

# Geographic Data Files (GDF) Reader/Writer

## FORMAT NOTES:

This format is not supported by FME Base Edition.

The Geographic Data Files (GDF) Reader/Writer allows FME to read and write files in the Central European Normalisation (CEN) Standard format established by European Committee for Standardisation. This chapter assumes familiarity with this format.

You can find some helpful background information at [http://www.ertico.com/en/links/links/gdf\\_-\\_geographic\\_data\\_files.htm](http://www.ertico.com/en/links/links/gdf_-_geographic_data_files.htm).

## Overview

The CEN standard for Geographic Data Files (GDF) is commonly called GDF 3.0. The International Standards Organization (ISO) standard is commonly called GDF 4.0. Several GDF data producers, like NAVTEQ and TeleAtlas, for example, do not strictly follow either GDF 3.0 or 4.0 standards, but rather follow their own slightly modified version of these standards.

GDF 3.0 (ASCII Sequential) is currently supported by the FME (including variations such as NAVTEQ, TeleAtlas, and ETAK).

The original GDF specifications (GDF 3.0) were developed in Europe to meet the needs of professionals and organizations involved in the creation, update, supply and application of referenced and structured road network data.

It is much more than a generic GIS standard, as GDF gives rules on how to capture the data, as well as how the features, attributes and relationships are defined.

GDF was developed in a European project named EDRM (European Digital Road Map). Its primary use is for car navigation systems (for example, Bosch , Philips, Volvo); however, because the standard is based on a general, non-application-specific data model, it is also used for many other transport and traffic applications including Fleet Management, Dispatch Management, Traffic Analysis, Traffic Management, and Automatic Vehicle Locations.

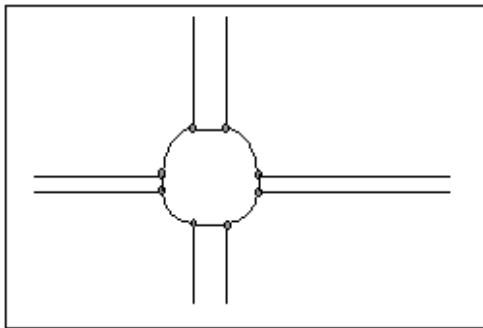
The GDF file format is often referred to as a *database*, and was never intended to be used by applications directly. Indeed, the structure of GDF files themselves impose significant inefficiencies when extracting data from GDF files. GDF users will generally transform the data into some other database or format upon which their application will work directly.

When using FME to write GDF, building a file containing simple spaghetti linework or road maps is simple. Building an accurate road map for use with Intelligent Transport Systems (ITS) may require professional intervention in mapping file customization. For example, essential information such as direction of traffic flow and turn restrictions cannot be inferred from input road data where no such information is explicitly stored.

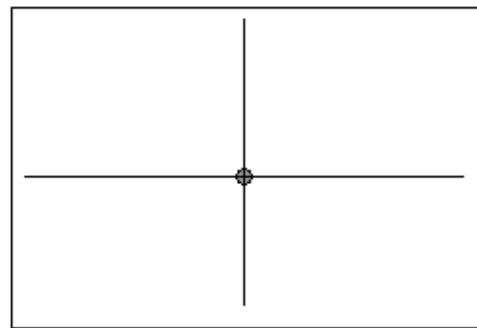
In the GDF file structure, features (or *elements*) are organized into three layers. Features in each layer do not actually contain any geometry, but simply link to features in the layer below from which you are supposed to take the geometry.

**Note:** The term *features* is used within GDF documentation to refer to elements residing on levels 1 and 2. This chapter uses the term *features* in the manner understood by standard FME terminology.)

1. **Level 0 (Topology):** This level contains elementary GIS topology components. No features overlap in any way, and neighbouring relationships are known. Everything is described by Nodes, Edges and Faces.
2. **Level 1 (Features):** Level 1 is the most used level of GDF. It contains simple features like road elements, rivers, boundaries, and signposts. Features can have attributes that are specific to the feature (for example, one way, width of the road, number of lanes). Features can also have relations, which are very important for car navigation systems. For example, relations can include "forbidden turn from road element 1 to road element 2" or "road element 1 has priority over road element 2."
3. **Level 2 (Complex Features):** At this level, the level 1 "simple features" are aggregated to a higher level feature. For example, at level 1, all road elements of an intersection are represented. At level 2, the intersection may only be represented with a single point. The figure below illustrates this.



**Level 1 Representation of a Roundabout**



**Level 2 Representation of a Roundabout**

### Roundabout Representation: Levels 1 and 2

Level 2 is of interest mostly when a simplified description of the road network is sufficient. For instance, inter-urban route calculation does not require a high level of detail. Vehicle location by means of a GPS receiver, however, does need the more detailed description of the road network.

The GDF reader and writer use symbolic names for different feature types stored within a data file. Each feature will have a `gdf_type` attribute on it. The following table gives a brief description of each of the different GDF types currently supported by the reader and writer. The entities are described in detail in subsequent sections. We used to have as a `gdf_type` every record type in addition to the geometric types. To make the geometry `gdf_type` more explicit, we now give a `gdf_no_geom` type to every feature type that does not contain any geometry, such as VOLHDREC.

<b>gdf_type</b>	<b>Description</b>
<code>gdf_level_0_point</code>	These are point features found on level 0.

