <xsd:documentation>
        If ValueType="name": NGA value
        We may need to make this a QName to qualify the
        name with a namespace that indicates the source
        organization (e.g. usgs or nga).
      </xsd:documentation>
    </xsd:annotation>
  </xsd:element>
  <xsd:element name="type" minOccurs="0">
    <xsd:annotation>
      <xsd:documentation>
        If ValueType="name": Domain value describing
        if alternativeGeographicIdentifier value is an
        official or variant name (valid values are:
        "official" or "variant")
        Can have multiple official and variant names.
        Ex. Canada has 2 official languages so there
        may be 2 official names; one english and
        one french.
      </xsd:documentation>
    </xsd:annotation>
    <xsd:simpleType>
      <xsd:restriction base="xsd:string">
        <xsd:maxLength value="10"/>
        <xsd:enumeration value="official"/>
        <xsd:enumeration value="variant"/>
      </xsd:restriction>
    </xsd:simpleType>
  </xsd:element>
  <xsd:element name="dateCommitted" type="xsd:date"
minOccurs="0">
    <xsd:annotation>
      <xsd:documentation>
        If ValueType="name": Date value for the name
        record: date name committed
      </xsd:documentation>
    </xsd:annotation>
  </xsd:element>
  <xsd:element name="primary" type="xsd:boolean"
minOccurs="0">
    <xsd:annotation>

```

```
        <xsd:documentation>
            If ValueType="name": NGA value ("true" or NULL)
        </xsd:documentation>
    </xsd:annotation>
</xsd:element>
<xsd:element name="citationCode" minOccurs="0">
    <xsd:annotation>
        <xsd:documentation>
            If ValueType="name": Domain value for USGS
bibliographic
            reference citation code
        </xsd:documentation>
    </xsd:annotation>
    <xsd:complexType>
        <xsd:simpleContent>
            <xsd:restriction base="gml:CodeType">
                <xsd:attribute name="codeSpace"
type="xsd:anyURI"/>
            </xsd:restriction>
        </xsd:simpleContent>
    </xsd:complexType>
</xsd:element>
</xsd:sequence>
</xsd:complexType>
</xsd:element>
</xsd:schema>
```



```
<?xml version="1.0"?>
<xsd:schema
  targetNamespace="http://www.isotc211.org/2005/gmdsf1"
  xmlns:gmdsf1="http://www.isotc211.org/2005/gmdsf1"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema"
  xmlns:gml="http://www.opengis.net/gml"
  xmlns:gmlsf="http://www.opengis.net/gmlsf"
  elementFormDefault="qualified"
  version="2005">

  <xsd:annotation>
    <xsd:appinfo
source="../../../../gml/3.1.1/profiles/gmlsfProfile/1.0.0/gmlsfLevels.xsd">
      <gmlsf:ComplianceLevel>1</gmlsf:ComplianceLevel>

<gmlsf:GMLProfileSchema>../../../../gml/3.1.1/profiles/gmlsfProfile/1.0.0/gmlsf.xsd</gmlsf:GMLProfileSchema>
    </xsd:appinfo>
  </xsd:annotation>

  <xsd:import namespace="http://www.opengis.net/gml"
    schemaLocation="../../../../gml/3.1.1/base/gml.xsd"/>

  <xsd:import namespace="http://www.opengis.net/gmlsf"
schemaLocation="../../../../gml/3.1.1/profiles/gmlsfProfile/1.0.0/gmlsfLevels.xsd"/>

  <xsd:complexType name="CI_ResponsiblePartyPropertyType">
    <xsd:sequence>
      <xsd:element ref="gmdsf1:CI_ResponsibleParty"/>
    </xsd:sequence>
  </xsd:complexType>
  <xsd:element name="CI_ResponsibleParty">
    <xsd:complexType>
      <xsd:sequence>
        <xsd:element name="individualName" type="xsd:string"
          minOccurs="0"/>
        <xsd:element name="organizationName" type="xsd:string"
          minOccurs="0"/>
        <xsd:element name="positionName" type="xsd:string"
          minOccurs="0"/>
        <xsd:element name="voice" type="xsd:string"
          minOccurs="0" maxOccurs="unbounded"/>
        <xsd:element name="facsimile" type="xsd:string"
          minOccurs="0" maxOccurs="unbounded"/>
        <xsd:element name="deliveryPoint" type="xsd:string"
          minOccurs="0"/>
        <xsd:element name="city" type="xsd:string"
          minOccurs="0"/>
        <xsd:element name="administrativeArea"
type="xsd:string"
```

```

        minOccurs="0"/>
<xsd:element name="postalCode" type="xsd:string"
        minOccurs="0"/>
<xsd:element name="country" type="xsd:string"
        minOccurs="0"/>
<xsd:element name="electronicMailAddress"
type="xsd:string"
        minOccurs="0" maxOccurs="unbounded"/>
<xsd:element name="linkage"
        type="xsd:anyURI" minOccurs="0"/>
<xsd:element name="protocol"
        type="xsd:string" minOccurs="0"/>
<xsd:element name="applicationProfile"
        type="xsd:string" minOccurs="0"/>
<xsd:element name="name"
        type="xsd:string" minOccurs="0"/>
<xsd:element name="description"
        type="xsd:string" minOccurs="0"/>
<xsd:element name="function" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string">
      <xsd:enumeration value="download"/>
      <xsd:enumeration value="information"/>
      <xsd:enumeration value="offlineAccess"/>
      <xsd:enumeration value="order"/>
      <xsd:enumeration value="search"/>
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="hoursOfService" type="xsd:string"
        minOccurs="0"/>
<xsd:element name="contactInstructions" type="xsd:string"
        minOccurs="0"/>
<xsd:element name="role" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string">
      <xsd:enumeration value="resourceProvider"/>
      <xsd:enumeration value="custodian"/>
      <xsd:enumeration value="owner"/>
      <xsd:enumeration value="user"/>
      <xsd:enumeration value="distributor"/>
      <xsd:enumeration value="originator"/>
      <xsd:enumeration value="pointOfContact"/>
      <xsd:enumeration value="principalInvestigator"/>
      <xsd:enumeration value="processor"/>
      <xsd:enumeration value="publisher"/>
      <xsd:enumeration value="author"/>
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
</xsd:sequence>
</xsd:complexType>
</xsd:element>
```

```
<xsd:complexType name="EX_GeographicExtentPropertyType">
  <xsd:sequence>
    <xsd:element ref="gmdsf1:EX_GeographicExtent"/>
  </xsd:sequence>
</xsd:complexType>
<xsd:element name="EX_GeographicExtent">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="extentTypeCode"
        type="xsd:boolean"
        minOccurs="0" default="1"/>
      <xsd:element name="boundingPolygon"
        type="gml:SurfacePropertyType"
        minOccurs="0"/>
      <xsd:element ref="gml:Envelope" minOccurs="0"/>
      <xsd:element name="geographicDescription"
        type="gml:CodeType" minOccurs="0"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
</xsd:schema>
```

Annex C: Dictionaries

(normative)

The following Dictionaries are cited:

ISO 639-3:2007, *Codes for the representation of names of languages* - ISO 639-3 is a code that aims to define three-letter identifiers for all known human languages. At the core of ISO 639-3 are the individual languages already accounted for in ISO 639-2. The large number of living languages in the initial inventory of ISO 639-3 beyond those already included in ISO 639-2 was derived primarily from Ethnologue (15th edition). Additional extinct, ancient, historic, and constructed languages have been obtained from Linguist List.

