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Entwurf

Geoinformation – Raumbezogene API für Features – Teil 1: Kern; Englische Fassung prEN ISO 19168-1:2020

Geographic information – Geospatial API for features – Part 1: Core; English version prEN ISO 19168-1:2020

Information géographique – API géospatiale pour les entités – Partie 1: Profil minimal; Version anglaise prEN ISO 19168-1:2020

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Nationales Vorwort

Dieses Dokument (prEN ISO 19168-1:2020) wurde vom Technischen Komitee ISO/TC 211 „Geographic information/Geomatics“ in Zusammenarbeit mit dem Technischen Komitee CEN/TC 287 „Geoinformation“, dessen Sekretariat von BSI (Vereinigtes Königreich) gehalten wird, erarbeitet.

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Für die in diesem Dokument zitierten Dokumente wird im Folgenden auf die entsprechenden deutschen Dokumente hingewiesen:

ISO 19142:2010	siehe	DIN EN ISO 19142:2011-04
ISO 8601-2	siehe	DIN ISO 8601-2

Aktuelle Informationen zu diesem Dokument können über die Internetseiten von DIN (www.din.de) durch eine Suche nach der Dokumentennummer aufgerufen werden.

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Nationaler Anhang NA
(informativ)

Begriffe

Die Benennungen der folgenden Begriffe und Abkürzungen sind identisch mit den Benennungen in der englischen Fassung.

3 Begriffe und Abkürzungen

Für die Anwendung dieses Dokuments gelten die folgenden Begriffe.

ISO und IEC stellen terminologische Datenbanken für die Verwendung in der Normung unter den folgenden Adressen bereit:

— ISO Online Browsing Platform: verfügbar unter https://www.iso.org/obp

— IEC Electropedia: verfügbar unter http://www.electropedia.org/

3.1.1
Datensatz, en: dataset
Sammlung von Daten

Anmerkung 1 zum Begriff: Veröffentlicht oder kuratiert von einem einzigen Agenten und in einem oder mehreren Formaten zugänglich oder als Download verfügbar.

Anmerkung 2 zum Begriff: Die Nutzung von „Sammlung“ nach dieser Definition von DCAT ist breiter gefasst als die Nutzung des Ausdruckes „Sammlung“ in diesem Dokument. Siehe die Definition von *Featuresammlung* (3.1.4).

[QUELLE: DCAT [8], 6.6, modifiziert – Die Definition wurde in Definition und Anmerkung 1 zum Begriff aufgeteilt; Anmerkung 2 zum Begriff wurde hinzugefügt.]

3.1.2
Verteilung, en: distribution
spezifische Darstellung eines *Datensatzes* (3.1.1)

BEISPIEL Eine herunterladbare Datei, ein RSS-Feed oder eine API.

[QUELLE: DCAT [8], 6.7, modifiziert – Die Definition wurde gekürzt.]

3.1.3
Feature, en: feature
Abstraktion eines Phänomens der realen Welt

Anmerkung 1 zum Begriff: Die Erläuterungen zu räumlichen Dingen, Features und Geometrie im Dokument „Spatial Data on the Web Best Practices“ [6] von W3C/OGC stellen mehr Details zur Verfügung.

[QUELLE: ISO 19101-1:2014, 4.1.11, modifiziert – Die Anmerkung 1 zum Begriff wurde hinzugefügt.]

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3.1.4
Featuresammlung
Sammlung
(en: feature collection)
Satz von *Features* (3.1.3) aus einem *Datensatz* (3.1.1)

3.1.5
Web API
API mit einer auf Web-Technologien beruhenden Architektur

Anmerkung 1 zum Begriff: Weitere Einzelheiten können „Best Practice 24: Use Web Standards as the foundation of APIs“ in „Data on the Web Best Practices“ [7] von W3C entnommen werden.

[QUELLE: DWBP [7], 8.10.1, modifiziert – Die Definition wurde der Eindeutigkeit halber umformuliert.]

