

## Annex 2 (provision) G-XML most minimal component

**Introduction** This Annex prescribes the definitions and composition of the G-XML most minimal component.

**1 Scope** The G-XML most minimal component prescribes the parts for the description of the geospatial data context using Geospatial data Extensible Markup Language G-XML.

The abstract concepts expressed by the G-XML components must be the most minimal, their characteristics should not be distorted, and they can be reused to describe the contents of various geospatial data.

**1.1 Relationship with other provisions** The following indicates the relationship between the GXML most minimal component and other provisions of Geospatial data Extensible Markup Language G-XML

- **Document type definitions of Geospatial data Extensible Markup Language G-XML** Through definitions based on G-XML most minimal component rules and G-XML compound module rules, this indicates the markup rules in the documentation corresponding to the extensible markup language (XML),
- **G-XML most minimal component of Annex 1** Prescribes the structure for describing the geospatial data context in combination with the GXML most minimal component.
- **G-XML elements of Annex 3** Indicates the elements of extensible markup language (XML), targeting the G-XML most minimal component.

**1.2 Table of contents of these provisions** The Table of contents of these provisions is as follows.

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3.24	Transformation most minimal component

**2. List of G-XML most minimal components** A list of G-XML most minimal components is shown in **Annex 2 Table 1**.

**Annex 2 Table 1 List of G-XML most minimal components**

Name of G-XML most minimal component	Location
Spatial reference system most minimal component	Prescribes the parts for describing the name of the collection of mathematical rules clarifying the assigned location in metric geospace.
Boundary most minimal component	Prescribes the parts for describing boundaries of metric geospace.
Metadata most minimal component	Prescribes the parts for describing the metadata related to geospatial data described by G-XML.
Spatial locator most minimal component	Prescribes the parts for describing location in metric geospace.
Temporal locator module	Prescribes the parts for describing location in time
Direction module	Prescribes the parts for describing direction
Status most minimal component	Prescribes the parts for describing mover status
Property most minimal component	Prescribes the parts for describing information enabling expression in combination with name, type, and value.
Name most minimal component	Prescribes the parts for describing name
Description most minimal component	Prescribes the parts for describing a description
Annotation most minimal component	Prescribes the parts for describing an annotation of a geospatial real image in a Cartesian coordinate system visualized by character string.

Name of G-XML most minimal component	Location
Symbol most minimal component	Prescribes the parts for describing an abstracted symbol of a geospatial real image in a Cartesian coordinate system.
Point most minimal component	Prescribes the parts for describing point, one of the geometry, enabled for rendering in a Cartesian coordinate system.
Line string most minimal component	Prescribes the parts for describing line string, one of the geometry, enabled for rendering in a Cartesian coordinate system.
Rectangle most minimal component	Prescribes the parts for describing rectangle, one of the geometry, enabled for rendering in a Cartesian coordinate system.
Linear ring most minimal component	Prescribes the parts for describing linear ring, one of the geometry, enabled for rendering in a Cartesian coordinate system.
Polygon most minimal component	Prescribes the parts for describing polygon, one of the geometry, enabled for rendering in a Cartesian coordinate system.
Circle most minimal component	Prescribes the parts for describing circle , one of the geometry, enabled for rendering in a Cartesian coordinate system.
Arc most minimal component	Prescribes the parts for describing arc, one of the geometry, enabled for rendering in a Cartesian coordinate system.
Rendering rule most minimal component	Prescribes the parts for describing rules specifying how geospatial data described by G-XML is rendered on a computer system.
Rendering rule list most minimal component	Prescribes the parts for describing a list of rendering rules referred to when applying rendering rules on geospatial data described by G-XML.
Location relationship most minimal component	Prescribes the parts for describing the location relationship of different objects as viewed from an object in geospace.
Coordinates most minimal component	Prescribes the parts for describing coordinates expressing a location in metric space.
Transformation most minimal component	Prescribes the parts for describing a method for projecting an object in a local Cartesian coordinate system in metric geospace.

**3. Definition and composition of each component** The G-XML most minimal component specifications are indicated per component in **3.1 - 3.24 of Annex 2**.

### **3.1 Spatial reference system most minimal component**

**3.1.1 Definition** The G-XML most minimal component prescribes the parts for describing names of the collection of mathematical rules for clarifying the assignment of locations in metric geospace.

In spatial reference system, for every different rule a uniform name is defined. The

rules for assigning locations in metric geospace are prescribed, by linking this name to the whole metric geospace.

**3.1.2 Composition** The spatial reference system most minimal component is indicated by spatial reference system attributes. There are no constituent elements.

For details of spatial reference system attributes, refer to **9 of Annex 3**.

## 3.2 Boundary most minimal component

**3.2.1 Definition** The G-XML most minimal component prescribes the parts for describing boundaries in metric geospace.

Boundaries are prescribed by rectangles in metric geospace.

**3.2.2 Composition** Root elements of XML elements pertaining to the boundary most minimal component are Boundary elements. Rectangles indicating boundary elements are coded by Rectangle elements, which are child elements.

