

OGC Features and Geometries JSON (JSON-FG)

Clemens Portele

The 120th OGC Member Meeting

15 September 2021

The world's leading and comprehensive
community of experts making location information:



Findable



Accessible



Interoperable



Reusable



- Developers today prefer JSON over XML
- GeoJSON popular and widely supported
- OGC API Features implementations typically support GeoJSON
- But intentional limitations exist in GeoJSON that are an issue for some use cases:
 - Restricted to WGS 84 as Coordinate Reference System
 - Ellipsoidal metrics not supported
 - Points, line strings and polygons – no support for solids
 - Supports spatial, but not temporal geometries

Approach

12 : 45 : 87
FEB - 05 - 3254
167 78 804

OGC

- Develop an OGC Features and Geometries JSON standard addressing the identified limitations
 - Avoid edge cases, focus on capabilities that are useful for many spatial experts
 - Additional capabilities could be added in the future, if there is broad support for the initial OGC Features and Geometries JSON in implementations
- Specify as a superset of GeoJSON
 - i.e., valid GeoJSON is also valid OGC Features and Geometries JSON
 - adding additional top-level members and links in the JSON objects (feature and feature collection)
- No dependency on JSON-LD
 - but for those that want to use JSON-LD, avoid conflicts
- It is not the idea to develop a GML-equivalent for JSON!



MAX - 34 - 685
KL - IT - 3678 - 986

4583

ogc.org |

2995

- Kick-off: June 1st, 2021
- SWG meetings every two weeks
- Proposals for six topics covering the scope in the charter discussed and agreed in the SWG
- Supported by a task in Testbed-17
- Link: <https://github.com/opengeospatial/ogc-feat-geo-json/blob/main/proposals/summary.adoc>
- Start drafting
- **Looking for feedback, in particular from developers**
- Our target is a complete draft by end of 2021 (baseline for more testing and validation)

Identifying the feature types

OGC

12 : 45 : 87
FEB - 05 - 3254
167 78 804

- Features are often categorized by type
 - typically one feature type, but multiple feature types are supported, too
- GIS clients often depend on knowledge about the feature type
 - example: to associate a style to render the feature on a map with the feature
- GeoJSON has no concept of feature types or feature schemas

```
{  
  "type": "Feature",  
  "id": "DENW19AL0000giv5BL",  
  "featureType": "app:building",  
  ...  
  "links": [  
    {  
      "href": "https://inspire.ec.europa.eu/  
              featureconcept/Building",  
      "rel": "type",  
      "title": "This feature is of type 'building'"  
    }  
  ],  
  ...  
}
```

a token for filtering

in addition, a link to the semantic type definition in some registry, if available



MAX - 34 - 685
KL - IT - 3678 - 986



2995



ogc.org | 5

Identifying the schema

12 : 45 : 87
FEB - 05 - 3254
167 78 804

OGC

- Clients can use schemas to validate the JSON document or to derive additional information about the content
- Follow the JSON Schema guidance:
 - *It is RECOMMENDED that instances described by a schema provide a link to a downloadable JSON Schema using the link relation "describedby".*
 - Determine that an instance is a GeoJSON / JSON-FG feature though the canonical URIs of the schemas

```
{  
  ...  
  "links": [  
    {  
      "href": "https://ogc-api.nrw.de/lika/v1/  
              collections/gebaeude_bauwerk/schema",  
      "rel": "describedby",  
      "type": "application/schema+json",  
      "title": "JSON Schema of this document"  
    },  
    {  
      "href": "http://schemas.opengis.net/tbd/  
              Feature.json",  
      "rel": "describedby",  
      "type": "application/schema+json",  
      "title": "This document is a JSON-FG Feature"  
    },  
    {  
      "href": "https://geojson.org/schema/  
              Feature.json",  
      "rel": "describedby",  
      "type": "application/schema+json",  
      "title": "This document is a GeoJSON Feature"  
    }  
  ],  
  ...  
}
```

links to all schemas that the document conforms to



MAX - 34 - 685
KL - IT - 3678 - 986

X 2995

O 4583

ogc.org | 6

Encoding the temporal extent

OGC

12 : 45 : 87
FEB - 05 - 3254
167 78 804

- GeoJSON supports spatial geometries
- Features are often associated with temporal information, too
- OGC API Features supports not only spatial, but also temporal filtering (`datetime` parameter)
- JSON-FG adds support for the most common case
 - associating a feature with a single temporal instant or interval in the Gregorian calendar
 - main use case filtering (time slider) or display without the need to understand the feature schema
 - leveraging ISO 8601 and RFC 3339
- No constraints how this primary temporal geometry is derived from the feature properties

```
{  
  "type": "Feature",  
  ...  
  "when": {  
    "interval": [ "2014-04-24T10:50:18Z", null ]  
  },  
  ...  
  "properties": {  
    "lastChange": "2014-04-24T10:50:18Z",  
    "built": "2012-03",  
    ...  
  }  
}
```

top-level member "when"