<b>gdf_type</b>	<b>Description</b>
gdf_level_0_line	These are linear features found on level 0.
gdf_level_0_polygon	These are polygonal features found on level 0.
gdf_level_1_point	These are point features found on level 1.
gdf_level_1_line	These are linear features found on level 1.
gdf_level_1_polygon	These are polygonal features found on level 1.
gdf_level_2_point	These are (complex) point features found on level 2.
gdf_level_2_line	These are (complex) linear features found on level 2.
gdf_level_2_polygon	These are (complex) polygonal features found on level 2.
gdf_nullrec	Refer to the official GDF specification for NULLREC records for a full explanation of this feature type.
gdf_volhdrec	Refer to the official GDF specification for VOLHDREC records for a full explanation of this feature type.
gdf_volhdrec_link_daset_vol	This feature type holds mappings between gdf_volhdrec features and their dataset volumes.
gdf_dshdrec_01	Refer to the official GDF specification for DSHDREC records for a full explanation of this feature type.
gdf_dshdrec_01_link_language	This feature type holds mappings between gdf_dshdrec_01 features and their languages.
gdf_dshdrec_01_link_country	This feature type holds mappings between gdf_dshdrec_01 features and their countries.
gdf_dshdrec_02 gdf_dshdrec_03 gdf_dshdrec_04 gdf_dshdrec_05 gdf_dshdrec_06 gdf_dshdrec_07	Refer to the official GDF specification for DSHDREC records for a full explanation of these feature types.
gdf_fieldefrec	Refer to the official GDF specification for FIELDEFREC records for a full explanation of this feature type.
gdf_recdefrec	Refer to the official GDF specification for RECDEFREC records for a full explanation of this feature type.
gdf_recdefrec_link_fld_name	This feature type holds mappings between gdf_recdefrec features and their field names.

<b>gdf_type</b>	<b>Description</b>
gdf_atdefrec	Refer to the official GDF specification for ATDEFREC records for a full explanation of this feature type.
gdf_direc	Refer to the official GDF specification for DIREC records for a full explanation of this feature type.
gdf_featdefrec	Refer to the official GDF specification for FEATDEFREC records for a full explanation of this feature type.
gdf_spadorec	Refer to the official GDF specification for SPADOREC records for a full explanation of this feature type.
gdf_feaqualrec	Refer to the official GDF specification for FEAQUALREC records for a full explanation of this feature type.
gdf_atqualrec	Refer to the official GDF specification for ATQUALREC records for a full explanation of this feature type.
gdf_srcerec_01 gdf_srcerec_02	Refer to the official GDF specification for SRCEREC records for a full explanation of this feature type.
gdf_srcerec_02_link_language	This feature type holds mappings between gdf_srcerec_02 features and their languages.
gdf_srcerec_02_link_country	This feature type holds mappings between gdf_srcerec_02 features and their countries.
gdf_srcerec_03 gdf_srcerec_04 gdf_srcerec_05 gdf_srcerec_06 gdf_srcerec_07 gdf_srcerec_08 gdf_srcerec_09	Refer to the official GDF specification for SRCEREC records for a full explanation of these feature types.
gdf_dattvalrec	Refer to the official GDF specification for DAT-TVALREC records for a full explanation of this feature type.
gdf_sechrec_01 gdf_sechrec_02 gdf_sechrec_03	Refer to the official GDF specification for SECHREC records for a full explanation of this feature type.
gdf_sechrec_03_link_feature_quality	This feature type holds mappings between gdf_sechrec_03 features and their feature qualities.
gdf_sechrec_03_link_attribute_quality	This feature type holds mappings between gdf_sechrec_03 features and their attribute qualities.
gdf_sechrec_04	Refer to the official GDF specification for SECHREC records for a full explanation of this feature type.

<b>gdf_type</b>	<b>Description</b>
<code>gdf_sechrec_04_link_source_desc</code>	This feature type holds mappings between <code>gdf_sechrec_04</code> features and their source descriptions.
<code>gdf_sechrec_05</code>	Refer to the official GDF specification for <code>SECHREC</code> records for a full explanation of this feature type.
<code>gdf_sechrec_05_link_declination</code>	This feature type holds mappings between <code>gdf_sechrec_05</code> features and their declinations.
<code>gdf_sechrec_06</code>	Refer to the official GDF specification for <code>SECHREC</code> records for a full explanation of this feature type.
<code>gdf_sechrec_06_link_geoid</code>	This feature type holds mappings between <code>gdf_sechrec_06</code> features and their geoids.
<code>gdf_sechrec_07</code> <code>gdf_sechrec_08</code> <code>gdf_sechrec_09</code>	Refer to the official GDF specification for <code>SECHREC</code> records for a full explanation of this feature type.
<code>gdf_layhrec</code>	Refer to the official GDF specification for <code>LAYHREC</code> records for a full explanation of this feature type.
<code>gdf_layhrec_link_them_cod</code>	This feature type holds mappings between <code>gdf_layhrec</code> features and their theme codes.
<code>gdf_datelrec</code>	Refer to the official GDF specification for <code>DATELREC</code> records for a full explanation of this feature type.
<code>gdf_verdatrec</code>	Refer to the official GDF specification for <code>VERDATREC</code> records for a full explanation of this feature type.
<code>gdf_verdatrec_link_level</code>	This feature type holds mappings between <code>gdf_verdatrec</code> features and their levels.
<code>gdf_projecrec</code>	Refer to the official GDF specification for <code>PROJECREC</code> records for a full explanation of this feature type.
<code>gdf_projecrec_link_parms</code>	This feature type holds mappings between <code>gdf_projecrec</code> features and their projection parameters.
<code>gdf_natgridrec</code>	Refer to the official GDF specification for <code>NATGRIDREC</code> records for a full explanation of this feature type.
<code>gdf_geoidrec</code>	Refer to the official GDF specification for <code>GEOIDREC</code> records for a full explanation of this feature type.
<code>gdf_magnetrec</code>	Refer to the official GDF specification for <code>MAGNETREC</code> records for a full explanation of this feature type.

