Using the Geospatial One-Stop Operational Portal API – Draft

Prepared for:

Department of the Interior
Geospatial One-Stop
12201 Sunrise Valley Drive
Mail Stop 590
Reston, VA 20192

Prepared by:

ESRI
380 New York Street
Redlands, California 92373-8100

Document History

Version	Date	Description	Person Responsible
0.1	8/29/2005	Initial Draft	Jason Cupp
0.2	9/20/2005	Added example requests and responses	Jason Cupp
0.3	11/11/2005	Added the Format queryable and example request	Jason Cupp
1.0	11/30/2005	Final Document	Jason Cupp
1.1	5/15/2007	Added Z39.50 database name	Marten Hogeweg

Table of Contents

1.0   Introduction

This document for connecting to the Geospatial One-Stop Operational Portal (GOS) metadata catalog using the Open Geospatial Consortium (OGC) Catalog Service for the Web (CS-W) was prepared by ESRI, Inc. for the Department of Interior Geospatial One-Stop (DOI-GOS) in partial fulfillment of the Geospatial One-Stop Operational Portal contract (GSA GS-35F-5086H).

1.1   Purpose of This Document

To facilitate agencies to leverage the content stored in the GOS metadata catalog, this catalog is made available through a number of Application Programming Interfaces (API), including CS-W, Z39.50, ArcIMS, and the Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH).

This document provides the connection information for the GOS API and provides a detailed description of the CS-W API.

1.2   Intended Audience of This Document

This document is intended for developers who want to develop a searching interface for a specific application outside of the GOS portal, but leveraging the content of the GOS catalog of metadata.

1.3   Document Overview

This document is divided into the following sections:

- ■ Introduction: This section introduces the document in the context of the GOS project.

- ■ Connection Information: This section provides lists the end points for the different API through which the GOS catalog can be queried.

- ■ CS-W API: This section provides the detailed capabilities and examples for using the CS-W API with the GOS catalog.

- ■ Appendixes.

1.4 Related Documents

Following is a list of all relevant documents for the project that this project management plan relates to:

- US Government's Statement of Work for Geospatial One-Stop Operational Portal (RFQ No. 1435-04-05-RP-36180), dated October 15, 2004

- OGC 04-021r2, OpenGIS® Catalogue Services Specification, Version: 2.0, 2004-05-11.

2.0   Connection Information

This section provides a list of the end points for the different API that the GOS portal supports.

CS-W	http://gos2.geodata.gov/aimscsw/csw2.0
Z39.50	Host=gos2.geodata.gov Port=210 Database Name = CATALOG_Browse_Metadata
OAI-PMH	http://gos2.geodata.gov/aimsharvester/oai2.0
ESRI ArcIMS Metadata Server	Server=http://gos2.geodata.gov Service=CATALOG_Browse_Metadata

The CS-W API is discussed in the next section. For details on the other API you are referred to resources such as.

- The Library of Congress Z39.50 page accessible at
  http://www.loc.gov/z3950/agency/

- The Open Archives Initiative Protocol for Metadata Harvesting web pages at
  http://www.openarchives.org/OAI/2.0/openarchivesprotocol.htm

- The ESRI support web site at http://support.esri.com

3.0   GOS CSW API

3.1   Introduction

The GOS CSW service is an implementation of the OGC Catalogue Services 2.0 specification. To use this service, CSW clients may use the following URL: http://gos2.geodata.gov/aimscsw/csw2.0
This document describes the GOS CSW service's capabilities and includes example requests and responses.

3.1.1   Supported Operations

The GOS CSW API supports the mandatory CSW requests. The Harvest and Transaction operations are not supported at this time.

Table 1- Supported CSW Operations

Operation	Status	Supported
GetCapabilities	mandatory	yes
DescribeRecord	mandatory	yes
GetRecords	mandatory	yes
GetRecordById	mandatory	yes
HarvestRecords	optional	no
Transaction	optional	no

3.1.2   Namespaces

The following table lists the namespace prefix declarations that are used throughout this document and the associated specification and version.

