

# DNF data in GML

**DNF release 1 product data: A description of how  
DNF data is represented in the Geography Markup  
Language.**

DNF release 1

## **Responsibility for this document**

Ordnance Survey DNF Business Manager is responsible for the content of this document.

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## **Approval for issue**

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## 1 Introduction

### 1.1 Purpose

To define how Ordnance Survey data available within the Digital National Framework (DNF) is represented in the Geography Markup Language (GML) version 2.0. This document is primarily for system developers who are writing software that uses such data.

### 1.2 Scope

This document is the GML format section of the DNF Specifications. An understanding of XML and XML schema is required.

### 1.3 Related documents

The following DNF Specification documents are particularly relevant to this document:

- [Classification and attributes of DNF features](#)
- [DNF geometry and topology](#)

The following [Open GIS Consortium](#) document is required to use this document:

- [Geography Markup Language v2.0](#)

## 1.4 Use of GML

This document describes the Ordnance Survey application schema based on the Open GIS Consortium (OGC) Geography Markup Language (GML). Explanations of how we manage complex properties and polygon based topological relationships in our application schema are provided in the relevant sections of this document.

## 1.5 Use of examples

Any examples in this text that mention specific data content are to be taken as examples only. All data content is defined separately in the referenced documents and the examples are not necessarily in harmony with the data specification.

## 1.6 Definition of terms

### DNF feature attribute

'Attribute' as defined in the DNF specification document [DNF glossary](#) is called DNF feature attribute in this document.

### XML attribute

'Attribute' as used in an XML context is referred to as XML attribute throughout this document.

### Property

Most DNF feature attributes are encoded as GML properties – property means a GML property in this document.

### Query

Each GML output provided by Ordnance Survey services is in response to a request for data from a user. In this document, the data request is called a query.

### Extent

As part of a request for data, the user can specify a polygon or rectangle which delimits the area of data required. In this document this is termed the query extent.

## 2 XML declaration

The XML declaration to all query results shall be:

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

### 3 Document type

All information returned from a query shall be provided in an `osgb:FeatureCollection`. If no features lie inside a query then an empty collection shall be returned with its required collection properties.

The document will define the XML namespaces:

- `osgb` <http://www.ordnancesurvey.co.uk/xml/namespaces/osgb>
- `gml` <http://www.opengis.net/gml>
- `xsi` <http://www.w3.org/2000/10/XMLSchema-instance>
- `xlink` <http://www.w3.org/1999/xlink>

It shall define the location of the schema as `http://www.ordnancesurvey.co.uk/xml/schema OSDNFFeatures.xsd`.

The 'fid' shall be set to the Ordnance Survey identifier given to the query.

For example:

```
<osgb:FeatureCollection
  xmlns:osgb='http://www.ordnancesurvey.co.uk/xml/namespaces/osgb'
  xmlns:gml='http://www.opengis.net/gml'
  xmlns:xsi='http://www.w3.org/2000/10/XMLSchema-instance'
  xmlns:xlink='http://www.w3.org/1999/xlink'
  xsi:schemaLocation='http://www.ordnancesurvey.co.uk/xml/schema OSDNFFeatures.xsd'
  fid='queryId' >
  ...
</osgb:FeatureCollection>
```

## 4 Query result properties

The `gml:boundedBy` element shall be the first property of the feature collection. This shall contain a `gml:null` element with the value of unknown.

The start time of the query shall be specified at GMT as a feature property. The name of the property shall be `queryTime`.

The following optional properties shall be provided for the `osgb:FeatureCollection` if they were provided as part of the query, the ordering of these properties is according to the order they appear in the table:

Name	Type	Format	Description
<code>queryExtent</code>	Geometric property	<code>gml:Polygon</code> or <code>osgb:Rectangle</code> (see. geometric properties in <a href="#">section 6.3</a> ).	The query extent provided as part of a spatial query.
<code>queryChangeSinceDate</code>	Date	CCYY-MM-DD	The date that was given as part of a change only query.