3.1 Abkürzungen

API	Application Programming Interface
CORS	Cross-Origin Resource Sharing
CRS	Coordinate Reference System
HTTP	Hypertext Transfer Protocol
HTTPS	Hypertext Transfer Protocol Secure
IANA	Internet Assigned Numbers Authority
OGC	Open Geospatial Consortium
TRS	Temporal Coordinate Reference System
URI	Uniform Resource Identifier
YAML	YAML Ain’t Markup Language

Nationaler Anhang NB
(informativ)

Literaturhinweise

DIN EN ISO 19142:2011-04, *Geoinformation — Web Feature Service (ISO 19142:2010); Deutsche Fassung EN ISO 19142:2010*

DIN ISO 8601-2, *Datenelemente und Austauschformate — Informationsaustausch — Darstellung von Datum und Uhrzeit — Teil 2: Erweiterungen (ISO/DIS 8601-2:2016)*

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 211, *Geographic information/Geomatics*.

A list of all parts in the ISO 19168 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

OGC API standards[9] define modular API building blocks to spatially enable Web APIs in a consistent manner. The OpenAPI specification is used to define the API building blocks.

The OGC API family of standards is organized by resource type. This document specifies the fundamental API building blocks for interacting with features. The spatial data community uses the term 'feature' for things in the real world that are of interest.

For those not familiar with the term 'feature,' the explanations on Spatial Things, Features and Geometry in the W3C/OGC Spatial Data on the Web Best Practice document provide more detail.

OGC API Features provides API building blocks to create, modify and query features on the Web. OGC API Features is comprised of multiple parts, each of them a separate standard. This document, the "Core", specifies the core capabilities and is restricted to fetching features where geometries are represented in the coordinate reference system, WGS 84, with axis order longitude/latitude. Additional capabilities that address more advanced needs will be specified in additional parts. Examples include support for creating and modifying features, more complex data models, richer queries, additional coordinate reference systems, multiple datasets and collection hierarchies.

By default, every API implementing this document will provide access to a single dataset. Rather than sharing the data as a complete dataset, the OGC API Features standards offer direct, fine-grained access to the data at the feature (object) level.

The API building blocks specified in this document are consistent with the architecture of the Web. In particular, the API design is guided by the IETF HTTP/HTTPS RFCs, the W3C Data on the Web Best Practices, the W3C/OGC Spatial Data on the Web Best Practices and the emerging OGC Web API Guidelines. A particular example is the use of the concepts of datasets and dataset distributions as defined in DCAT and used in schema.org.

This document specifies discovery and query operations that are implemented using the HTTP GET method. Support for additional methods (in particular POST, PUT, DELETE, PATCH) will be specified in additional parts.

Discovery operations enable clients to interrogate the API, including the API definition and metadata about the feature collections provided by the API, to determine the capabilities of the API and retrieve information about available distributions of the dataset.

Query operations enable clients to retrieve features from the underlying data store based upon simple selection criteria, defined by the client.

A subset of the OGC API family of standards is expected to be published by ISO. For example, this document is published by ISO as ISO 19168-1. To reflect that only a subset of the OGC API standards will be published by ISO and to avoid using organization names in the titles of ISO standards, standards from the "OGC API" series are published by ISO as "Geospatial API," i.e. the title of this document in OGC is "OGC API — Features — Part 1: Core" and the title in ISO is "Geographic Information — Geospatial API for features — Part 1: Core."

For simplicity, this document consistently uses:

— "OGC API" to refer to the family of standards for geospatial Web APIs that in ISO is published as "Geospatial API;"

— "OGC API - Features" to refer to the multipart standard for features that in ISO is published as ISO 19168 / "Geographic Information - Geospatial API for features;"

— "OGC API - Features — Part 1: Core" to refer to this document that in ISO is published as ISO 19168-1 / "Geographic Information - Geospatial API for features — Part 1: Core."

This document defines the resources listed in Table 1. For an overview of the resources, see 7.1.

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Table 1 — Overview of resources, applicable HTTP methods and links to the document sections

Resource	Path	HTTP method	Document reference
Landing page	/	GET	7.2 API landing page
Conformance declaration	/conformance	GET	7.4 Declaration of conformance classes
Feature collections	/collections	GET	7.13 Feature collections
Feature collection	/collections/{collectionId}	GET	7.14 Feature collection
Features	/collections/{collectionId}/items	GET	7.15 Features
Feature	/collections/{collectionId}/items/{featureId}	GET	7.16 Feature

Implementations of OGC API Features are intended to support two different approaches for how clients can use the API. For further information, see 6.1.