ISO 3166-1, *Codes for the representation of names of countries and their subdivisions – Part 1: Country codes* - ISO 3166-1 is part of the ISO 3166 standard published by the International Organization for Standardization (ISO), and defines codes for the names of countries, dependent territories, and special areas of geographical interest.

ISO 15924:2004, *Codes for the representation of names of scripts* - This International Standard provides a code for the presentation of names of scripts. The codes were devised for use in terminology, lexicography, bibliography, and linguistics, but they may be used for any application requiring the expression of scripts in coded form.

ISO 639-3:2007

```
<?xml version="1.0" encoding="UTF-8"?>
<Dictionary
  gml:id="ISO639-3"
  xmlns="http://www.opengis.net/gml"
  xmlns:gml="http://www.opengis.net/gml"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://www.opengis.net/gml
  http://schemas.opengis.net/gml/3.1.1/base/gml.xsd">
  <description>
    ISO 639-3 is a code that aims to define three-letter identifiers
    for all known human languages. At the core of ISO 639-3 are the
    individual languages already accounted for in ISO 639-2. The large
    number of living languages in the initial inventory of ISO 639-3 beyond
    those already included in ISO 639-2 was derived primarily from
    Ethnologue (15th edition). Additional extinct, ancient, historic, and
    constructed languages have been obtained from Linguist List.
  </description>
  <name>Codes for the Representation of Names of Languages</name>
  <dictionaryEntry>
```

```
<Definition gml:id="aaa">
  <name>Ghotuo</name>
</Definition>
</dictionaryEntry>
<dictionaryEntry>
  <Definition gml:id="aab">
    <name>Alumu-Tesu</name>
  </Definition>
</dictionaryEntry>
<dictionaryEntry>
  <Definition gml:id="aac">
    <name>Ari</name>
  </Definition>
</dictionaryEntry>
<dictionaryEntry>
  <Definition gml:id="aad">
    <name>Amal</name>
  </Definition>
</dictionaryEntry>
<dictionaryEntry>
  <Definition gml:id="aae">
    <name>Arbëreshë Albanian</name>
  </Definition>
</dictionaryEntry>
<dictionaryEntry>
  <Definition gml:id="aaf">
    <name>Aranadan</name>
  </Definition>
</dictionaryEntry>
<dictionaryEntry>
  <Definition gml:id="aag">
    <name>Ambrak</name>
  </Definition>
</dictionaryEntry>
<dictionaryEntry>
  <Definition gml:id="aah">
    <name>Abu' Arapesh</name>
  </Definition>
</dictionaryEntry>
<dictionaryEntry>
  <Definition gml:id="aai">
    <name>Arifama-Miniafia</name>
  </Definition>
</dictionaryEntry>
<dictionaryEntry>
  <Definition gml:id="aak">
    <name>Ankave</name>
  </Definition>
</dictionaryEntry>
<dictionaryEntry>
  <Definition gml:id="aal">
    <name>Afade</name>
  </Definition>
```

```
</dictionaryEntry>
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  <Definition gml:id="aan">
    <name>Anambé</name>
  </Definition>
</dictionaryEntry>
<dictionaryEntry>
  <Definition gml:id="aao">
    <name>Algerian Saharan Arabic</name>
  </Definition>
</dictionaryEntry>
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  <Definition gml:id="aap">
    <name>Pará Arára</name>
  </Definition>
</dictionaryEntry>
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  <Definition gml:id="aaq">
    <name>Eastern Abnaki</name>
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    <name>Aasáx</name>
  </Definition>
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    <name>Arvanitika Albanian</name>
  </Definition>
</dictionaryEntry>
<dictionaryEntry>
  <Definition gml:id="aau">
    <name>Abau</name>
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</dictionaryEntry>
<dictionaryEntry>
  <Definition gml:id="aaw">
    <name>Solong</name>
  </Definition>
</dictionaryEntry>
<dictionaryEntry>
  <Definition gml:id="aax">
```

```
        <name>Mandobo Atas</name>
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</dictionaryEntry>
<dictionaryEntry>
    <Definition gml:id="aaz">
        <name>Amarasi</name>
    </Definition>
</dictionaryEntry>
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    <Definition gml:id="aba">
        <name>Abé</name>
    </Definition>
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<dictionaryEntry>
    <Definition gml:id="abb">
        <name>Bankon</name>
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        <name>Ambala Ayta</name>
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    <Definition gml:id="abd">
        <name>Camarines Norte Agta</name>
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        <name>Abai Sungai</name>
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        <name>Tajiki Arabic</name>
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    <Definition gml:id="abi">
        <name>Abidji</name>
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</dictionaryEntry>
```

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    <name>Abkhazian</name>
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</dictionaryEntry>
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  </Definition>
</dictionaryEntry>
<dictionaryEntry>
  <Definition gml:id="agc">
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  </Definition>
</dictionaryEntry>
<dictionaryEntry>
  <Definition gml:id="agd">
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ISO 3166-1

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ISO 15924:2004

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  xmlns:gml="http://www.opengis.net/gml"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://www.opengis.net/gml
http://schemas.opengis.net/gml/3.1.1/base/gml.xsd">
  <description>
    This International Standard provides a code for the presentation
    of names of scripts. The codes were devised for use in
    terminology, lexicography, bibliography, and linguistics, but they may be
    used for any application requiring the expression of scripts in coded
    form.