Table 2 - Namespace Prefix Declarations

Prefix	Namespace URI	Specification
csw	http://www.opengis.net/cat/csw	CSW part (Clause 10) of OGC Catalogue Services 2.0
ows	http://www.opengis.net/ows	OGC Common 0.0.3
ogc	http://www.opengis.net/ogc	OGC Filter 1
gml	http://www.opengis.net/gml	GML 3.0.0
dc	http://purl.org/dc/elements/1.1/	Dublin Core

3.1.3   Core Queryables

The GOS CSW API does not define any additional queryable properties beyond the CSW core queryables. The GOS information model is backed by XML documents and a spatial database. It's XML documents contain FGDC, ISO DTD, GOS XML elements and attributes. The spatial database services queries for modification date and spatial extent. Below is a table mapping OGC Catalog Core Queryables to items in the GOS information model.

Table 3- OGC Core Queryable Properties

Name	Definition	Data type	Property Mapping to Information Model
Subject	The topic of the content of the resource	CharacterString	[ISO-DTD] /metadata/dataIdInfo/descKeys/keyword [FGDC] /metadata/idinfo/keywords/theme/themekey
Title	A name given to the resource	CharacterString	[ISO-DTD] /metadata/dataIdInfo/idCitation/resTitle [FGDC] /metadata/idinfo/citation/citeinfo/title
Abstract	A summary of the content of the resource	CharacterString	[ISO-DTD] /metadata/dataIdInfo/idAbs [FGDC] /metadata/idinfo/descript/abstract
Format	The physical or digital manifestation of the resource	CharacterString	Maps to the ArcIMS Metadata Service content-types. Accepted values are: liveData, downloadableData, offlineData, staticMapImage, document, application, geographicService, clearinghousem mapFiles, geographicActivities
Identifier	An unambiguous reference to the resource within a given context	Identifier	TBD – presently maps to AnyText
Modified	Date on which the resource was last changed	Date-8601, example: 1963-06-19	RDBMS
AnyText	This queryable represents the catalogue entry as a whole	CharacterString	Whole resource text.
Type	The nature or genre of the content of the resource. Type can include general categories, genres or aggregation levels of content.	Code list	TBD – presently maps to AnyText
Envelope	A bounding box for identifying a geographic area of interest	GML BBOX	RDBMS
CRS	Coordinate Reference System (Authority and ID) for the Envelope	Identifier	TBD
Association	Complete statement of a one-to-one relationship	Association	TBD

3.1.4   Core Queryable Property Names

Queryable properties are exposed to CSW clients through OGC Filter property names. There is ambiguity in the OGC Filter and CSW specifications on how to exactly resolve Filter property names based on their XML encoding. As such, the GOS API resolves this ambiguity by allowing multiple namespace-prefixes attached to core queryable properties.
Also, the CSW specification is not specific about which Filter operators are allowed for each core queryable property. These are described in Table 4 - Core queryable Filter representation.

Table 4 - Core queryable Filter representations

Core Queryable	Possible XML Qualified Names	Allowed operations
Subject	Subject ogc:Subject csw:Subject	ogc:PropertyIsLike ogc:PropertyIsEqualTo (same as PropertyIsLike)
Title	Title ogc:Title csw:Title	ogc:PropertyIsLike ogc:PropertyIsEqualTo (same as PropertyIsLike)
Abstract	Abstract ogc:Abstract csw:Abstract	ogc:PropertyIsLike ogc:PropertyIsEqualTo (same as PropertyIsLike)
Format	Format ogc:Format csw:Format	ogc:PropertyIsLike ogc:PropertyIsEqualTo (same as PropertyIsLike)
Identifier	Identifier ogc:Identifier csw:Identifier	ogc:PropertyIsLike ogc:PropertyIsEqualTo (same as PropertyIsLike)
Modified	Modified ogc:Modified csw:Modified	ogc:PropertyIsLessThan ogc:PropertyIsGreaterThan
AnyText	AnyText ogc:AnyText csw:AnyText	ogc:PropertyIsLike ogc:PropertyIsEqualTo (same as PropertyIsLike)
Type	Type ogc:Type csw:Type	ogc:PropertyIsLike ogc:PropertyIsEqualTo (same as PropertyIsLike)
Envelope	ogc:Geometry	* see Spatial Queries below
CRS	TBD	TBD
Association	TBD	TBD

3.1.5   Spatial Queries

Envelope queries are encoded using OGC Filter spatial predicates. The GOS API doesn't support every spatial predicate available in the Filter specification.