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Geographic information — Geospatial API for features —

Part 1: Core

1 Scope

This document specifies the behaviour of Web APIs that provide access to features in a dataset in a manner independent of the underlying data store. This document defines discovery and query operations.

Discovery operations enable clients to interrogate the API, including the API definition and metadata about the feature collections provided by the API, to determine the capabilities of the API and retrieve information about available distributions of the dataset.

Query operations enable clients to retrieve features from the underlying data store based upon simple selection criteria, defined by the client.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Internet Engineering Task Force (IETF), RFC 2818: **HTTP Over TLS** [online]. Edited by E. Rescorla. 2000 [viewed 2020-03-16]. Available at https://tools.ietf.org/rfc/rfc2818.txt

Internet Engineering Task Force (IETF), RFC 3339:2002: **Date and Time on the Internet: Timestamps** [online]. Edited by G. Klyne, C. Newman. 2002 [viewed 2020-03-16]. Available at https://tools.ietf.org/rfc/rfc3339.txt

Internet Engineering Task Force (IETF), RFC 7230 to RFC 7235: **HTTP/1.1** [online]. Edited by R. Fielding, J. Reschke, Y. Lafon, M. Nottingham. 2014 [viewed 2020-04-28]. Available at https://tools.ietf.org/rfc/rfc7230.txt, https://tools.ietf.org/rfc/rfc7231.txt, https://tools.ietf.org/rfc/rfc7232.txt, https://tools.ietf.org/rfc/rfc7233.txt, https://tools.ietf.org/rfc/rfc7234.txt, and https://tools.ietf.org/rfc/rfc7235.txt

Internet Engineering Task Force (IETF), RFC 8288:2017: **Web Linking** [online]. Edited by M. Nottingham. 2017 [viewed 2020-03-16]. Available at https://tools.ietf.org/rfc/rfc8288.txt

OpenAPI Initiative (OAI), **OpenAPI Specification 3.0** [online]. 2020 [viewed 2020-03-16]. The latest patch version at the time of publication of this standard was 3.0.3, available at http://spec.openapis.org/oas/v3.0.3

3 Terms, definitions and abbreviated terms

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

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3.1.1
dataset
collection of data

Note 1 to entry: Published or curated by a single agent, and available for access or download in one or more formats.

Note 2 to entry: The use of 'collection' in the definition from DCAT is broader than the use of the term collection in this document. See the definition of *feature collection* (3.1.4).

[SOURCE: DCAT[8], 6.6, modified — Definition split into definition and Note 1 to entry; Note 2 to entry has been added]

3.1.2
distribution
specific representation of a *dataset* (3.1.1)

EXAMPLE A downloadable file, an RSS feed or an API.

[SOURCE: DCAT[8], 6.7, modified — Definition has been shortened]

3.1.3
feature
abstraction of real-world phenomena

Note 1 to entry: The explanations on Spatial Things, Features and Geometry in the W3C/OGC Spatial Data on the Web Best Practice document[6] provide more detail.

[SOURCE: ISO 19101-1:2014, 4.1.11, modified — Note 1 to entry has been added]

3.1.4
feature collection
collection
set of *features* (3.1.3) from a *dataset* (3.1.1)

3.1.5
Web API
API using an architectural style that is founded on the technologies of the Web

Note 1 to entry: Best Practice 24: Use Web Standards as the foundation of APIs in the W3C Data on the Web Best Practices[7] provides more detail.

[SOURCE: DWBP[7], 8.10.1, modified — Rephrased for clarity]

3.1 Abbreviated terms

API Application Programming Interface

CORS Cross-Origin Resource Sharing

CRS Coordinate Reference System

HTTP Hypertext Transfer Protocol

HTTPS Hypertext Transfer Protocol Secure

IANA Internet Assigned Numbers Authority

OGC Open Geospatial Consortium

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TRS Temporal Coordinate Reference System

URI Uniform Resource Identifier

YAML YAML Ain't Markup Language

4 Conformance

This document defines six requirements/conformance classes.

The standardization targets of all conformance classes are "Web APIs."

The main requirements class is:

— Core.

The Core specifies requirements that all Web APIs have to implement.