If there are features in the collection the last element in the feature collection shall be an `osgb:boundedBy` element. This will be a GML box defining the minimum bounding rectangle of all items in the collection, including the query extent. If the collection is empty no `osgb:boundedBy` element shall be provided.

For example:

```
<osgb:FeatureCollection
  xmlns:osgb="http://www.ordnancesurvey.co.uk/xml/namespaces/osgb"
  xmlns:gml="http://www.opengis.net/gml"
  xmlns:xsi="http://www.w3.org/2000/10/XMLSchema-instance"
  xmlns:xlink="http://www.w3.org/1999/xlink"
  xsi:schemaLocation="http://www.ordnancesurvey.co.uk/xml/schema OSDNFFeatures.xsd"
  fid="queryId">

  <gml:boundedBy><gml:null>unknown</gml:null></gml:boundedBy>
  <osgb:queryTime>2001-03-28T14:31:54</osgb:queryTime>
  <osgb:queryExtent">
    <osgb:Rectangle srsName="osgb:BNG">
      <gml:coordinates>4000000,3094763 4000010,3094820</gml:coordinates>
    </osgb:Rectangle>
  </osgb:queryExtent>
  <osgb:queryChangeSinceDate>2001-01-31</osgb:queryChangeSinceDate>

  <!--features go here-->

  <osgb:boundedBy>
    <gml:Box srsName="osgb:BNG">
      <gml:coordinates>3999350,3089542 4005602,3095673</gml:coordinates>
    </gml:Box>
  </osgb:boundedBy>
</osgb:FeatureCollection>
```

## 5 DNF features

Each feature within the `osgb:FeatureCollection` shall be encapsulated in one of the following member elements according to its DNF feature type:

Member element	DNF feature type
<code>topographicMember</code>	TopographicPoint, TopographicLine, TopographicArea
<code>cartographicMember</code>	CartographicText, CartographicSymbol
<code>boundaryMember</code>	BoundaryLine

Each member element shall contain a single feature element that has the name of the DNF attribute set, e.g. `TopographicPoint`, `TopographicLine`, etc.

Where the feature has a TOID it shall be provided in the 'fid' attribute of the `osgb:Feature` element. A TOID has a maximum of 16 digits and is prefixed with `osgb`. The `osgb` prefix is required to form a valid XML ID type, this should be removed when presenting a TOID to a user in an application.

A feature element shall not contain a name, description or `boundedBy` element.

For example:

```
<osgb:topographicMember>
  <osgb:TopographicPoint fid="osgb15789329786">
    ....
  </osgb:TopographicPoint>
</osgb:topographicMember>
<osgb:cartographicMember>
  <osgb:CartographicSymbol fid="osgb5247456254568763">
    ....
  </osgb:CartographicSymbol>
</osgb:cartographicMember>
```

## 6 Properties

Our application schema defines four main types of properties that are present inside a feature element. These are simple, complex, geometric, and topological properties. The ordering of properties within a feature element is important as XML validation is reliant on elements being in a specified order. The order of properties is specified within the XML schema.

### 6.1 Simple

A 'simple' property is one that contains a single piece of non-geometric information. These properties correspond to the simple DNF feature attributes defined in the DNF Specifications document [Classification and attributes of DNF features](#). The value of each DNF feature attribute is enclosed in an element that takes its name from the DNF feature attribute.

For example:

```
<osgb:descriptiveGroup>Rail</osgb:descriptiveGroup>  
<osgb:calculatedAreaValue>13254</osgb:calculatedAreaValue>
```

### 6.2 Feature associations

A feature association is a simple property that defines a relationship between one feature and another, for example, an administrative boundary could maintain a relationship to a topographic feature such as a stream that defines the boundary.

The name of the DNF feature attribute that defines a feature association shall be the name of the XML element.

The feature association is defined by the XML attribute `xlink:href`. This shall refer to the feature as if it was locally available even though this is not guaranteed to be the case, i.e. it shall be set to the character `#` followed by `osgb` and then the TOID of the feature being referenced.