Table 5 - Supported Spatial Predicates

OGC Filter Spatial Predicate	GOS Spatial Predicate
ogc:Not/ogc:Disjoint	overlaps
ogc:Intersects	overlaps
ogc:Overlaps	overlaps
ogc:Within	within

overlaps - finds metadata documents in which part or all of the metadata document's envelope falls within the specified search box. Anything the search box touches is found.
within - finds metadata documents where the document's envelope falls entirely within the specified search box. The document's spatial envelope can touch the search box boundary.

3.1.6 Output Schemas and Element Sets

Output Schema and Element Set are not independent. The choice of element set is constrained by the choice of output schema, i.e. the available element sets are wholly dependent on the choice of output schema. *This arrangement is presently not possible to declare in a CSW capabilities document.*

Table 6 - Supported Output Schemas and Element Sets

Output Schema	Element Set
csw:Record	brief, summary, full
csw:record	*alias for csw:Record*
OGCCORE	*alias for csw:Record*

3.1.7 Core Returnables

Core returnables are defined in terms of Dublin Core metadata elements. These returnable properties are included in the csw:Record schema.

Table 7 - Core Returnables

Core Returnable	Core Queryable Term	Description
dc:title	Title	A name given to the resource. Also known as "Name".
dc:creator	N/A	An entity primarily responsible for making the content of the resource.
dc:subject	Subject	A topic of the content of the resource. This is a place where a Topic Category or other taxonomy could be applied.
dct:abstract	Abstract	An account of the content of the resource. This is also known as the "Abstract" in other aspects of OGC, FGDC, and ISO metadata.
dc:publisher	N/A	An entity responsible for making the resource available. This would equate to the Distributor in ISO and FGDC metadata.
dc:contributor	N/A	An entity responsible for making contributions to the content of the resource.
dc:date	Modified	A date of a creation or update event of the metadata resource.
dc:type	Type	The nature or genre of the content of the resource.
dc:format	Format	The physical or digital manifestation of the resource.
dc:identifier	Identifier	An unambiguous reference to the resource within a given context.
dc:source	Source	A reference to a resource from which the present resource is derived.
dc:language	N/A	A language of the intellectual content of the resource.
dc:relation	Relation, Target, Source	A reference to a related resource.
dct:spatial	Envelope, CRS	The spatial extent or scope of the content of the resource.

dc:rights	N/A	Information about rights held in and over the resource.

Based on the selection of Output Schema and Element Set, the records returned contains a selection of the core returnables.

Table 8 - Returnable Properties

Output Schema	Element Set	Returnables
csw:Record	brief	dc:identifier
		dc:type
	summary	dc:identifier
		dc:type
		dc:title
		dct:modfied *(specialization of dc:date)*
	full	returned is the raw XML as it exists in the GOS database

3.2   Requests

3.2.1   Get Capabilities

Both KVP and POST style requests are supported by the GOS CSW service.

KVP	`?REQUEST=GetCapabilities&SERVICE=CSW`

POST	`<csw:GetCapabilities xmlns:csw="http://www.opengis.net/cat/csw" service="csw" xmlns="http://www.opengis.net/ows">`
	`  <AcceptVersions>`
	`    <Version>2.0.0</Version>`
	`  </AcceptVersions>`
	`  <Sections>`
	`    <Section>Contents</Section>`
	`  </Sections>`
	`  <AcceptFormats>`
	`    <OutputFormat>text/xml</OutputFormat>`
	`  </AcceptFormats>`
	`</csw:GetCapabilities>`

3.2.2   DescribeRecord

KVP	`?REQUEST=DescribeRecord&service=CSW&version=2.0.0`
POST	`<csw:DescribeRecord service="csw" version="2.0.0" xmlns:csw="http://www.opengis.net/cat/csw"></csw:DescribeRecord>`

3.2.3   GetRecords

A GetRecords requests requires a constraint language and since the GOS CSW service doesn't support CQL (Common Query Language), only XML Filter with POST style requests are supported.