  </description>
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        Arabic
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        araméen impérial
        Imperial_Aramaic
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      Han
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      japonais (alias pour han + hiragana + katakana)
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      Lepcha
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            Lisu
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      meitei mayek
      Meetei_Mayek
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      birman
      Myanmar
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      nakhi géba
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      Rejang
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      Old_Persian
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      Cuneiform
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        <name>996</name>
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            Common
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      Unknown
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    <name>999</name>
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Annex D: Use Cases

(informative)

D.1 Parent-Child Navigation Use Case

In this use case, a viewer client application wishes to give the user the ability to navigate through a spatially organized 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 user can then select a geographic feature of interest for a variety of actions, for example:

- a) Zoom a map or otherwise run a query relating to the feature;
- b) Refine navigation choices with a new list of features based on the ‘Parent’ feature of the feature specified; and
- c) Focus a locator map on a new scale, to show position of the Parent term.

The interface would either build such a tree through a request to the Gazetteer Service or invoke the Parent link.

D.2 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 is essentially a general WFS request that would return features. 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.

D.3 Aggregated Query Use Case

This Use Case pertains to a situation where a client invokes more than one Gazetteer Service simultaneously to extract collections of named features. For example, a request

by a single client or agent may be to return all named features of a given feature type or types that fall within a specific bounding geometry where the bounding geometry covers an international border region. In response to this query collections of named features are returned by multiple Gazetteer Services.

D.4 GeoSynchronization via Mobile Apps Use Case

This Use Case pertains to a situation where national, federal, state, provincial or local partners are seeking relationships, agreements, techniques and technologies to facilitate integration of geographic names data from local publishers or providers for integration into an authoritative Gazetteer Service. To achieve this organizations engage in collaborative data maintenance and integration partnerships based on the use of a transactional Gazetteer Service combined with a GeoSynchronization Service (GSS).

In this scenario users implement server-side components, web applications and mobile ‘apps’. Three user roles are supported: **Publisher**, **Reviewer**, and **Follower**. The Publisher is responsible for querying existing geographic names via a Gazetteer Service, retrieving location instances and adding or proposing changes to geographic names using a simple mobile app. The Reviewer is the authority for verifying the data contribution or changes using simple web applications in conjunction with a GeoSynchronization Service, he or she is the gatekeeper for data changes entering the network. A Follower is a user who gets updates about data operations that were successfully performed by the system, for example higher level organization looking for updates on events may have a Follower role. A user may have more than one role.

D.5 “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)

D.6 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.

Annex E: Transliteration domains

CODE	DESCRIPTION
NOT_TRANSLITERATED	Name has not been transliterated
UNKNOWN	Unknown transliteration method
amh_Ethi2Latn_ALA_1997	Amharic ALA-Library of Congress 1997 System