The Core does not mandate a specific encoding or format for representing features or feature collections. Four requirements classes depend on the Core and specify representations for these resources in commonly used encodings for spatial data on the web:

— HTML,

— GeoJSON,

— Geography Markup Language (GML), Simple Features Profile, Level 0, and

— Geography Markup Language (GML), Simple Features Profile, Level 2.

None of these encodings are mandatory and an implementation of the Core may also decide to implement none of them, but to implement another encoding instead.

That said, the Core requirements class includes recommendations to support, where practical, HTML and GeoJSON as encodings. Clause 6 (Overview) includes a discussion about the recommended encodings.

The Core does not mandate any encoding or format for the formal definition of the API either. One option is the OpenAPI 3.0 specification and a requirements class has been specified for OpenAPI 3.0, which depends on the Core:

— OpenAPI specification 3.0.

As with the feature encodings, an implementation of the Core requirements class may also decide to use other API definition representations in addition or instead of an OpenAPI 3.0 definition. Examples for alternative API definitions: OpenAPI 2.0 (Swagger), future versions of the OpenAPI specification, an OWS Common 2.0 capabilities document or WSDL.

The Core is intended to be a minimal useful API for fine-grained read-access to a spatial dataset where geometries are represented in the coordinate reference system WGS 84 with axis order longitude/latitude.

Additional capabilities, e.g. support for transactions, complex data structures, rich queries, other coordinate reference systems, subscription/notification, and returning aggregated results, may be specified in future parts of the OGC API Features series or as vendor-specific extensions.

Conformance with this document shall be checked using all the relevant tests specified in Annex A (normative) of this document. The framework, concepts, and methodology for testing, and the criteria to be achieved to claim conformance are specified in the OGC Compliance Testing Policies and Procedures and the OGC Compliance Testing web site. Table 2 provides conformance class URIs

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Table 2 — Conformance class URIs

Conformance class	URI
Core	http://www.opengis.net/spec/ogcapi-features-1/1.0/conf/core
HTML	http://www.opengis.net/spec/ogcapi-features-1/1.0/conf/html
GeoJSON	http://www.opengis.net/spec/ogcapi-features-1/1.0/conf/geojson
GML, Simple Features Profile, Level 0	http://www.opengis.net/spec/ogcapi-features-1/1.0/conf/gmlsf0
GML, Simple Features Profile, Level 2	http://www.opengis.net/spec/ogcapi-features-1/1.0/conf/gmlsf2
OpenAPI Specification 3.0	http://www.opengis.net/spec/ogcapi-features-1/1.0/conf/oas30

5 Conventions

5.1 Identifiers

The normative provisions in this document are denoted by the URI `http://www.opengis.net/spec/ogcapi-features-1/1.0`.

All requirements and conformance tests that appear in this document are denoted by partial URIs which are relative to this base.

5.2 Link relations

To express relationships between resources, RFC 8288 (Web Linking) is used.

The following registered link relation types[3] are used in this document.

— **alternate**: Refers to a substitute for this context.

— **collection**: The target IRI points to a resource which represents the collection resource for the context IRI.

— **describedby**: Refers to a resource providing information about the link's context.

— **item**: The target IRI points to a resource that is a member of the collection represented by the context IRI.

— **next**: Indicates that the link's context is a part of a series, and that the next in the series is the link target.

— **license**: Refers to a license associated with this context.

— **prev**: Indicates that the link's context is a part of a series, and that the previous in the series is the link target.

  — This relation is only used in examples.

— **self**: Conveys an identifier for the link's context.

— **service-desc**: Identifies service description for the context that is primarily intended for consumption by machines.

  — API definitions are considered service descriptions.

— **service-doc**: Identifies service documentation for the context that is primarily intended for human consumption.

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In addition, the following link relation types are used for which no applicable registered link relation type could be identified.

— **items**: Refers to a resource that is comprised of members of the collection represented by the link's context.

— **conformance**: Refers to a resource that identifies the specifications that the link's context conforms to.

— **data**: Refers to the root resource of a dataset in an API.

Each resource representation includes an array of links. Implementations are free to add additional links for all resources provided by the API. For example, an **enclosure** link could reference a bulk download of a collection. Or a **related** link on a feature could reference a related feature.