<b>gdf_type</b>	<b>Description</b>
gdf_commentrec	Refer to the official GDF specification for <code>COMMENTREC</code> records for a full explanation of this feature type.
gdf_voltermrec	Refer to the official GDF specification for <code>VOLTERMREC</code> records for a full explanation of this feature type.
gdf_xyzrec_point gdf_xyzrec_line	Refer to the official GDF specification for <code>XYZREC</code> records for a full explanation of this feature type.
gdf_nedgrec	Refer to the official GDF specification for <code>NEDG- EREC</code> records for a full explanation of this feature type.
gdf_knotrec	Refer to the official GDF specification for <code>KNOTREC</code> records for a full explanation of this feature type.
gdf_facerec	Refer to the official GDF specification for <code>FACEREC</code> records for a full explanation of this feature type.
gdf_facerec_link_edge_id	This feature type holds mappings between <code>gdf_facerec</code> features and their edge IDs.
gdf_namerec	Refer to the official GDF specification for <code>NAMEREC</code> records for a full explanation of this feature type.
gdf_dsatrec	Refer to the official GDF specification for <code>DSATREC</code> records for a full explanation of this feature type.
gdf_dsatrec_link_attr	This feature type holds mappings between <code>gdf_dsatrec</code> features and their attribute IDs.
gdf_timerec	Refer to the official GDF specification for <code>TIMEREC</code> records for a full explanation of this feature type.
gdf_convertrec	Refer to the official GDF specification for <code>CONVERTREC</code> records for a full explanation of this feature type.
gdf_relatrec	Refer to the official GDF specification for <code>RELATREC</code> records for a full explanation of this feature type.
gdf_relatrec_link_feat	This feature type holds mappings between <code>gdf_relatrec</code> features and their feature IDs.
gdf_relatrec_link_attribute	This feature type holds mappings between <code>gdf_relatrec</code> features and their attribute IDs.
gdf_poferec	Refer to the official GDF specification for <code>POFEREC</code> records for a full explanation of this feature type.
gdf_poferec_link_knot	This feature type holds mappings between <code>gdf_poferec</code> features and their knot IDs.
gdf_poferec_link_attribute	This feature type holds mappings between <code>gdf_poferec</code> features and their attribute IDs.

<b>gdf_type</b>	<b>Description</b>
<code>gdf_linfrec</code>	Refer to the official GDF specification for <code>LINFREC</code> records for a full explanation of this feature type.
<code>gdf_linfrec_link_edge</code>	This feature type holds mappings between <code>gdf_linfrec</code> features and their edge IDs.
<code>gdf_linfrec_link_attribute</code>	This feature type holds mappings between <code>gdf_linfrec</code> features and their attribute IDs.
<code>gdf_arferec</code>	Refer to the official GDF specification for <code>ARFEREC</code> records for a full explanation of this feature type.
<code>gdf_arferec_link_face</code>	This feature type holds mappings between <code>gdf_arferec</code> features and their face IDs.
<code>gdf_arferec_link_attribute</code>	This feature type holds mappings between <code>gdf_arferec</code> features and their attribute IDs.
<code>gdf_compferec</code>	Refer to the official GDF specification for <code>COMPFEREC</code> records for a full explanation of this feature type.
<code>gdf_compferec_link_feat</code>	This feature type holds mappings between <code>gdf_compferec</code> features and their feature IDs.
<code>gdf_compferec_link_attribute</code>	This feature type holds mappings between <code>gdf_compferec</code> features and their attribute IDs.
<code>gdf_unknown_record</code>	All GDF records which are not completely understood by the FME are output as this feature type.

## GDF Quick Facts

Format Type Identifier	GDF
Reader/Writer	Both
Licensing Level	Professional
Dependencies	Requires extra-cost plug-in from Safe Software
Dataset Type	File
Feature Type	Level and geometry based name
Typical File Extensions	.gdf
Automated Translation Support	Yes
User-Defined Attributes	No
Coordinate System Support	No
Generic Color Support	No
Spatial Index	Never
Schema Required	Yes
Transaction Support	No
Geometry Type	gdf_type

Geometry Support			
Geometry	Supported?	Geometry	Supported?
aggregate	no	point	yes
circles	no	polygon	yes
circular arc	no	raster	no
donut polygon	yes	solid	no
elliptical arc	no	surface	no
ellipses	no	text	no
line	yes	z values	no
none	yes		

## Reader Overview

The GDF reader reads the entire file sequentially. Header information from the Volume level is therefore processed first, followed by information from the Dataset, Section, and Layer levels, respectively. Scaling and offset factors found in the header of the GDF file are applied to all coordinates read from the file. The reader extracts each individual feature, one at a time, and passes it on to the rest of the FME for processing.

The reader now supports a dynamic schema configuration based on the FIELDEFREC (03) and RECDEFREC (04) records. The reader has a default configuration for different variants such as Navteq and TeleAtlas 3.4. If the dataset to be read has a header with FIELDEFREC (03) and RECDEFREC (04) records, those will be used to adjust the configuration. Therefore, new record types can be defined in the dataset header and the reader will handle them correctly.

The geometry of level 1 points is the center of the bounding box of all the components. The geometry of level 1 lines is the concatenation of all the components. The geometry of level 1 areas is computed by "dissolving" of all the components.

Complex (Level 2) features symbolize abstract network topology and therefore cannot be faithfully represented by visual graphic representation in all cases. The attributes on complex features will always retain all information necessary to completely reconstruct the level 2 topology or otherwise access every aspect of the data represented in the GDF file. The geometry on complex features is intelligently created to visually represent those parts of the network topology where possible. In most cases, the geometry on complex features is indeed helpful in understanding the network through a graphical viewer.

The geometry assigned to complex features is either lines, points, or polygons. Complex features that have FROM/TO links are read as level 2 lines whose geometry is assumed to be a single segment line from the center of the bounding box of the FROM feature and to the center of the bounding box of the TO feature. If the complex feature has no FROM/TO links, then the types of the members are considered. Those with only polygonal members are read as level 2 polygons whose geometry is the result of dissolving all the polygonal members. Finally, those complex features that do not consist entirely of polygonal members are read as level 2 points whose geometry is assumed to be the center of the bounding box of all the components. One exception to the above should be noted; all complex features with no FROM/TO links and exactly one member will assume the complete geometry and type of that member. Any complex features that contain a reference to a member that does not appear in the file will be output as a COMPFEREC feature with no geometry.

When the GDF reader encounters a record type it does not know how to process, it simply outputs this element as an UNKNOWN\_RECORD and moves on to read the next feature. However, this should not happen unless the record schema has not been previously defined in a RECDEFREC (04) record in the header.