AnyText	
KVP	`N/A`

| **POST** | ```
<csw:GetRecords xmlns:csw="http://www.opengis.net/cat/csw"
xmlns:ogc="http://www.opengis.net/ogc"
xmlns:ows="http://www.opengis.net/ows" version="2.0.0" service="csw"
xmlns:dc="http://purl.org/dc/elements/1.1/">
  <csw:Query typeNames="csw:Record">
    <csw:ElementSetName>summary</csw:ElementSetName>
    <csw:Constraint version="1.0.0">
      <ogc:Filter>
        <ogc:PropertyIsLike wildCard="" escape="" singleChar="">
          <ogc:PropertyName>AnyText</ogc:PropertyName>
          <ogc:Literal>railroads</ogc:Literal>
        </ogc:PropertyIsLike>
      </ogc:Filter>
    </csw:Constraint>
  </csw:Query>
</csw:GetRecords>
``` |
| **Response** | ```
<csw:GetRecordsResponse xmlns:csw="http://www.opengis.net/cat/csw"
xmlns:dc="http://purl.org/dc/elements/1.1/"
xmlns:xs="http://www.w3.org/2001/XMLSchema"
xmlns:ogc="http://www.opengis.net/ogc"
xmlns:ows="http://www.opengis.net/ows">
        <csw:SearchStatus timestamp="2005-09-16T13:51:14.862-
07:00" status="subset"></csw:SearchStatus>
        <csw:SearchResults elementSet="summary"
recordSchema="OGCCORE" numberOfRecordsMatched="0"
numberOfRecordsReturned="2" nextRecord="3">
          <csw:SummaryRecord>
            <dc:identifier>{F02C748C-1DD1-11B2-AD9E-
C04BF54CBC66}</dc:identifier>
            <dc:type>liveData</dc:type>
            <dc:title>Delaware Census 2000 SF1 WMS
Services</dc:title>
            <dct:modified
xmlns:dct="http://purl.org/dc/terms/">2005-08-18
13:56:54</dct:modified>
            <dct:spatial
xmlns:dct="http://purl.org/dc/terms/">northlimit=39.8391090098384;
eastlimit=-74.9758900352417; southlimit=38.4504440731142; westlimit=-
75.7896970619304;</dct:spatial>
          </csw:SummaryRecord>
          <csw:SummaryRecord>
            <dc:identifier>{F7C117AF-7034-45CC-8CD2-
12C1C0A44AD9}</dc:identifier>
            <dc:type>offlineData</dc:type>
            <dc:title>Santa Clara County Railroads</dc:title>
            <dct:modified
xmlns:dct="http://purl.org/dc/terms/">2005-09-13
16:50:50</dct:modified>
            <dct:spatial
xmlns:dct="http://purl.org/dc/terms/">northlimit=37.4652960255723;
eastlimit=-121.510846067468; southlimit=36.8905579767524; westlimit=-
122.170540069468;</dct:spatial>
          </csw:SummaryRecord>
        </csw:SearchResults>
</csw:GetRecordsResponse>
``` |
| **Title** | |
| **KVP** | N/A |
| **POST** | ```
<csw:GetRecords xmlns:csw="http://www.opengis.net/cat/csw"
xmlns:ogc="http://www.opengis.net/ogc"
xmlns:ows="http://www.opengis.net/ows" version="2.0.0" service="csw"
xmlns:dc="http://purl.org/dc/elements/1.1/">
  <csw:Query typeNames="csw:Record">
    <csw:ElementSetName>summary</csw:ElementSetName>
    <csw:Constraint version="1.0.0">
      <ogc:Filter xmlns:ogc="http://www.opengis.net/ogc">
        <ogc:PropertyIsLike>
          <ogc:PropertyName>Title</ogc:PropertyName>
          <ogc:Literal>California</ogc:Literal>
``` |