amh_Ethi2Latn_BGN_1967	Amharic Board on Geographic Names/Permanent Committee on Geographical Names for British Official Use(PCGN) 1967 System
ara_Arab2Latn_ALA_1997	Arabic ALA-Library of Congress 1997 System
ara_Arab2Latn_BGN_1956	Arabic US Board on Geographic Names(BGN)/Permanent Committee on Geographical Names for British Official Use(PCGN) 1956 System
ara_Arab2Latn_BUC_2002	Arabic Tim Buckwalter 2002 System
ara_Arab2Latn_IGN_1973	Arabic Institut Geographique Nationale 1973 System
ara_Arab2Latn_ODNI_2004	Arabic Personal Names Office of the Director Of National Intelligence 2004 System
ara_Arab2Latn_RJGC_1996	Arabic Royal Jordanian Geographic Center 1996 System
ara_Arab2Latn_SES_1930	Arabic Survey of Egypt System
asm_Deva2Latn_ALA_1997	Assamese ALA-Library of Congress 1997 System
aze_Cyrl2Latn_ALA_1997	Azerbaijani ALA-Library of Congress 1997 System
aze_Cyrl2Latn_GAZ_1991	Cyrillic-Roman Table of Correspondences Azeri Government 1991
bak_Cyrl2Latn_BGN_2007	Bashkir 2007 BGN/PCGN Cyrillic-Latin Table of Correspondences
ban_Bali2Latn_ALA_1997	Balinese ALA-Library of Congress 1997 System
bel_Cyrl2Latn_ALA_1997	Byelorussian ALA-Library of Congress 1997 System
bel_Cyrl2Latn_BGN_1979	Byelorussian US Board on Geographic Names(BGN)/Permanent Committee on Geographic al Names for British Official Use(PCGN) 1979 System

bel_Cyrl2Latn_GBO_1992	Byelorussian National Cartographic Authority 1992-3 System (based on GOST 1983)
bel_Cyrl2Latn_GBO_1998	Byelorussian Government of Belarus 1998 System
ben_Beng2Latn_ALA_1997	Bengali ALA-Library of Congress 1997 System
bod_Tibt2Latn_ALA_1997	Tibetan ALA-Library of Congress 1997 System
bul_Cyrl2Latn_ALA_1997	Bulgarian ALA-Library of Congress Bulgarian 1997 System
bul_Cyrl2Latn_BGN_1952	Bulgarian US Board on Geographic Names(BGN)/Permanent Committee on Geographical Names for British Official Use(Permanent Committee on Geographical Names for British Official Use(PCGN)) Bulgarian 1952 System
bul_Cyrl2Latn_BUL_1952	Bulgarian 2002 Bulgarian Government Romanization System
bul_Cyrl2Latn_ODNI_2005	Bulgarian Personal Names Office of the Director Of National Intelligence Bulgarian Personal Names 2004 System
che_Cyrl2Latn_BGN_2007	Chechen 2007 BGN/PCGN Cyrillic-Latin Table of Correspondences
deu_Latn2Latn_BGN_1986	German Spelling Convention US Board on Geographic Names(BGN)/Permanent Committee on Geographical Names for British Official Use(PCGN) 1986
div_Thaa2Latn_ALA_1997	Maldivian (Divehi) ALA-Library of Congress 1997 System
div_Thaa2Latn_BGN_1972	Maldivian (Divehi) US Board on Geographic Names(BGN)/Permanent Committee on Geographical Names for British Official Use(PCGN) 1972 system (out of date)
div_Thaa2Latn_GMV_1988	Maldivian (Divehi) Maldivian Government 1988 system
dzo_Tibt2Latn_GBT_1994	Dzongkha Government of Bhutan 1994 System
ell_Grek2Latn_ALA_1997	Greek ALA-Library of Congress 1997 System
ell_Grek2Latn_BGN_1962	US Board on Geographic Names(BGN)/Permanent Committee on Geographical Names for British Official Use(PCGN) Greek 1962 System (out of date)
ell_Grek2Latn_ELOT743_1996	Greek ELOT 743 System, US Board on Geographic Names(BGN)/Permanent Committee on Geographical

	Names for British Official Use(PCGN) 1996 agreement
fao_Latn2Latn_BGN_1968	Faroese Spelling Convention US Board on Geographic Names(BGN)/Permanent Committee on Geographical Names for British Official Use(PCGN) 1968
fas_Arab2Latn_ALA_1997	Persian 1997 ALA-Library of Congress System
fas_Arab2Latn_AMMI_1959	Afghanistan Ministry of Mines and Industries Transliteration System for Geographic Names in Afghanistan (Yaghubi)
fas_Arab2Latn_BGN_1958	Persian (Afghan and Iranian) BNG/Permanent Committee on Geographical Names for British Official Use(PCGN) 1958 System
fas_Arab2Latn_NCO_2004	Persian 2004 Broad Transcription System National Cartographic Center of Iran
fas_Arab2Latn_ODNI_2004	Farsi (Iranian Persian) Personal Names Office of the Director Of National Intelligence 2004 System
guj_Gijr2Latn_ALA_1997	Gujerati 1997 ALA-Library of Congress System
heb_Hebr2Latn_ALA_1997	Hebrew and Yiddish ALA-Library of Congress 1997 System
heb_Hebr2Latn_HAS_1962	Hebrew Academy System, US Board on Geographic Names(BGN)/Permanent Committee on Geographical Names for British Official Use(PCGN) Hebrew 1962 Agreement
hin_Deva2Latn_ALA_1997	Hindi ALA-Library of Congress 1997 System
hye_Arnm2Latn_ALA_1997	Armenian ALA-Library of Congress 1997 System
hye_Arnm2Latn_BGN_1981	Armenian 1981 BGN/PCGN Romanization System