In addition to the different record types, which are known as the physical representation in GDF terminology, the reader also takes into account the Data Model to create the FME Features. This Data Model is vendor and version specific and defines the GDF feature names and attribute names and values. Should the need arise, the Data Model for the different variants and versions of GDF can be edited in a text editor and can be found under plugins/gdf/DataModel from the install directory of FME.

## Reader Directives

The suffixes listed are prefixed by the current <ReaderKeyword> in a mapping file. By default, the <ReaderKeyword> for the GDF reader is GDF.

### DATASET

**Required/Optional:** *Required*

The value for this keyword is the file containing the GDF data set to be read.

### Example:

```
GDF_DATASET /usr/data/road/amsterdam.gdf
```

## SPECIFICATION

The value for this keyword can be one of the following values `CEN`, `NAVTEQ`, `NAVTECH` (deprecated), `TELEATLAS`, or `BESTGUESS`. This indicates which GDF specification will be used when parsing the input GDF file.

A value of `CEN` means that the official CEN 3.0 specification will be used. The values `NAVTEQ` and `TELEATLAS` indicates that the NAVTEQ or TeleAtlas variants of the GDF specification should be used, respectively. The value `BESTGUESS` tells the GDF reader to use an intelligent guess as to which specification to use, based on the header of the GDF file. The default value is `BESTGUESS`.

### Example:

A typical mapping file fragment specifying the specification looks like:

```
GDF_SPECIFICATION BESTGUESS
```

## GEOMETRY\_COMPLETION

The value for this keyword should be `NONE`, `LEVEL0`, `LEVEL1`, or `LEVEL2`. The default is `LEVEL2`. This indicates the level up to which the user wants to complete the geometry. All levels above this will have the geometry linked to the features indirectly. All levels with complete geometry will have the geometry explicitly on each feature directly.

When the FME reads GDF files, it requires a lot of effort to store and reference all the features between layers. For example, to get the geometry of a single level 2 feature, first the FME must locate all the level 1 features that are linked to it. Then it has to locate all the level 0 features that are linked to each Level 1 feature. Then it has to locate all the XYZ features that are linked to every Level 0 feature. Finally it has to put all that geometry together and process it to generate the geometry for the single level 2 feature. It is much easier if the features were output with no geometry but instead kept attributes that indicated to which other features it was linked.

For this reason, there is an option of choosing whether features produced by the reader have the "links" on them, or if the FME should go through all the effort to complete the links and form the geometry on each feature. There is also the option of specifying on which levels the geometry should be completed, and which levels will be left as "linked" to lower-level features.

For example, if you were only interested in the level 1 features of a GDF dataset (you were going to delete or ignore the level 2 features) then there would be no reason for the FME to complete the geometry on level 2 features. You could choose to complete only the geometry on level 1 features and leave the level 2 features as linked (since you would be deleting them anyway).

Another example might be if you are planning to import features into a spatial database. In your new model, you would like to keep the links present so that if you edited and modified the geometry of a level 0 feature, the geometry of all level 1 and 2 features that link to it would immediately change. In this situation, you would select `NONE` for geometry completion, and just import all the features into your database as linked.

Of course, if you are translating GDF to any of the more common file-based formats for general viewing and usage, completing the geometry all the way up to level 2 is probably the most reasonable choice.

**Example:**

A typical mapping file fragment specifying that geometry be completed only up to level 1 looks like:

```
GDF_GEOMETRY_COMPLETION LEVEL1
```

**ATTRIBUTE\_COMPLETION**

The value for this keyword should be `Yes` or `No`. The default is `Yes`. This indicates if the user wants to complete the attribute links for each feature. If selected, all features will have their attributes explicitly appear on the features directly. If not selected, all features will have their attribute information remain in separate tables joined with link values.

The issues surrounding attribute completion when reading GDF is similar to geometry completion. Natively, a feature's attributes are referenced through a linking mechanism and extra effort is needed if it is desired that the features read from GDF know all their attributes directly.

Therefore there is an option of choosing between whether features produced by the reader have the "links" on them or if the FME should go through all the effort to complete the links and supply the attributes directly on each feature as they are read. Reasoning as to whether or not to choose attribute completion is similar to that outlined for geometry completion.

**Example:**

A typical mapping file fragment specifying that attributes not completed on each feature looks like:

```
GDF_ATTRIBUTE_COMPLETION No
```

**OUTPUT\_MERGED\_RECORDS**

The value for this keyword should be `Yes` or `No`. The default is `No`. This indicates if the user wants attribute features that have been used in attribute completion to be output by the reader. This keyword has no effect if the `ATTRIBUTE_COMPLETION` keyword is set to `No`. If this keyword is set to `Yes` then features that primarily carry attribute values (for example GDF Name records) will be output.

**Example:**

A typical mapping file fragment specifying that record features that were used in attribute completion should not be output looks like:

```
GDF_OUTPUT_MERGED_RECORDS No
```

### CODE\_VALUE\_LOOKUP

The value for this keyword should be `Yes` or `No`. The default is `Yes`. This indicates if the user wants to replace the known codes of attributes with their actual expanded values for each feature. If selected, all features will have the code values of their attributes replaced. For example, an attribute `Vehicle Type` with the value `16` will have that value replaced by `Taxi`. If this option is not enabled, all features will have their attribute values left as the original codes.

#### Example:

A typical mapping file fragment specifying that code values not be completed on each feature looks like:

```
GDF_CODE_VALUE_LOOKUP No
```

### GDF\_MULTIPLE\_VALUE\_SEPARATOR

The value for this keyword can be any string. The default is `|||`. This indicates which characters will separate the values when one attribute has more than one value.

For instance, the `Official Name of an Order 1 Administrative Area (Country)` may have two values: `Japan` and `Nippon`. If the separator above is used, the value for `Official Name` will become `Japan|||Nippon`. It is useful to have known strings as separators when automatically splitting these strings during future processing.