```
                            </ogc:PropertyIsLike>
                          </ogc:Filter>
                        </csw:Constraint>
                      </csw:Query>
                    </csw:GetRecords>
```

Subject

KVP	N/A

POST	`<csw:GetRecords xmlns:csw="http://www.opengis.net/cat/csw"`
	`xmlns:ogc="http://www.opengis.net/ogc"`
	`xmlns:ows="http://www.opengis.net/ows" version="2.0.0" service="csw"`
	`xmlns:dc="http://purl.org/dc/elements/1.1/">`
	`  <csw:Query typeNames="csw:Record">`
	`    <csw:ElementSetName>summary</csw:ElementSetName>`
	`    <csw:Constraint version="1.0.0">`
	`      <ogc:Filter xmlns="http://www.opengis.net/ogc">`
	`        <ogc:PropertyIsEqualTo>`
	`          <ogc:PropertyName>Subject</ogc:PropertyName>`
	`          <ogc:Literal>inlandWaters</ogc:Literal>`
	`        </ogc:PropertyIsEqualTo>`
	`      </ogc:Filter>`
	`    </csw:Constraint>`
	`  </csw:Query>`
	`</csw:GetRecords>`

Format

This request searches for data with the format "liveData" – this includes ArcIMS Image, ArcIMS Feature, and WMS services – and that also contain the keyword "wms".

KVP	N/A

POST	`<csw:GetRecords xmlns:csw="http://www.opengis.net/cat/csw"`
	`xmlns:ogc="http://www.opengis.net/ogc"`
	`xmlns:ows="http://www.opengis.net/ows" version="2.0.0" service="csw"`
	`xmlns:dc="http://purl.org/dc/elements/1.1/">`
	`  <csw:Query typeNames="csw:Record">`
	`    <csw:ElementSetName>summary</csw:ElementSetName>`
	`    <csw:Constraint version="1.0.0">`
	`      <ogc:Filter>`
	`        <ogc:And>`
	`          <ogc:PropertyIsEqualTo>`
	`            <ogc:PropertyName>Format</ogc:PropertyName>`
	`            <ogc:Literal>liveData</ogc:Literal>`
	`          </ogc:PropertyIsEqualTo>`
	`          <ogc:PropertyIsLike wildCard="" escape="" singleChar="">`
	`            <ogc:PropertyName>AnyText</ogc:PropertyName>`
	`            <ogc:Literal>wms</ogc:Literal>`
	`          </ogc:PropertyIsLike>`
	`        </ogc:And>`
	`      </ogc:Filter>`
	`    </csw:Constraint>`
	`  </csw:Query>`
	`</csw:GetRecords>`

Modified

KVP	N/A

POST	`<csw:GetRecords xmlns:csw="http://www.opengis.net/cat/csw"`
	`xmlns:ogc="http://www.opengis.net/ogc"`
	`xmlns:ows="http://www.opengis.net/ows" version="2.0.0" service="csw"`
	`xmlns:dc="http://purl.org/dc/elements/1.1/">`
	`  <csw:Query typeNames="csw:Record">`
	`    <csw:ElementSetName>summary</csw:ElementSetName>`
	`    <csw:Constraint version="1.0.0">`
	`      <ogc:Filter xmlns="http://www.opengis.net/ogc">`
	`        <ogc:PropertyIsGreaterThan>`
	`          <ogc:PropertyName>Modified</ogc:PropertyName>`
	`          <ogc:Literal>2004-02-01</ogc:Literal>`
	`        </ogc:PropertyIsGreaterThan>`

| | ```
          </ogc:Filter>
        </csw:Constraint>
      </csw:Query>
  </csw:GetRecords>
``` |
| **Envelope** | |
| **KVP** | ```
N/A
``` |
| **POST** | ```
<csw:GetRecords xmlns:csw="http://www.opengis.net/cat/csw"
xmlns:ogc="http://www.opengis.net/ogc"
xmlns:ows="http://www.opengis.net/ows" version="2.0.0" service="csw"
xmlns:dc="http://purl.org/dc/elements/1.1/">
  <csw:Query typeNames="csw:Record">
    <csw:ElementSetName>summary</csw:ElementSetName>
    <csw:Constraint version="1.0.0">
      <ogc:Filter xmlns="http://www.opengis.net/ogc"
xmlns:gml="http://www.opengis.net/gml">
        <ogc:BBOX>
          <ogc:PropertyName>Geometry</ogc:PropertyName>
          <gml:Box
srsName="http://www.opengis.net/gml/srs/epsg.xml#4326">

<gml:coordinates>13.0983,31.589935.5472,42.8143,180</gml:coordinates>
          </gml:Box>
        </ogc:BBOX>
      </ogc:Filter>
    </csw:Constraint>
  </csw:Query>
</csw:GetRecords>
``` |