For example:

```
<osgb:referenceToFeature xlink:href="#osgb5798572">
```



## 6.3 Geometry

A geometric property is one that describes a specific geometry. We have extended the GML v2.0 specification to include a rectangle that is defined by two points. The first point defines the minimum co-ordinate whilst the second point defines the maximum co-ordinate.

All geometric properties are encoded by placing the GML geometry elements inside an element that takes its name from the DNF feature attribute.

The XML attribute srsName shall be set to osgb:BNG (BNG stands for British National Grid) which uses eastings and northings specified in metres.

For example:

```
<osgb:anchorPoint>
  <gml:Point srsName="osgb:BNG">
    <gml:coordinates>12365.563,8975.676</gml:coordinates>
  </gml:Point>
</osgb:anchorPoint>
<osgb:queryExtent>
  <osgb:Rectangle srsName="osgb:BNG">
    <gml:coordinates>0,0 700000,1300000</gml:coordinates>
  </osgb:Rectangle>
</osgb:queryExtent>
```

## 6.4 Topology

This document seeks only to describe the XML encoding of topology. For details on how this is used to represent DNF features, see the DNF specification document [DNF geometry and topology](#).

Each DNF feature attribute that is a polygon shall be represented by an element which has the same name as the DNF feature attribute.

This GML property element shall contain a single `osgb:outerBoundaryIs` element and zero or more `osgb:innerBoundaryIs` elements.

A boundary element (`innerBoundaryIs` or `outerBoundaryIs`) shall contain a single `osgb:Ring`.

An `osgb:Ring` element shall have an XML attribute `orientation`, set to `clockwise` or `anticlockwise`, describing which way the ring is encoded. All outer boundaries shall have an `anticlockwise` orientation and all inner boundaries shall have a `clockwise` orientation.

An `osgb:Ring` shall contain one or more `osgb:ringMember` elements.

Each `osgb:ringMember` element shall use the XML attribute `xlink:href` to define a relationship to a linear feature. The URL to the feature shall be given as `#osgb` followed by the TOID of the feature.

If the feature referenced by the `ordvsi:chainMember` is traversed forwards in the ring then no XML orientation attribute needs to be provided. Otherwise the orientation attribute shall be set to '-'.

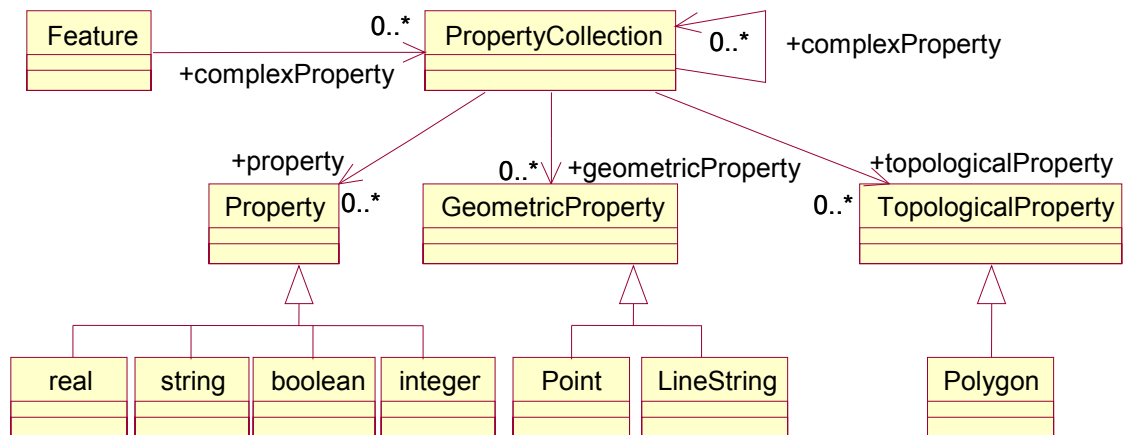
For example:

```
<osgb:topographicMember>
  <osgb:TopographicArea fid="osgb9">
    ...
    <osgb:polygon>
      <osgb:outerBoundaryIs>
        <osgb:Ring orientation="anticlockwise">
          <!-- 'orientation' defaults to '+' -->
          <osgb:ringMember xlink:href="#osgb0"/>
        </osgb:Ring>
      </osgb:outerBoundaryIs>
      <osgb:innerBoundaryIs>
        <osgb:Ring orientation="clockwise">
          <osgb:ringMember xlink:href="#osgb1"/>
          <osgb:ringMember orientation="-" xlink:href="#osgb4"/>
          <osgb:ringMember orientation="-" xlink:href="#osgb5"/>
          <osgb:ringMember xlink:href="#osgb3"/>
        </osgb:Ring>
      </osgb:innerBoundaryIs>
    </osgb:polygon>
  </osgb:TopographicArea>
</osgb:topographicMember>
```