#### Example:

A typical mapping file fragment specifying the separator as a colon looks like:

```
GDF_MULTIPLE_VALUE_SEPARATOR :
```

Also, to represent multiple values, the GDF Reader will output a list of attributes in the form:

```
Official Name{0} = Japan  
Official Name{1} = Nippon
```

### IGNORE\_METADATA\_HEADER

This option supersedes the previous `IGNORE_03_RECORDS`. The value for this keyword should be `Yes` or `No`. The default is `No`. This indicates if the user wants to ignore the `FIELDEFREC (03)` and `RECDEFREC (04)` records in the GDF file, or parse and honor them. If selected, all `FIELDEFREC (03)` records and `RECDEFREC (04)` in the file will be ignored when reading. This is useful for reading files with corrupt metadata. Without ignoring these corrupt lines, the file could not be read correctly. However, if the dataset is encoded in a schema different from the default one provided by the reader and the `FIELDEFREC (03)` and `RECDEFREC (04)` records for that dataset are corrupted, it will be impossible for the reader to read the dataset.

#### Example:

A typical mapping file fragment specifying that the metadata from the dataset header should be ignored looks like:

```
GDF_IGNORE_METADATA_HEADER No
```

### CODE\_LOOKUP

This directive indicates if the user wants to replace the known codes of attribute names with their actual expanded name for each feature. If selected, all features will have the code values of their attribute names replaced. For example, an attribute `ON` will be renamed to `Official Name`. If this option is not enabled, all features will have their attribute names left as the original codes.

A typical mapping file fragment specifying that codes not be completed on each feature looks like:

**Values:** *YES* | *NO*

**Default Value:** *YES*

**Example:**

```
GDF_CODE_LOOKUP No
```

## Writer Overview

Creating a GDF file currently involves a significant amount of customization. All features sent to the GDF writer are assumed to be in the "linked" structure as outlined in the feature representation section. The order of these features must also be correctly determined before sending them to the writer.

Future versions of the GDF writer may acquire more intelligence and be able to correctly produce the necessary "linked" features automatically, given regular lines, polygons, etc; currently, however, custom mapping files are required.

Producing a meaningful GDF file as output will require setting up a custom mapping file that describes the details of your input schema for the following reasons:

- Generic (automatic) translations usually work for most formats because they are so simple. (If some road has an attribute "length" in the source, it makes sense to make an attribute called "length" in the destination.) However, GDF is a special case. GDF is so incredibly complex that such a "best guess" is impossible. Translating most formats does not require the understanding of a schema, just knowledge of it. In GDF, the FME not only needs to know the schema of the input data, but it must actually understand the meaning as well.
- GDF has hundreds, if not thousands, of predefined attributes and values that features can have. When FME is given a source dataset without any indication which attributes in the source data should be used to fill in the required attribution in the output GDF file, most of this information will be lost. (There is no way to "guess" at the feature code value for any road when all it is given is a source file with no knowledge of the meaning of the schema or input data.) Therefore, an "automatic" translation will usually not generate anything useful. What needs to happen is that

a user needs to create a custom mapping file that tells the FME where to find all the required GDF data within their specific source dataset.

- If `gdf_fielddefrec` features are written, their field width definitions will be honored. This allows the user to dynamically define custom field widths for use in the GDF files produced. This is useful, for example, in creating both TeleAtlas Multinet 3.1 and 3.2 GDF files, which use different field widths in several records.

## Writer Directives

This section lists the directives processed by the GDF Writer. The suffixes shown are prefixed by the current `<WriterKeyword>` in a mapping file. By default, the `<WriterKeyword>` for the GDF writer is `GDF`.

### DATASET

**Required/Optional:** *Required*

The value for this directive is the file where the output GDF data set should be written to.

**Example:**

```
GDF_DATASET /usr/data/navigate/surrey.gdf
```

### SPECIFICATION

**Required/Optional:** *Optional*

Sets the specification that should be used when writing the output GDF file.

**Values:** *CEN, NAVTEQ, NAVTECH (deprecated), TELEATLAS, or BESTGUESS*

This indicates which GDF specification will be used when creating the output GDF file.

A value of `CEN` means that the official CEN 3.0 specification will be used. The values `NAVTEQ` and `TELEATLAS` indicates that the NAVTEQ or TeleAtlas variants of the GDF specification should be used, respectively. The value `BESTGUESS` tells the GDF reader to use an intelligent guess as to which specification to use, based on the header of the GDF file it is overwriting, if any.

**Default value:** *BESTGUESS*

**Example:**

```
GDF_SPECIFICATION CEN
```

## Feature Representation

Special FME feature attributes are used to hold GDF information. The GDF writer will use these attribute values as it fills in GDF records during output. The GDF reader will set these attributes in the FME feature it creates for each feature it reads.

FME does not typically concern itself with the value of the *FME feature type* of a GDF feature. The GDF writer will ignore the feature type and instead look for the value of the `gdf_type` attribute to know how to correctly write each feature. The feature type set by the reader will be set to the `gdf_type` value without the "gdf\_" prefix (and uppercase if the feature corresponds directly to a GDF record type). Subsequent subsections describe parameters specific to each of the supported feature types.

In previous versions of the GDF plug-in, FME ignored the value of the FME feature type of a GDF feature. The GDF writer now uses the FME feature type attribute to correctly write each feature, and will ignore those that do not correspond to GDF primitive record types. The feature type will be set by the reader to either the value without the "gdf\_" prefix (and GDF record type in uppercase), or a geometry type in lowercase, such as `gdf_level_1_point`.

Attribute Name	Contents
<code>gdf_type</code>	<p>The FME name for the type of element this feature represents.</p> <p><b>Range:</b> See the table in the <i>Overview</i> subsection.</p> <p><b>Default:</b> No default</p>

Level 1 and Level 2 features may also contain attributes from the GDF specification as well as user-defined attributes.

For example, if a user-defined postal code attribute is included, the following attributes will be present on the feature:

- "Custom Postal Code" - holds the actual value of this attribute
- "Custom Postal Code\_ABS\_REL" - indicates whether absolute or relative curvilinear positions are stored.
- "Custom Postal Code\_ATT\_DIR" - holds the direction(s) for which this attribute is valid.