5.3 Use of HTTPS

For simplicity, this document in general only refers to the HTTP protocol. This is not meant to exclude the use of HTTPS but is a shorthand notation for "HTTP or HTTPS." In fact, most servers are expected to use HTTPS, not HTTP.

5.4 HTTP URIs

This document does not restrict the lexical space of URIs used in the API beyond the requirements of the HTTP and URI Syntax IETF RFCs. If URIs include reserved characters that are delimiters in the URI subcomponent, these have to be percent-encoded. See RFC 3986:2005, Clause 2[2] for details.

5.5 API definition

5.5.1 General remarks

Good documentation is essential for every API so that developers can more easily learn how to use the API. In the best case, documentation will be available in HTML and in a format that can be processed by software to connect to the API.

This document specifies requirements and recommendations for APIs that share feature data and that want to follow a standard way of doing so. In general, APIs will go beyond the requirements and recommendations stated in this document, or other parts of the OGC API series of standards, and will support additional operations, parameters, etc. that are specific to the API or the software tool used to implement the API.

5.5.2 Role of OpenAPI

This document uses OpenAPI 3.0 fragments as examples and to formally state requirements. However, using OpenAPI 3.0 is not required for implementing a server.

Therefore, the Core requirements class only requires that an API definition be provided and linked from the landing page.

A separate requirements class is specified for API definitions that follow the OpenAPI specification 3.0. This does not preclude that in the future or in parallel, other versions of OpenAPI or other API descriptions are provided by a server.

NOTE This approach is used to avoid lock-in to a specific approach to defining an API as it is expected that the API landscape will continue to evolve.

In this document, fragments of OpenAPI definitions are shown in YAML (YAML Ain't Markup Language) [1] since YAML is easier to read than JSON and is typically used in OpenAPI editors. YAML is described by its authors as a human friendly data serialization standard for all programming languages.

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5.5.3 References to OpenAPI components in normative statements

Some normative statements (requirements, recommendations and permissions) use a phrase that a component in the API definition of the server must be "based upon" a schema or parameter component in the OGC schema repository.

In this case, the following changes to the pre-defined OpenAPI component are permitted.

— If the server supports an XML encoding, `xml` properties may be added to the relevant OpenAPI schema components.

— The range of values of a parameter or property may be extended (additional values) or constrained (if a subset of all possible values is applicable to the server). An example for a constrained range of values is to explicitly specify the supported values of a string parameter or property using an enum.

— The default value of a parameter may be changed or added unless a requirement explicitly prohibits this.

— Additional properties may be added to the schema definition of a Response Object.

— Informative text may be changed or added, e.g. comments or description properties.

For API definitions that do not conform to the OpenAPI Specification 3.0, the normative statement should be interpreted in the context of the API definition language used.

5.5.4 Paths in OpenAPI definitions

All paths in an OpenAPI definition are relative to a base URL of the server.

EXAMPLE 1 URL of the OpenAPI definition.

If the OpenAPI Server Object looks like this:

```
servers:
  - url: https://dev.example.org/
    description: Development server
  - url: https://data.example.org/
    description: Production server
```

The path "/mypath" in the OpenAPI definition of a Web API would be the URL `https://data.example.org/mypath` for the production server.

5.5.5 Reusable OpenAPI components

Reusable components for OpenAPI definitions for implementations of OGC API Features are referenced from this document.

6 Overview

6.1 Design considerations

While this is the first version of the OGC API Features series, the fine-grained access to features over the Web has been supported by the OGC Web Feature Service (WFS) standard (in ISO: ISO 19142) and many implementations of that standard for many years. WFS uses a Remote-Procedure-Call-over-HTTP architectural style using XML for any payloads. When the WFS standard was originally designed in the late 1990s and early 2000s this was the state-of-the-art.

OGC API Features supports similar capabilities, but uses a modernized approach that follows the current Web architecture and in particular the W3C/OGC best practices for sharing Spatial Data on the Web as well as the W3C best practices for sharing Data on the Web.

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Beside the general alignment with the architecture of the Web (e.g., consistency with HTTP/HTTPS, hypermedia controls), another goal for OGC API Features is modularization. This goal has several facets, as described below.

— Clear separation between core requirements and more advanced capabilities. This document specifies the core requirements that are relevant for almost everyone who wants to share or use feature data on a fine-grained level. Additional capabilities that several communities are using today will be specified as extensions in additional parts of the OGC API Features series.