isl_Arnm2Latn_BGN_1981	Armenian US Board on Geographic Names(BGN)/Permanent Committee on Geographical Names for British Official Use(PCGN) 1981 System
isl_Latn2Latn_BGN_1968	Icelandic Spelling Convention US Board on Geographic Names(BGN)/Permanent Committee on Geographical Names for British Official Use(PCGN) 1968
jav_Java2Latn_ALA_1997	Javanese, Sundanese, and Madurese ALA-Library of Congress 1997 System
jpn_Hrkt2Latn_ALA_1997	Japanese ALA-Library of Congress 1997 System

jpn_Hrkt2Latn_BGN_1930	Japanese Kana Modified Hepburn 1930 System
jpn_Hrkt2Latn_GJP_1954	Japanese Kunrei-siki 1954 System
kas_Arab2Latn_ALA_1997	Kashmiri ALA-Library of Congress 1997 System
kat_Geor2Latn_ALA_1997	Georgian ALA-Library of Congress 1997 System
kat_Geor2Latn_BGN_1981	Georgian US Board on Geographic Names(BGN)/Permanent Committee on Geographical Names for British Official Use(PCGN) 1981 System
kat_Geor2Latn_GGG_2002	Georgian State Department of Geodesy and Cartography 2002 System
kaz_Cyrl2Latn_BGN_1979	US Board on Geographic Names(BGN)/Permanent Committee on Geographical Names for British Official Use(PCGN) Kazakh Cyrillic 1979 System
khm_Khmr2Latn_ALA_1997	Cambodian (Khmer) ALA-Library of Congress 1997 System
khm_Khmr2Latn_SGK_1959	Khmere Service Geographique 1959 System
kir_Cyrl2Latn_BGN_1979	Kirghiz US Board on Geographic Names(BGN)/Permanent Committee on Geographical Names for British Official Use(PCGN) 1979 System
kor_Hang2Latn_ALA_1997	Korean ALA-Library of Congress 1997 System
kor_Hang2Latn_GKN_2002	Korean Democratic People's Republic of Korea Korean 2002 System
kor_Hang2Latn_MOCT_2000	Korean Ministry of Culture and Tourism 2000 System
kor_Hang2Latn_MR_1939	Korean McCune-Reischauer System, 1943 US Board on Geographic Names(BGN) Agreement
kor_Hang2Latn_ODNI_2004	Korean Personal Names Office of the Director Of National Intelligence 2004 System
kur_Arab2Latn_ALA_1997	Kurdish 1997 ALA-Library of Congress Kurdish 1997 System
kur_Arab2Latn_BGN_1931	2007 Kurdish Hawar Romanization System BGN/PCGN
kur_Arab2Latn_EDMONDS_1931	Kurdish 1931 J.C. Edmonds Romanization System
lad_Hebr2Latn_ALA_1997	Ladino ALA-Library of Congress 1997 System
lao_Lao2Latn_ALA_1997	Lao ALA-Library of Congress 1997 System

lao_Lao2Latn_CNT_1966	Lao Commission Nationale de Toponymie 1966 System, US Board on Geographic Names(BGN)/Permanent Committee on Geographical Names for British Official Use(PCGN) Agreement
mal_Mlym2Latn_ALA_1997	Malayalam ALA-Library of Congress 1997 System
mar_Deva2Latn_ALA_1997	Marathi ALA-Library of Congress 1997 System
mkd_Cyrl2Latn_BGN_1981	Macedonian US Board on Geographic Names(BGN)/Permanent Committee on Geographical Names for British Official Use(PCGN) 1981 System
mkd_Cyrl2Latn_ODNI_2005	Macedonian Personal Names Office of the Director Of National Intelligence 2004 System
mly_Arab2Latn_ALA_1997	Malay ALA-Library of Congress 1997 System
mol_Cyrl2Latn_BGN_2002	Moldavian Table of Correspondences US Board on Geographic Names(BGN)/Permanent Committee on Geographical Names for British Official Use(PCGN) 2002
mon_Cyrl2Latn_ALA_1997	Mongolian ALA-Library of Congress 1997 System
mon_Cyrl2Latn_BGN_1964	Mongolian US Board on Geographic Names(BGN)/Permanent Committee on Geographical Names for British Official Use(PCGN) 1964 System
mya_Mymr2Latn_ALA_1997	Burmese ALA-Library of Congress 1997 System
nep_Deva2Latn_BGN_1964	Nepalese US Board on Geographic Names(BGN)/Permanent Committee on Geographical Names for British Official Use(PCGN) 1964 System
nep_Mymr2Latn_BGN_1970	Burmese US Board on Geographic Names(BGN)/Permanent Committee on Geographical Names for British Official Use(PCGN) 1970 Agreement
ori_Orya2Latn_ALA_1997	Oriya ALA-Library of Congress 1997 System
pan_Deva2Latn_ALA_1997	Panjabi ALA-Library of Congress 1997 System
pus_Arab2Latn_ALA_1997	Pashto ALA-Library of Congress 1997 System
pus_Arab2Latn_AMMI_1959	Afghanistan Ministry of Mines and Industries Transliteration System for Geographic Names in Afghanistan (Yaghubi)
pus_Arab2Latn_BGN_1968	Pashto (Pushtu) US Board on Geographic Names(BGN)/Permanent Committee on Geographical Names for British Official Use(PCGN) 1968 System

rus_Cyrl2Latn_ALA_1997	Russian ALA-Library of Congress 1997 System
rus_Cyrl2Latn_BGN_1947	Russian US Board on Geographic Names(BGN)/Permanent Committee on Geographical Names for British Official Use(PCGN) 1947 System
rus_Cyrl2Latn_GOST_1983	Russian GOST 1983 System, Main Administration of Geodesy and Cartography of the Former Soviet Union