## 6.5 Complex

A complex property is one that contains more than one piece of information. These properties correspond to the complex DNF feature attributes defined in the DNF Specifications document [Classification and attributes of DNF features](#).

### 6.5.1 Class model



The definition of a complex property here is recursive so complex properties may be nested. Currently within the DNF this recursion isn't used.

### 6.5.2 XML mapping

The complex property element takes its name from the complex DNF feature attribute. Each part of a complex property shall be encoded as a simple, feature associations, complex, geometry or topology property, as appropriate inside the complex property element.

For example:

```

<osgb:textRendering>
  <osgb:anchorPosition>4</osgb:anchorPosition>
  <osgb:font>2</osgb:font>
  <osgb:height>24</osgb:height>
  <osgb:orientation>3476</osgb:orientation>
</osgb:textRendering>
<osgb:heightAboveDatum>
  <osgb:heightAboveDatum>3456</osgb:heightAboveDatum>
  <osgb:accuracyOfPosition>2.0m</osgb:accuracyOfPosition>
</osgb:heightAboveDatum>
  
```

## 7 Change only update

Change only update requires that information be provided for features that were present in a spatial query but no longer meet the query criteria. Such features may have changed theme so that they are no longer in any of the themes being requested, had their geometry modified between queries so that they no longer meet the spatial criteria, or been deleted. This also applies to features that have changed theme so that they are no longer in any of the themes being requested. These features are represented as 'departed'.

A departed feature returned in a change query shall be represented in the output as an 'osgb:DepartedFeature' inside a 'osgb:departedMember' element.

The XML attribute 'fid' shall be set to the TOID of the feature prefixed with 'osgb', there are no other properties

For example:

```
<osgb:departedMember>
  <osgb:DepartedFeature fid="osgb329786" />
</osgb:departedMember>
```

## 8 Required XML schema

Seven XML schemas are required when using data provided by Ordnance Survey within the DNF. These are:

- **feature.xsd** Part of the OGC GML 2.0 specification. It defines the feature constructs used in GML 2.0. This is available from <http://www.opengis.net/schema.htm>
- **geometry.xsd** Part of the OGC GML2.0 specification. It defines the geometry constructs in GML 2.0. This is available from <http://www.opengis.net/schema.htm>
- **xlinks.xsd** Part of the OGC GML2.0 specification. It defines the XLINK constructs in GML 2.0. This is available from <http://www.opengis.net/schema.htm>
- **OSGeometryTopology.xsd** Geometry and topology extensions to the GML 2.0 specification required by Ordnance Survey. This is available at <http://www.ordnancesurvey.co.uk/xml/schema>
- **OSSimpleTypes.xsd** The basic enumerated types used within the DNF including 'descriptiveGroupType' and 'accuracyOfPositionType'. This is available at <http://www.ordnancesurvey.co.uk/xml/schema>
- **OSDNFFeatures.xsd** The definition of the features and their properties used within the DNF. This is available at <http://www.ordnancesurvey.co.uk/xml/schema>
- **OSQueryresult.xsd** The definition of a query result within the DNF. This is available at <http://www.ordnancesurvey.co.uk/xml/schema>