3.2.4   GetRecordById

| **KVP** | ```
?REQUEST=GetRecordById&service=CSW&version=2.0.0&Id=B6A0EC8C-
826D-11D8-BADF-080020ECC953
``` |
| **POST** | ```
<csw:GetRecordById xmlns:csw="http://www.opengis.net/cat/csw"
version="2.0.0" service="csw">
  <csw:Id>B6A0EC8C-826D-11D8-BADF-080020ECC953</csw:Id>
</csw:GetRecordById>
``` |

3.3   Responses

3.3.1   GetRecords

When the GOS database is queried, the exact number of records matching the search criteria is not computed. Only the maximum number of documents requested are counted and returned. Because of this, the numberOfRecordsMatched will always be equal to "0" and the status attribute will always have value of "subset" as in the following response.

```
<csw:GetRecordsResponse xmlns:csw="http://www.opengis.net/cat/csw"
xmlns:dc="http://purl.org/dc/elements/1.1/"
xmlns:xs="http://www.w3.org/2001/XMLSchema" xmlns:ogc="http://www.opengis.net/ogc"
xmlns:ows="http://www.opengis.net/ows">
  <csw:SearchStatus timestamp="2005-09-16T13:51:14.862-07:00"
status="subset"></csw:SearchStatus>
  <csw:SearchResults elementSet="summary" recordSchema="OGCCORE"
numberOfRecordsMatched="0" numberOfRecordsReturned="2" nextRecord="3">
    <csw:SummaryRecord>
      <dc:identifier>{F02C748C-1DD1-11B2-AD9E-C04BF54CBC66}</dc:identifier>
      <dc:type>liveData</dc:type>
      <dc:title>Delaware Census 2000 SF1 WMS Services</dc:title>
      <dct:modified xmlns:dct="http://purl.org/dc/terms/">2005-08-18
13:56:54</dct:modified>
      <dct:spatial
xmlns:dct="http://purl.org/dc/terms/">northlimit=39.8391090098384; eastlimit=-
74.9758900352417; southlimit=38.4504440731142; westlimit=-
75.7896970619304;</dct:spatial>
    </csw:SummaryRecord>
    <csw:SummaryRecord>
      <dc:identifier>{F7C117AF-7034-45CC-8CD2-12C1C0A44AD9}</dc:identifier>
      <dc:type>offlineData</dc:type>
      <dc:title>Santa Clara County Railroads</dc:title>
      <dct:modified xmlns:dct="http://purl.org/dc/terms/">2005-09-13
16:50:50</dct:modified>
      <dct:spatial
xmlns:dct="http://purl.org/dc/terms/">northlimit=37.4652960255723; eastlimit=-
121.510846067468; southlimit=36.8905579767524; westlimit=-
122.170540069468;</dct:spatial>
    </csw:SummaryRecord>
  </csw:SearchResults>
</csw:GetRecordsResponse>
```