For example, if a standard GDF attribute such as "official name" (ON) is included, the following attributes will be present on the feature:

- "Official Name" - holds the actual value of this attribute.
- "Official Name\_ABS\_REL" - indicates whether absolute or relative curvilinear positions are stored.
- "Official Name\_ATT\_DIR" - holds the direction(s) for which this attribute is valid.
- "Official Name\_DESCRIPTION\_ID" - Source Description Identifier ID. Number of a source document for the attribute.
- "Official Name\_LANGUAGE" - The MARC language of the specified name.
- "Official Name\_NAME\_DESCRIPTION\_ID" - Source Description Identifier ID. Number of a source document for the name.

Some attributes are actually composite attributes, meaning they are groups of values that together have a particular meaning. At this point, this representation of composites is handled only by the GDF reader. For example, Direction of Traffic Flow may have different restrictions for bicycles than they do for passenger vehicles. These composite attributes will be represented as follows:

- “Composite Direction of Traffic Flow” - `{{Direction of Traffic Flow=4}}{Vehicle Type=10}}`

The outer bracket pair shows that the contained values refer to each other and the inner brackets mark each particular value. In some cases, a composite may contain other composites. In certain instances, it may be inconvenient to deal with such a structure, but composites are also represented on a feature in a list format as follows:

- “Composite Direction of Traffic Flow{0}.Direction of Traffic Flow” = 4
- “Composite Direction of Traffic Flow{0}.Vehicle Type” = 10

---

**Note:** In the case of composite attributes, the ABS\_REL and ATT\_DIR will only appear on the top level (that is, they won't be included for subattributes).

---

All the standard GDF attributes as well as user-defined attributes are concatenated together as a single string provided in an attribute `gdf_all_attributes`. The attribute names are followed by their values in this string.

All features will have the following attributes: `gdf_volume_id`, `gdf_dataset_id`, `gdf_section_id`, and `gdf_layer_id` where applicable. These values are taken from the header of the corresponding record and attached to the feature. A feature will only have these IDs for its level and those levels that are higher, provided that the ID value is specified.

## level\_0\_point

**gdf\_type:** `gdf_level_0_point`

The geometry of this type of feature is a point. This feature does not contain any attributes from the GDF specification or user-defined attributes but does have the attributes listed below:

Attribute Name	Contents
KNOTREC_XYZ_ID	Please refer to the official GDF specifications for details on the description of this attribute and possible range restrictions. <b>Range:</b> 0-2147483647 <b>Default:</b> No Default
KNOTREC_KNOT_ID	Please refer to the official GDF specifications for details on the description of this attribute and possible range restrictions. <b>Range:</b> 0-2147483647 <b>Default:</b> No Default
KNOTREC_FACE_ID	Please refer to the official GDF specifications for details on the description of this attribute and possible range restrictions. <b>Range:</b> 0-2147483647 <b>Default:</b> No Default

Attribute Name	Contents
KNOTREC_STATUS	Please refer to the official GDF specifications for details on the description of this attribute and possible range restrictions. <b>Range:</b> 0-99 <b>Default:</b> No Default

## level\_0\_line

**gdf\_type:** gdf\_level\_0\_line

The geometry of this type of feature is a line. This feature does not contain any attributes from the GDF specification or user-defined attributes but does have the attributes listed below:

Attribute Name	Contents
NEDGEREC_XYZ_ID	Please refer to the official GDF specifications for details on the description of this attribute and possible range restrictions. <b>Range:</b> 0-2147483647 <b>Default:</b> No Default
NEDGEREC_EDGE_ID	Please refer to the official GDF specifications for details on the description of this attribute and possible range restrictions. <b>Range:</b> 0-2147483647 <b>Default:</b> No Default
NEDGEREC_FKNOT_ID	Please refer to the official GDF specifications for details on the description of this attribute and possible range restrictions. <b>Range:</b> 0-2147483647 <b>Default:</b> No Default
NEDGEREC_TKNOT_ID	Please refer to the official GDF specifications for details on the description of this attribute and possible range restrictions. <b>Range:</b> 0-2147483647 <b>Default:</b> No Default
NEDGEREC_LFACE_ID	Please refer to the official GDF specifications for details on the description of this attribute and possible range restrictions. <b>Range:</b> 0-2147483647 <b>Default:</b> No Default
NEDGEREC_RFACE_ID	Please refer to the official GDF specifications for details on the description of this attribute and possible range restrictions. <b>Range:</b> 0-2147483647 <b>Default:</b> No Default

Attribute Name	Contents
NEDGEREC_STATUS	Please refer to the official GDF specifications for details on the description of this attribute and possible range restrictions. <b>Range:</b> 0-99 <b>Default:</b> No Default

## level\_0\_polygon

**gdf\_type:** gdf\_level\_0\_polygon

The geometry of this type of feature is a polygon. This feature does not contain any attributes from the GDF specification or user-defined attributes but does have the attributes listed below:

Attribute Name	Contents
FACEREC_FACE_ID	Please refer to the official GDF specifications for details on the description of this attribute and possible range restrictions. <b>Range:</b> 0-2147483647 <b>Default:</b> No Default
FACEREC_NUM_EDGE{ } . EDGE_ID FACEREC_NUM_EDGE{ } . ORIENT	These are list attributes that hold the NEDGEREC_EDGE_ID numbers of all the edges (NEDGEREC) that are connected to this feature. The orientation these edges are connected with are also stored. <b>Range:</b> 0-2147483647 <b>Default:</b> No Default

## level\_1\_point

**gdf\_type:** gdf\_level\_1\_point

The geometry of this type of feature is a point. As outlined above, this feature may contain attributes from the GDF specification as well as user-defined attributes along with the attributes listed below:

Attribute Name	Contents
POFEREC_POINT_ID	Please refer to the official GDF specifications for details on the description of this attribute and possible range restrictions. <b>Range:</b> 0-2147483647 <b>Default:</b> No Default
POFEREC_DESC_ID	Please refer to the official GDF specifications for details on the description of this attribute and possible range restrictions. <b>Range:</b> 0-99999 <b>Default:</b> No Default