MAX - 34 - 685
KL - IT - 3678 - 986

4583

ogc.org | 7

Encoding a spatial geometry

OGC

- GeoJSON supports Simple Features geometries (2D or 2.5D points, line strings, polygons or aggregations of them) in WGS 84
 - A geometry that meet these constraints would still be in the "geometry" member
- Other geometries are added in another top-level member
 - Solid where the boundary is specified using polygons
 - Geometry in other CRSs
 - the CRS is declared in "coord-ref-sys", also supports ad-hoc compound CRS and coordinate epochs for dynamic CRSs
- To support GeoJSON readers a fallback geometry can be added in the "geometry" member

```
{  
  ...  
  "coord-ref-sys": "http://www.opengis.net/def/crs/EPSG/0/  
  5555",  
  "where": {  
    "type": "Polyhedron",  
    "coordinates": [  
      [  
        [  
          [ 479816.67, 5705861.672, 100 ], ...  
          [ 479816.67, 5705861.672, 100 ]  
        ], ...  
      ], ...  
    ], ...  
  },  
  "geometry": {  
    "type": "Polygon",  
    "coordinates": [  
      [  
        [ 8.709204563652449, 51.50352856284526, 100 ], ...  
        [ 8.709204563652449, 51.50352856284526, 100 ]  
      ], ...  
    ], ...  
  },  
  ...  
}
```

top-level member "coord-ref-sys" declares the CRS in the "where" geometry

top-level member "where"

a valid GeoJSON geometry in "geometry"



MAX - 34 - 685
KL - IT - 3678 - 986

4583

ogc.org | 8

Relationships and links

OGC

12 : 45 : 87
FEB - 05 - 3254
167 78 804

- Relationships with other features or other resources like codelists
 - Direct properties of the feature or in embedded JSON objects
- Three patterns for encoding have been identified
- Depending on the data and how the data is expected to be used, the preferences of data publishers for one or the other pattern will vary
- Pattern 1: web link in the "links" array
- Pattern 2: like a regular feature property - with a simplified link object
- Pattern 3: like a regular feature property - with a URI value

```
{  
  ...  
  "links": [  
    {  
      "href" : "https://ogc-api.nrw.de/likar/v1/  
      collections/flurstueck/items/  
      05297001600313_____",  
      "rel" : "http://www.opengis.net/def/rel/ogc/  
      1.0/within",  
      "title" : "Cadastral parcel 313 in district  
      Wünnenberg (016)"  
    }  
,  
  "properties": {  
    ...  
    "owners": [  
      {  
        "href": "https://example.org/john-doe",  
        "title": "John Doe"  
      },  
      {  
        "href": "https://example.org/jane-doe",  
        "title": "Jane Doe"  
      }  
    ]  
  }  
}
```



MAX - 34 - 685
KL - IT - 3678 - 986

4583

ogc.org | 9

Looking for your feedback

OGC

12 : 45 : 87
FEB - 05 - 3254
167 78 804

- Are these extensions useful for your use cases?
- Are they simple enough to implement?
- More information:
 - <https://github.com/opengeospatial/ogc-feat-geo-json>
- Issues:
 - <https://github.com/opengeospatial/ogc-feat-geo-json/issues>



MAX - 34 - 685
KL - IT - 3678 - 986

4583

Testbed-17 server implementations

OGC

12 : 45 : 87
FEB - 05 - 3254
167 78 804

- t17.Idproxy.net (Idproxy)
 - [https://t17.Idproxy.net/fns/collections/notam/items?
f=jsonfg&crs=http://www.opengis.net/def/crs/EPSG/0/3857](https://t17.Idproxy.net/fns/collections/notam/items?f=jsonfg&crs=http://www.opengis.net/def/crs/EPSG/0/3857)
- fgjson.skymantics.com (pygeoapi)
 - [https://fgjson.skymantics.com/collections/air_route_sample/items?
f=jsonfg](https://fgjson.skymantics.com/collections/air_route_sample/items?f=jsonfg)
- test.cubewerx.com/cubewerx/cubeserv/tb17 (CubeWerx)
 - [https://test.cubewerx.com/cubewerx/cubeserv/tb17/ogcapi/US%20Buildings/collections/us_buildings/items?
f=application%2Fvnd.ogc.fg%2Bjson&crs=http://www.opengis.net/def/crs/EPSG/0/3857](https://test.cubewerx.com/cubewerx/cubeserv/tb17/ogcapi/US%20Buildings/collections/us_buildings/items?f=application%2Fvnd.ogc.fg%2Bjson&crs=http://www.opengis.net/def/crs/EPSG/0/3857)

Note: Temporarily using application/vnd.ogc.fg+json as media type



MAX - 34 - 685
KL - IT - 3678 - 986

4583

Testbed-17 client implementations

OGC

12 : 45 : 87
FEB - 05 - 3254
167 78 804

- <https://geosolutions-it.github.io/mapstore-testbed/fjson-app/dist/#/> (MapStore)
- <https://demo.luciad.com/tb17> (LuciadRIA)



MAX - 34 - 685
KL - IT - 3678 - 986



2995

4583