rus_Cyrl2Latn_ODNI_2004	Russian Personal Names Office of the Director Of National Intelligence 2004 System
sin_Sinh2Latn_ALA_1997	Sinhalese ALA-Library of Congress 1997 System
sme_Latn2Latn_BGN_1984	North Lappish Spelling Convention US Board on Geographic Names(BGN)/Permanent Committee on Geographical Names for British Official Use(PCGN) 1984 System
snd_Arab2Latn_ALA_1997	Sindhi ALA-Library of Congress 1997 System
srp_Cyrl2Latn_ALA_1997	Serbian and Macedonian ALA-Library of Congress 1997 System
srp_Cyrl2Latn_BGN_2005	Serbian Cyrillic Table of Correspondences US Board on Geographic Names(BGN)/Permanent Committee on Geographical Names for British Official Use(PCGN) 2005
srp_Cyrl2Latn_ODNI_2005	Serbian Personal Names Office of the Director Of National Intelligence 2004 System
tam_Taml2Latn_ALA_1997	Tamil ALA-Library of Congress 1997 System
tat_Cyrl2Latn_BGN_2005	Tatar 2005 BGN/PCGN Cyrillic-Roman Table of Correspondences
tel_Telu2Latn_ALA_1997	Telugu ALA-Library of Congress 1997 System
tgk_Cyrl2Latn_BGN_1994	US Board on Geographic Names(BGN)/Permanent Committee on Geographical Names for British Official Use(PCGN) Tajik Cyrillic 1994 System
tha_Thai2Latn_ALA_1997	Thai ALA-Library of Congress 1997 System
tha_Thai2Latn_RIT_1968	Thai Royal Institute of Thailand 1968 System (out of date)
tir_Ethi2Latn_ALA_1997	Tigrinya ALA-Library of Congress 1997 System
tir_Ethi2Latn_BGN_2007	Tigrinya 2007 BGN/PCGN Romanization System
tir_Thai2Latn_RIT_2000	Thai Royal Institute of Thailand 2000 System

tuk_Cyrl2Latn_BGN_1979	Turkmen Cyrillic US Board on Geographic Names(BGN)/Permanent Committee on Geographical Names for British Official Use(PCGN) 1979 System (out of date)
tuk_Cyrl2Latn_GTX_2000	Cyrillic Table of Correspondences Government of Turkmenistan Turkmen 2000 System
uig_Arab2Latn_ALA_1997	Uyghur ALA-Library of Congress 1997 System
uig_Arab2Latn_UCIS_2001	Uyghur 2001 Latin Script for Uyghur, Uyghur Computer Information Society
uig_Arab2Latn_XLSC_1959	Uyghur Pinyin New Script 1959 XUAR Language and Script Committee
ukr_Cyrl2Latn_ALA_1997	Ukrainian ALA-Library of Congress 1997 System
ukr_Cyrl2Latn_BGN_1965	Ukrainian Board on Geographic Names/Permanent Committee on Geographical Names for British Official Use(PCGN) 1965 System
ukr_Cyrl2Latn_GUP_1996	Ukrainian Government of Ukraine 1996 System
ukr_Cyrl2Latn_ODNI_2005	Ukrainian Personal Names Office of the Director Of National Intelligence 2004 System
urd_Arab2Latn_ALA_1997	Urdu ALA-Library of Congress 1997 System
urd_Arab2Latn_BGN_2007	Urdu 2007 BGN/PCGN Urdu Romanization System
urd_Arab2Latn_HUN_	Hunterian System
urd_Arab2Latn_ODNI_2004	Urdu Personal Names Office of the Director Of National Intelligence 2004 System
urd_Arab2Latn_UN_1972	Urdu United Nations 1972 System
uzb_Cyrl2Latn_BGN_1979	Uzbek Cyrillic US Board on Geographic Names(BGN)/Permanent Committee on Geographical Names for British Official Use(PCGN) 1979 System (out of date)
uzb_Cyrl2Latn_GUZ_2000	Uzbek Cyrillic Table of Correspondences Government of Uzbekistan 2000 System
zho_Hani2Latn_ALA_1997	Chinese ALA-Library of Congress 1997 System
zho_Hani2Latn_AcadSin_2002	Chinese Tongyong Pinyin Academica Sinica 2002 System
zho_Hani2Latn_GCH_1979	Chinese Hanyu Pinyin 1979 System

zho_Hani2Latn_WDG_1979	Chinese Wade-Giles 1979 System
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Annex F: Language and Script domains

LANG_CD	DESCRIPTION
aar	Afar
abk	Abkhazian
ace	Achinese
ach	Acoli
ady	Adyghe; Adygei
afr	Afrikaans
aka	Akan
ale	Aleut
amh	Amharic
ara	Arabic
asm	Assamese
ava	Avaric
ave	Avestan
aym	Aymara
aze	Azerbaijani
bak	Bashkir
bal	Baluchi
bam	Bambara
ban	Balinese
bas	Basa (Cameroon)
bdq	Bahnar
bej	Beja
bel	Belarusian

bem	Bemba (Zambia)
ben	Bengali
bhb	Bhili
bik	Bikol
bin	Bini
bis	Bislama
bla	Siksika
bod	Tibetan
bos	Bosnian
bre	Breton
brh	Brahui
bri	Mokpwe
bsk	Burushaski
bsq	Bassa
btb	Beti (Cameroon)
btq	Batek
bul	Bulgarian
cat	Catalan
cbk	Chavacano
ceb	Cebuano
ces	Czech
cgg	Chiga
cha	Chamorro
che	Chechen
chk	Chuukese

cho	Choctaw
chv	Chuvash
cjk	Chokwe
ckt	Chukot
cld	Chaldean Neo-Aramaic
cop	Coptic
cor	Cornish
cre	Cree
csb	Kashubian
cym	Welsh
dan	Danish
deu	German
din	Dinka
diq	Dimli
div	Divehi
doi	Dogri (generic)
dua	Duala
dyu	Dyula
dzo	Dzongkha
efi	Efik
ell	Greek, Modern (1453-)
eng	English
est	Estonian
eus	Basque
evn	Evenki

ewe	Ewe
ewo	Ewondo
fao	Faroese
fas	Persian
fij	Fijian
fil	Filipino; Pilipino
fin	Finnish
fng	Fanagalo
fon	Fon
fra	French
fry	Frisian
fud	Futuna, East
fuf	Pular