— Technologies that change more frequently are decoupled and specified in separate modules ("requirements classes" in OGC terminology). This enables, for example, the use/re-use of new encodings for spatial data or API descriptions.

— Modularization is not just about features or resources, but about providing building blocks for fine-grained access to spatial data that can be used in Web APIs in general. In other words, a server supporting OGC API Features is not intended to implement just a standalone Features API. A corollary of this is that the same Web API may also implement other standards of the OGC API family that support additional resource types; for example, tile resources could provide access to the same features, but organized in a spatial partitioning system; or map resources could process the features and render them as map images.

Implementations of OGC API Features are intended to support two different approaches for how clients can use the API.

In the first approach, clients are implemented with knowledge about this document and its resource types. The clients navigate the resources based on this knowledge and based on the responses provided by the API. The API definition may be used to determine details, e.g., on filter parameters, but this may not be necessary depending on the needs of the client. These are clients that are in general able to use multiple APIs as long as they implement OGC API Features.

The other approach targets developers that are not familiar with the OGC API standards, but want to interact with spatial data provided by an API that happens to implement OGC API Features. In this case the developer studies and uses the API definition, typically an OpenAPI document, to understand the API and implement the code to interact with the API. This assumes familiarity with the API definition language and the related tooling, but it should not be necessary to study the OGC API standards.

6.2 Encodings

This document does not mandate any encoding or format for representing features or feature collections. In addition to rules for HTML, the standard encoding for Web content, rules for commonly used encodings for spatial data on the Web are provided (GeoJSON, GML).

None of these encodings is mandatory and an implementation of the Core requirements class may implement none of them but implement another encoding instead.

Support for HTML is recommended as HTML is the core language of the World Wide Web. A server that supports HTML will support browsing the data with a web browser and will enable search engines to crawl and index the dataset.

GeoJSON is a commonly used format that is simple to understand and well supported by tools and software libraries. Since most Web developers are comfortable with using a JSON-based format, this version of OGC API Features recommends supporting GeoJSON for encoding feature data, if the feature data can be represented in GeoJSON for the intended use.

Some examples for cases that are out-of-scope of GeoJSON are:

— when solids are used for geometries (e.g., in a 3D city model),

— geometries that include non-linear curve interpolations that cannot be simplified (e.g., use of arcs in authoritative geometries),

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— geometries that have to be represented in a coordinate reference system (CRS) that is not based on WGS 84 longitude/latitude (e.g., an authoritative national CRS),

— features that have more than one geometric property.

In addition to HTML and GeoJSON, a significant volume of feature data is available in XML-based formats, notably GML. GML supports more complex requirements than GeoJSON and does not have any of the limitations mentioned in the above bullets, but as a result, GML is more complex to handle for both servers and clients. Requirements classes for GML are, therefore, included in this document. We expect that these will typically be supported by servers where users are known to expect feature data in XML/GML.

The recommendations for using HTML and GeoJSON reflect the importance of HTML and the current popularity of JSON-based data formats. As the practices in the Web community evolve, the recommendations will likely be updated in future versions of this document to provide guidance on using other encodings.

This document does not provide any guidance on other encodings. The supported encodings, or more precisely the media types of the supported encodings, can be determined from the API definition. The desired encoding is selected using HTTP content negotiation.

For example, if the server supports GeoJSON Text Sequences, an encoding that is based on JSON text sequences and GeoJSON to support streaming by making the data incrementally parseable, the media type `application/geo+json-seq` would be used.

In addition, HTTP supports compression and therefore the standard HTTP mechanisms can be used to reduce the size of the messages between the server and the client.

6.3 Examples

This document uses a simple example throughout the document: The dataset contains buildings and the server provides access to them through a single feature collection ("buildings") and two encodings, GeoJSON and HTML.

The buildings have a few (optional) properties: the polygon geometry of the building footprint, a name, the function of the building (residential, commercial or public use), the floor count and the timestamp of the last update of the building feature in the dataset.

In addition to the examples included in the document, additional and more comprehensive examples are available at http://schemas.opengis.net/ogcapi/features/part1/1.0/examples.