Attribute Name	Contents
POFEREC_FEAT_CODE	Please refer to the official GDF specifications for details on the description of this attribute and possible range restrictions. <b>Range:</b> 0-9999 <b>Default:</b> No Default
POFEREC_NUM_ATT{ }.SATT_ID	This is a list attribute that holds the DSATREC_SATT_ID numbers of all the segmented attributes (DSATREC) that are connected to this feature. <b>Range:</b> 0-2147483647 <b>Default:</b> No Default
POFEREC_NUM_KNOT{ }.KNOT_ID	This is a list attribute that holds the KNOTREC_KNOT_ID numbers of all the knots (KNOTREC) that are connected to this feature. <b>Range:</b> 0-2147483647 <b>Default:</b> No Default
gdf_theme_type	Please refer to the official GDF specifications for details on the description of GDF themes. <b>Range:</b> 254 character string <b>Default:</b> No Default
gdf_feature_type	Please refer to the official GDF specifications for details on the description of GDF feature types. <b>Range:</b> 254 character string <b>Default:</b> No Default

## level\_1\_line

**gdf\_type:** gdf\_level\_1\_line

The geometry of this type of feature is a line. As outlined above, this feature may contain attributes from the GDF specification as well as user-defined attributes along with the attributes listed below:

Attribute Name	Contents
LINFREC_LIFE_ID	Please refer to the official GDF specifications for details on the description of this attribute and possible range restrictions. <b>Range:</b> 0-2147483647 <b>Default:</b> No Default
LINFREC_DESC_ID	Please refer to the official GDF specifications for details on the description of this attribute and possible range restrictions. <b>Range:</b> 0-99999 <b>Default:</b> No Default

Attribute Name	Contents
LINFREC_FEAT_CODE	Please refer to the official GDF specifications for details on the description of this attribute and possible range restrictions. <b>Range:</b> 0-9999 <b>Default:</b> No Default
LINFREC_SPLIT_IND	Please refer to the official GDF specifications for details on the description of this attribute and possible range restrictions. <b>Range:</b> 0-9 <b>Default:</b> No Default
LINFREC_FROM_ID	Please refer to the official GDF specifications for details on the description of this attribute and possible range restrictions. <b>Range:</b> 0-2147483647 <b>Default:</b> No Default
LINFREC_TO_ID	Please refer to the official GDF specifications for details on the description of this attribute and possible range restrictions. <b>Range:</b> 0-2147483647 <b>Default:</b> No Default
LINFREC_NUM_ATT{ }.SATT_ID	This is a list attribute that holds the DSATREC_SATT_ID numbers of all the segmented attributes (DSATREC) that are connected to this feature. <b>Range:</b> 0-2147483647 <b>Default:</b> No Default
LINFREC_NUM_EDGE{ }.EDGE_ID LINFREC_NUM_EDGE{ }.POS_NEG	These are list attributes that hold the NEDGEREC_EDGE_ID numbers of all the edges (NEDGEREC) that are connected to this feature. The direction these edges are connected are also stored. <b>Range:</b> 0-2147483647 <b>Default:</b> No Default
gdf_theme_type	Please refer to the official GDF specifications for details on the description of GDF themes. <b>Range:</b> 254 character string <b>Default:</b> No Default
gdf_feature_type	Please refer to the official GDF specifications for details on the description of GDF feature types. <b>Range:</b> 254 character string <b>Default:</b> No Default

## level\_1\_polygon

**gdf\_type:** gdf\_level\_1\_polygon

The geometry of this type of feature is a polygon. As outlined above, this feature may contain attributes from the GDF specification as well as user-defined attributes along with the attributes listed below:

Attribute Name	Contents
ARFEREC_AREA_ID	Please refer to the official GDF specifications for details on the description of this attribute and possible range restrictions. <b>Range:</b> 0-2147483647 <b>Default:</b> No Default
ARFEREC_DESC_ID	Please refer to the official GDF specifications for details on the description of this attribute and possible range restrictions. <b>Range:</b> 0-99999 <b>Default:</b> No Default
ARFEREC_FEAT_CODE	Please refer to the official GDF specifications for details on the description of this attribute and possible range restrictions. <b>Range:</b> 0-9999 <b>Default:</b> No Default
ARFEREC_SPLIT_IND	Please refer to the official GDF specifications for details on the description of this attribute and possible range restrictions. <b>Range:</b> 0-9 <b>Default:</b> No Default
ARFEREC_NUM_ATT{ }.SATT_ID	This is a list attribute that holds the DSATREC_SATT_ID numbers of all the segmented attributes (DSATREC) that are connected to this feature. <b>Range:</b> 0-2147483647 <b>Default:</b> No Default
ARFEREC_NUM_FACE{ }.FACE_ID	This is a list attribute that holds the FACEREC_FACE_ID numbers of all the faces (FACEREC) that are connected to this feature. <b>Range:</b> 0-2147483647 <b>Default:</b> No Default
gdf_theme_type	Please refer to the official GDF specifications for details on the description of GDF themes. <b>Range:</b> 254 character string <b>Default:</b> No Default
gdf_feature_type	Please refer to the official GDF specifications for details on the description of GDF feature types. <b>Range:</b> 254 character string <b>Default:</b> No Default

## level\_2\_point

**gdf\_type:** gdf\_level\_2\_point

The geometry of this type of feature is a point. As outlined above, this feature may contain attributes from the GDF specification as well as user-defined attributes along with the attributes listed below:

Attribute Name	Contents
COMPFEREC_COMF_ID	Please refer to the official GDF specifications for details on the description of this attribute and possible range restrictions. <b>Range:</b> 0-2147483647 <b>Default:</b> No Default
COMPFEREC_DESC_ID	Please refer to the official GDF specifications for details on the description of this attribute and possible range restrictions. <b>Range:</b> 0-99999 <b>Default:</b> No Default
COMPFEREC_FEAT_CODE	Please refer to the official GDF specifications for details on the description of this attribute and possible range restrictions. <b>Range:</b> 0-9999 <b>Default:</b> No Default
COMPFEREC_SPLIT_IND	Please refer to the official GDF specifications for details on the description of this attribute and possible range restrictions. <b>Range:</b> 0-9 <b>Default:</b> No Default
COMPFEREC_NUM_ATT{ }.SATT_ID	This is a list attribute that holds the DSATREC_SATT_ID numbers of all the segmented attributes (DSATREC) that are connected to this feature. <b>Range:</b> 0-2147483647 <b>Default:</b> No Default
COMPFEREC_NUM_PARTS{ }.FEAT_ID COMPFEREC_NUM_PARTS{ }.FEAT_CAT	These are list attributes that hold the ID numbers of all the members (POFEREC, LINFREC, ARFEREC, or COMPFEREC) that are connected to this feature. The category of the member is also stored. (Point = 1, Line = 2, Area = 3, Complex = 4) <b>Range:</b> 0-2147483647 <b>Default:</b> No Default
gdf_theme_type	Please refer to the official GDF specifications for details on the description of GDF themes. <b>Range:</b> 254 character string <b>Default:</b> No Default
gdf_feature_type	Please refer to the official GDF specifications for details on the description of GDF feature types. <b>Range:</b> 254 character string <b>Default:</b> No Default

## level\_2\_line

**gdf\_type:** gdf\_level\_2\_line

The geometry of this type of feature is a line. As outlined above, this feature may contain attributes from the GDF specification as well as user-defined attributes along with the attributes listed below:

Attribute Name	Contents
COMPFEREC_COMF_ID	Please refer to the official GDF specifications for details on the description of this attribute and possible range restrictions. <b>Range:</b> 0-2147483647 <b>Default:</b> No Default
COMPFEREC_DESC_ID	Please refer to the official GDF specifications for details on the description of this attribute and possible range restrictions. <b>Range:</b> 0-99999 <b>Default:</b> No Default
COMPFEREC_FEAT_CODE	Please refer to the official GDF specifications for details on the description of this attribute and possible range restrictions. <b>Range:</b> 0-9999 <b>Default:</b> No Default
COMPFEREC_SPLIT_IND	Please refer to the official GDF specifications for details on the description of this attribute and possible range restrictions. <b>Range:</b> 0-9 <b>Default:</b> No Default
COMPFEREC_FROM_ID	Please refer to the official GDF specifications for details on the description of this attribute and possible range restrictions. <b>Range:</b> 0-2147483647 <b>Default:</b> No Default
COMPFEREC_TO_ID	Please refer to the official GDF specifications for details on the description of this attribute and possible range restrictions. <b>Range:</b> 0-2147483647 <b>Default:</b> No Default
COMPFEREC_NUM_ATT{ }.SATT_ID	This is a list attribute that holds the DSATREC_SATT_ID numbers of all the segmented attributes (DSATREC) that are connected to this feature. <b>Range:</b> 0-2147483647 <b>Default:</b> No Default

Attribute Name	Contents
COMPFEREC_NUM_PARTS{ }.FEAT_ID COMPFEREC_NUM_PARTS{ }.FEAT_CAT	These are list attributes that hold the ID numbers of all the members (POFEREC, LINFREC, ARFEREC, or COMPFEREC) that are connected to this feature. The category of the member is also stored. (Point = 1, Line = 2, Area = 3, Complex = 4) <b>Range:</b> 0-2147483647 <b>Default:</b> No Default
gdf_theme_type	Please refer to the official GDF specifications for details on the description of GDF themes. <b>Range:</b> 254 character string <b>Default:</b> No Default
gdf_feature_type	Please refer to the official GDF specifications for details on the description of GDF feature types. <b>Range:</b> 254 character string <b>Default:</b> No Default

## level\_2\_polygon

**gdf\_type:** gdf\_level\_2\_polygon

The geometry of this type of feature is a polygon. As outlined above, this feature may contain attributes from the GDF specification as well as user-defined attributes along with the attributes listed below:

Attribute Name	Contents
COMPFEREC_COMF_ID	Please refer to the official GDF specifications for details on the description of this attribute and possible range restrictions. <b>Range:</b> 0-2147483647 <b>Default:</b> No Default
COMPFEREC_DESC_ID	Please refer to the official GDF specifications for details on the description of this attribute and possible range restrictions. <b>Range:</b> 0-99999 <b>Default:</b> No Default
COMPFEREC_FEAT_CODE	Please refer to the official GDF specifications for details on the description of this attribute and possible range restrictions. <b>Range:</b> 0-9999 <b>Default:</b> No Default
COMPFEREC_SPLIT_IND	Please refer to the official GDF specifications for details on the description of this attribute and possible range restrictions. <b>Range:</b> 0-9 <b>Default:</b> No Default

Attribute Name	Contents
COMPFEREC_NUM_ATT{ }.SATT_ID	<p>This is a list attribute that holds the DSATREC_SATT_ID numbers of all the segmented attributes (DSATREC) that are connected to this feature.</p> <p><b>Range:</b> 0-2147483647  <b>Default:</b> No Default</p>
COMPFEREC_NUM_PARTS{ }.FEAT_ID COMPFEREC_NUM_PARTS{ }.FEAT_CAT	<p>These are list attributes that hold the ID numbers of all the members (POFEREC, LINFREC, ARFEREC, or COMPFEREC) that are connected to this feature. The category of the member is also stored. (Point = 1, Line = 2, Area = 3, Complex = 4)</p> <p><b>Range:</b> 0-2147483647  <b>Default:</b> No Default</p>
gdf_theme_type	<p>Please refer to the official GDF specifications for details on the description of GDF themes.</p> <p><b>Range:</b> 254 character string  <b>Default:</b> No Default</p>
gdf_feature_type	<p>Please refer to the official GDF specifications for details on the description of GDF feature types.</p> <p><b>Range:</b> 254 character string  <b>Default:</b> No Default</p>

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