ful	Fulah
gaa	Ga
gil	Gilbertese
gla	Gaelic (Scots)
gle	Irish
glg	Gallegan
glk	Gilaki
glv	Manx
gog	Gogo
gon	Gondi
got	Gothic
grc	Greek, Ancient (to 1453)

grn	Guarani
guj	Gujarati
guz	Gusii
hat	Haitian; Haitian Creole
hau	Hausa
haw	Hawaiian
hay	Haya
hbo	Hebrew, Ancient
hdy	Hadiyya
heb	Hebrew
her	Herero
hil	Hiligaynon
hin	Hindi
hmn	Hmong
hmo	Hiri Motu
hoc	Ho
hop	Hopi
hrv	Croatian
hun	Hungarian
hye	Armenian
iba	Iban
ibg	Ibanag
ibo	Igbo
iku	Inuktitut
ilb	Ila

ilo	Iloko
ind	Indonesian
isl	Icelandic
ita	Italian
jam	Jamaican Creole English
jav	Javanese
jbn	Nafusi
jpn	Japanese
jra	Jarai
kab	Kabyle
kac	Kachin
kal	Kalaallisut
kam	Kamba (Kenya)
kan	Kannada
kas	Kashmiri
kat	Georgian
kau	Kanuri
kaz	Kazakh
kbp	Kabiyé
khm	Khmer
kik	Kikuyu
kin	Kinyarwanda
kir	Kirghiz
kmb	Kimbundu
kok	Konkani (generic)

kon	Kongo
kor	Korean
kos	Kosraean
kpe	Kpelle
kpg	Kapingamarangi
kpo	Ikposo
krc	Karachay-Balkar
kri	Krio
kru	Kurukh
ktb	Kambaata
ktu	Kituba (Democratic Republic of Congo)
kur	Kurdish
lad	Ladino
lah	Lahnda
lam	Lamba
lao	Lao
lat	Latin
lav	Latvian
lcf	Lubu
ldd	Luri
lhu	Lahu
lin	Lingala
lis	Lisu
lit	Lithuanian
ljp	Lampung

lns	Lamnso
lol	Mongo
lom	Loma (Liberia)
lua	Luba-Lulua
lub	Luba-Katanga
lue	Luvale
lug	Ganda
lun	Lunda
luo	Luo (Kenya and Tanzania)
luy	Luyia
mad	Madurese
mah	Marshall
mak	Makasar
mal	Malayalam
mar	Marathi
mas	Masai
mdh	Maguindanao
men	Mende (Sierra Leone)
mer	Meru
mfa	Malay, Pattani
min	Minangkabau
miq	Mískito
mkd	Macedonian
mlg	Malagasy
mlq	Maninkakan, Western

mlt	Maltese
mly	Malay (specific)
mol	Moldavian
mon	Mongolian
mos	Mossi
mri	Maori
mrl	Mortlockese
mrw	Maranao
msa	Malay (generic)
mtq	Muong
mwr	Marwari
mya	Burmese
mye	Myene
myg	Manta
mzn	Mazanderani
nau	Nauru
nde	Ndebele, North
nep	Nepali
ngl	Lomwe
niu	Niuean
nld	Dutch
nor	Norwegian
nso	Sotho, Northern
nup	Nupe-Nupe-Tako
nut	Nung (Viet Nam)

nya	Chichewa; Nyanja
nyn	Nyankole
nyo	Nyoro
oji	Ojibwa
ori	Oriya
orm	Oromo
oss	Ossetian; Ossetic
pag	Pangasinan
pam	Pampanga
pan	Panjabi
pap	Papiamento
pau	Palauan
pli	Pali
pol	Polish
pon	Pohnpeian
por	Portuguese
prv	Provençal
pus	Pushto
puw	Puluwatese
que	Quechua
rad	Rade
raj	Rajasthani
rar	Rarotongan
rej	Rejang
rif	Tarifit

roh	Raeto-Romance
rom	Romany
ron	Romanian
run	Rundi
rus	Russian
sag	Sango
sah	Yakut
san	Sanskrit
sas	Sasak
sat	Santali
sed	Sedang
seh	Sena
shi	Tachelhit
shn	Shan
sid	Sidamo
sin	Sinhalese
slk	Slovak
slv	Slovenian
sme	Northern Sami
smo	Samoaan
sna	Shona
snd	Sindhi
snk	Soninke
som	Somali
sop	Songe

sot	Sotho, Southern
spa	Spanish
sqi	Albanian
srb	Sora
srn	Sranan
srp	Serbian
srr	Serer
ssw	Swati
sun	Sundanese
sus	Susu
sux	Sumerian
swa	Swahili (generic)
swb	Comorian
swe	Swedish
syl	Sylheti
syr	Syriac
tah	Tahitian
tam	Tamil
tat	Tatar
tcy	Tulu
tel	Telugu
tem	Timne
tet	Tetum
tgk	Tajik
tgl	Tagalog

tha	Thai
tig	Tigre
tir	Tigrinya
tiv	Tiv
tkl	Tokelau
tll	Tetela
tmh	Tamashek
toi	Tonga (Zambia)
tou	Tho
tsc	Tswa
tsg	Tausug
tsn	Tswana
tso	Tsonga
tuk	Turkmen
tum	Tumbuka
tur	Turkish
tvl	Tuvalu
tzm	Tamazight, Central Atlas
uig	Uighur
ukr	Ukrainian
uli	Ulithian
umb	Umbundu
und	Undetermined
urd	Urdu
uzb	Uzbek

vai	Vai
vie	Vietnamese
vmw	Makhuwa
vol	Volapük
wal	Walamo
war	Waray (Philippines)
wbm	Wa
wes	Pidgin, Cameroon
wls	Wallisian
woe	Woleaian
wol	Wolof
xho	Xhosa
xog	Soga
yao	Yao
yap	Yapese
yid	Yiddish
yor	Yoruba
zap	Zapotec
zen	Zenaga
zha	Zhuang
zho	Chinese
zne	Zande (specific)
zul	Zulu

Annex G: Dialect domains

CODE	DESCRIPTION	LANG_CD
aae	Arbëreshë Albanian	sqi
aa0	Algerian Saharan Spoken Arabic	ara
aat	Arvanitika Albanian	sqi
abh	Tajiki Spoken Arabic	ara
abv	Baharna Spoken Arabic	ara
acm	Mesopotamian Spoken Arabic	ara
acq	Ta'izzi-Adeni Spoken Arabic	ara
acw	Hijazi Spoken Arabic	ara
acx	Omani Spoken Arabic	ara
acy	Cypriot Spoken Arabic	ara
adf	Dhofari Spoken Arabic	ara
aeb	Tunisian Spoken Arabic	ara
aec	Saidi Spoken Arabic	ara
afb	Gulf Spoken Arabic	ara
aii	Assyrian Neo-Aramaic	syr
ajp	South Levantine Spoken Arabic	ara
aln	Gheg Albanian	sqi
als	Tosk Albanian	sqi
apc	North Levantine Spoken Arabic	ara
apd	Sudanese Spoken Arabic	ara
arb	Standard Arabic	ara
arq	Algerian Spoken Arabic	ara
ars	Najdi Spoken Arabic	ara

ary	Moroccan Spoken Arabic	ara
arz	Egyptian Spoken Arabic	ara
auz	Uzbeki Spoken Arabic	ara
avl	Eastern Egyptian Bedawi Spoken Arabic	ara
ayc	Southern Aymara	aym
ayh	Hadrami Spoken Arabic	ara
ayl	Libyan Spoken Arabic	ara
ayn	Sanaani Spoken Arabic	ara
ayp	North Mesopotamian Spoken Arabic	ara
ayr	Central Aymara	aym
azb	South Azerbaijani	aze
azj	North Azerbaijani	aze