7 Requirements class "Core"

7.1 Overview

Requirements class	
http://www.opengis.net/spec/ogcapi-features-1/1.0/req/core	
Target type	Web API
Dependency	RFC 7230 to RFC 7235 (HTTP/1.1)
Dependency	RFC 2818 (HTTP over TLS)
Dependency	RFC 3339 (Date and Time on the Internet: Timestamps)
Dependency	RFC 8288 (Web Linking)

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A server that implements this requirements class provides access to the features in a dataset.

NOTE 1 Other parts of this document can define API extensions that support multiple datasets. The statement that the features are from "a dataset" is not meant to preclude such extensions. It reflects that this document does not specify how the API publishes features or other spatial data from multiple datasets.

The entry point is a `Landing page` (path /).

NOTE 2 All paths (e.g., /) are relative. If the API covers other resources beyond those specified in this document, the landing page can also be, for example, a sub-resource of the base URL of the API.

The `Landing page` provides links to:

— the `API definition` (link relations `service-desc` and `service-doc`),

— the `Conformance declaration` (path /`conformance`, link relation `conformance`), and

— the `Collections` (path /`collections`, link relation `data`).

The `API definition` describes the capabilities of the server that can be used by clients to connect to the server or by development tools to support the implementation of servers and clients. Accessing the `API definition` using HTTP GET returns a description of the API. The `API definition` can be hosted on the API server(s) or a separate server.

The `Conformance declaration` states the conformance classes from standards or community specifications, identified by a URI, to which the API conforms. Clients can, but are not required to, use this information. Accessing the Conformance declaration using HTTP GET returns the list of URIs of conformance classes implemented by the server.

The data is organized into one or more collections. `Collections` provides information about and access to the collections.

This document specifies requirements only for collections consisting of features, i.e., each collection considered by this document is a feature collection. Other OGC API standards may add requirements for other types of collections.

NOTE 3 To support the future use of datasets with items that are not features, the term "feature" has not been added in the names of the resource types or their paths.

This document does not include any requirements about how the features in the dataset have to be aggregated into collections. A typical approach is to aggregate by feature type but any other approach that fits the dataset or the applications using this distribution may also be used.

Accessing `Collections` using HTTP GET returns a response that contains at least the list of collections. For each `Collection`, a link to the items in the collection (`Features`, path /`collections`/`{collectionId}`/`items`, link relation `items`) as well as key information about the collection. This information includes:

— a local identifier for the collection that is unique for the dataset;

— a list of coordinate reference systems (CRS) in which geometries may be returned by the server. The first CRS is the default coordinate reference system (in the *Core*, the default is always WGS 84 with axis order longitude/latitude);

— an optional title and description for the collection;

— an optional extent that can be used to provide an indication of the spatial and temporal extent of the collection, typically derived from the data;

— an optional indicator about the type of the items in the collection (the default value, if the indicator is not provided, is 'feature').

The `Collection` resource is also available at path `/collections/{collectionId}`, often with more details than included in the `Collections` response.

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Each `Collection` that is a feature collection consists of features. This document only discusses the behaviour of feature collections.

Each feature in a dataset is part of exactly one collection.

Accessing the `Features` using HTTP GET returns a document consisting of features in the collection. The features included in the response are determined by the server based on the query parameters of the request. To support access to larger collections without overloading the client, the API supports paged access with links to the next page, if more features are selected than the page size.

A `bbox` or `datetime` parameter may be used to select only a subset of the features in the collection (the features that are in the bounding box or time interval). The `bbox` parameter also matches all features in the collection that are not associated with a location. The `datetime` parameter also matches all features in the collection that are not associated with a time stamp or interval.

The `limit` parameter may be used to control the subset of the selected features that should be returned in the response, the page size.

Each page may include information about the number of selected and returned features (`numberMatched` and `numberReturned`) as well as links to support paging (link relation next).

Each `Feature` (`path /collections/{collectionId}/items/{featureId}`) is also a separate resource and may be requested individually using HTTP GET.

In addition to the simple path structures described above, where all features are organized in a one-level collection hierarchy, additional parts of the OGC API Feature series are expected to provide alternate access to the features served by the API via additional, deeper collection hierarchies.

7.2 API landing page

7.2.1 Operation

Requirement 1	**/req/core/root-op**
A	The server SHALL support the HTTP GET operation at the path /.

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