bbz	Babalia Creole Arabic	ara
bcc	Southern Balochi	bal
bcl	Central Bicolano	bik
bgn	Western Balochi	bal
bgp	Eastern Balochi	bal
bgq	Bagri	raj
bhk	Albay Bicolano	bik
bhr	Bara Malagasy	mlg
bjq	Southern Betsimisaraka Malagasy	mlg
bln	Southern Catanduanes Bicolano	bik
blu	Hmong Njua	hmn
bmm	Northern Betsimisaraka Malagasy	mlg
btj	Bacanese Malay	msa

bto	Iriga Bicolano	bik
bve	Berau Malay	msa
bvu	Bukit Malay	msa
ccx	Northern Zhuang	zha
ccy	Southern Zhuang	zha
cdo	Min Dong Chinese	zho
ciw	Chippewa	oji
cjy	Jinyu Chinese	zho
ckb	Central Kurdish (Sorani)	kur
cld	Chaldean Neo-Aramaic	syr
cmn	Mandarin Chinese	zho
coa	Cocos Islands Malay	msa
cos	Corsican	ita
cpx	Pu-Xian Chinese	zho
crj	Southern East Cree	cre
crk	Plains Cree	cre
crl	Northern East Cree	cre
crm	Moose Cree	cre
csw	Swampy Cree	cre
cts	Northern Catanduanes Bicolano	bik
cwd	Woods Cree	cre
czh	Huizhou Chinese	zho
czo	Min Zhong Chinese	zho
dgo	Dogri (specific)	doi
dhd	Dhundari	mwr

dib	South Central Dinka	din
dik	Southwestern Dinka	din
dip	Northeastern Dinka	din
diw	Northwestern Dinka	din
dks	Southeastern Dinka	din
fat	Fanti	aka
ffm	Maasina Fulfulde	ful
fri	Western Frisian	fry
frf	Northern Frisian	fry
frs	Eastern Frisian	fry
fub	Adamawa Fulfulde	ful
fuc	Pulaar	ful
fue	Borgu Fulfulde	ful
fuf	Pular	ful
fuh	Western Niger Fulfulde	ful
fui	Bagirmi Fulfulde	ful
fuq	Central-Eastern Niger Fulfulde	ful
fuv	Nigerian Fulfulde	ful
gan	Gan Chinese	zho
gax	Borana-Arsi-Guji Oromo	orm
gaz	West Central Oromo	orm
gda	Gade Lohar	raj
ggo	Southern Gondi	gon
gju	Gujari	raj
gkp	Guinea Kpelle	kpe

gno	Northern Gondi	gon
gnw	Western Bolivian Guaraní	grn
gom	Goanese Konkani	kok
gug	Paraguayan Guaraní	grn
gui	Eastern Bolivian Guaraní	grn
gun	Mbyá Guaraní	grn
hae	Eastern Oromo	orm
hak	Hakka Chinese	zho
hea	Northern Qiandong Hmong	hmn
hma	Southern Mashan Hmong	hmn
hmc	Central Huishui Hmong	hmn
hmd	Northeastern Dian Hmong	hmn
hme	Eastern Huishui Hmong	hmn
hmg	Southwestern Guiyang Hmong	hmn
hmh	Southwestern Huishui Hmong	hmn
hmi	Northern Huishui Hmong	hmn
hmj	Chonganjiang Hmong	hmn
hml	Luopohe Hmong	hmn
hmm	Central Mashan Hmong	hmn
hmp	Northern Mashan Hmong	hmn
hmq	Eastern Qiandong Hmong	hmn
hms	Southern Qiandong Hmong	hmn
hmw	Western Mashan Hmong	hmn
hmy	Southern Guiyang Hmong	hmn
hnd	Southern Hindko	lah

hno	Northern Hindko	lah
hoj	Harauti	raj
hsn	Xiang Chinese	zho
huj	Northern Guiyang Hmong	hmn
ike	Eastern Canadian Inuktitut	iku
ikt	Western Canadian Inuktitut	iku
jat	Jakati	lah
jax	Jambi Malay	msa
kby	Manga Kanuri	kau
khk	Halh Mongolian	mon
kmr	Northern Kurdish (Kurmanji)	kur
knc	Central Kanuri	kau
kng	Koongo	kon
knn	Konkani (specific)	kok
krt	Tumari Kanuri	kau
kwy	San Salvador Kongo	kon
ldi	Laari	kon
max	North Moluccan Malay	msa
meo	Kedah Malay	msa
mfa	Pattani Malay	msa
mly	Malay (specific)	msa
mmr	Western Xiangxi Hmong	hmn
mnp	Min Bei Chinese	zho
mqg	Kota Bangun Kutai Malay	msa
msh	Masikoro Malagasy	mlg

msi	Sabah Malay	msa
mtr	Mewari	mwr
mup	Malvi	raj
muq	Eastern Xiangxi Hmong	hmn
mve	Marwari (Pakistan)	mwr
mvf	Peripheral Mongolian	mon
mww	Hmong Daw	hmn
nan	Min Nan Chinese	zho
nap	Neapolitan	ita
nhd	Chiripá	grn
nno	Norwegian Nynorsk	nor
nob	Norwegian Bokmål	nor
ojb	Northwestern Ojibwa	oji
ojc	Central Ojibwa	oji
ojg	Eastern Ojibwa	oji
ojs	Severn Ojibwa	oji
ojw	Western Ojibwa	oji
orc	Orma	orm
otw	Ottawa	oji
pbt	Southern Pashto	pus
pbu	Northern Pashto	pus
pes	Western Farsi	fas
pga	Sudanese Creole Arabic	ara
phr	Pahari-Potwari	lah
plt	Plateau Malagasy	mlg

pmu	Mirpur Panjabi	lah
pnb	Western Panjabi	lah
prs	Eastern Farsi (Dari)	fas
pst	Central Pashto	pus
qdm	Dimotiki Greek	ell
qkt	Katharevousa Greek	ell
rnc	Carpathian Romani	rom
rmf	Kalo Finnish Romani	rom
rml	Baltic Romani	rom
rmn	Balkan Romani	rom
rmo	Sinte Romani	rom
rmw	Welsh Romani	rom
rmy	Vlax Romani	rom
rwr	Marwari (India)	mwr
scn	Sicilian	ita
sdh	Southern (Iranian) Kurdish	kur
shu	Chadian Spoken Arabic	ara
skg	Sakalava Malagasy	mlg
skr	Seraiki	lah
srd	Sardinian	ita
ssh	Shihhi Spoken Arabic	ara
swc	Congo Swahili	swa
swh	Swahili (specific)	swa
swv	Shekhawati	mwr
taq	Tamasheq	tmh

tdx	Tandroy-Mahafaly Malagasy	mlg
thv	Tahaggart Tamahaq	tmh
thz	Tayart Tamajeq	tmh
ttq	Tawallammat Tamajaq	tmh
twi	Twi	aka
txy	Tanosy Malagasy	mlg
uzn	Northern Uzbek	uzb
uzs	Southern Uzbek	uzb
vkt	Tenggarong Kutai Malay	msa
wbr	Wagdi	raj
wry	Merwari	mwr
wuu	Wu Chinese	zho
xhe	Khetrani	lah
xmm	Manado Malay	msa
xmv	Antankarana Malagasy	mlg
xmw	Tsimihety Malagasy	mlg
xnr	Kangri	doi
xpe	Liberia Kpelle	kpe
yue	Yue Chinese	zho