A list of elements constituting the boundary most minimal component is shown in **Annex 2 Table 2**.

**Annex 2 Table 2 List of elements**

Element	Attribute	Details
Boundary element	None	Refer to <b>3.15 of Annex 3</b>
Rectangle element	identifier (id) attribute, category attribute	Refer to <b>3.16 of Annex 3</b>

## 3.3 Metadata most minimal component

**3.3.1 Definition** The G-XML most minimal component prescribes the parts for describing metadata linked to geospatial data described by G-XML.

Metadata is data for explaining Geospatial data Extensible Markup Language G-XML document data itself, and its specifications are determined by standards prescribed by Geographical Information Standard and standards describing the smallest possible information elements for explaining Geospatial data Extensible Markup Language G-XML

**3.3.2 Composition** Root elements of XML elements pertaining to the metadata most minimal component are Metadata elements. Metadata elements are coded by metadata elements in G-XML format (Metadata.gxml) and/or metadata elements in the Geographical Information Standard format (Metadata.gsi), which are child elements. Each indicate information described in accordance with standards prescribed by Geographical Information Standard and the smallest amount of information requires for explaining Geospatial data Extensible Markup Language G-XML.

A list of elements constituting the metadata most minimal component is shown in **Annex 2 Table 3**.

**Annex 2 Table 3 List of elements**

Element	Attribute	Details
Metadata element	None	Refer to <b>3.2 of Annex 3</b>
G-XML Metadata (Metadata.gxml) element	None	Refer to <b>3.3 of Annex 3</b>
Geographical Information Standard Style Metadata (Metadata.gsi) element	instance specification (hyperreference) attribute	Refer to <b>3.4 of Annex 3</b>

### 3.4 Spatial locator most minimal component

**3.4.1 Definition** The G-XML most minimal component prescribes the parts for describing location in geospace.

The spatial locator element is determined by either a geographical reference name such as an address or coordinates indicating location in a Cartesian coordination system or by a spatial locator indicated by another Geospatial data Extensible Markup Language G-XML document.

**3.4.2 Composition** Root elements of XML elements pertaining to the spatial locator most minimal component are Spatial Locator elements. Spatial locator elements are coded by one of the elements Coordinates, Georeference Name or G-XML Document Locator (G-XMLReferenceID), which are child elements. These respectively indicate spatial location indicated by geographical reference name such as location and address in a Cartesian coordinate system and location indicated by another Geospatial data Extensible Markup Language G-XML document.

A list of elements constituting the spatial locator most minimal component is shown in **Annex 2 Table 4**.

Annex 2 Table 4 List of elements

Element	Attribute	Details
Spatial Locator element	length unit (unit.length) attribute, horizontal location accuracy (location.horizontal) attribute, vertical location accuracy (accuracy.location.vertical) attribute, certainty attribute	Refer to <b>3.33 of Annex 3</b>
Coordinates element	decimal point (decimal) attribute, value separator attribute, tuple separator attribute, spatial reference system attribute, location unit (unit.location) attribute, horizontal location accuracy (accuracy.location.horizontal) attribute, vertical location accuracy (accuracy.location.vertical) attribute,	Refer to <b>3.17 of Annex 3</b>
Georeference Name element	None	Refer to <b>3.36 of Annex 3</b>
G-XML Document Locator (G-XMLReferenceID) element	instance specification (hyperreference) attribute	Refer to <b>3.65 of Annex 3</b>

### 3.5 Temporal locator most minimal component

**3.5.1 Definition** The G-XML most minimal component prescribes the parts for describing location in time.

The temporal locator element is prescribed by either continuous time indicating time length, or time span indicating a line-like location in time, or time indicating a point-like location in time.

**3.5.2 Composition** Root elements of XML elements pertaining to the temporal locator most minimal component are Temporal Locator elements. Temporal Locator elements are coded by either the Time (At) element, the Time Period (Span) element, or the Continuous Time (Duration) element, which are child elements. These respectively indicate a point-like location in time, a line-like location in time, or the length of time.

A list of elements constituting the temporal locator most minimal component is shown in **Annex 2 Table 5**.

Annex 2 Table 5 List of elements

Element	Attribute	Details
Temporal Locator element	time unit (unit.time) attribute, time accuracy (accuracy.time) attribute, certainty attribute	Refer to <b>3.34 of Annex 3</b>
Time (At) element	time value (time) attribute, frequency attribute, time unit (unit.time) attribute, time accuracy (accuracy.time) attribute	Refer to <b>3.66 of Annex 3</b>
Time Period (Span) element	start time attribute, end time attribute, frequency attribute, time unit (unit.time) attribute, time accuracy (accuracy.time) attribute	Refer to <b>3.67 of Annex 3</b>

Element	Attribute	Details
Continuous Time (Duration) element	time value (time) attribute, time unit (unit.time) attribute, time accuracy (accuracy.time) attribute	Refer to <b>3.68 of Annex 3</b>

### 3.6 Direction most minimal component

**3.6.1 Definition** The G-XML most minimal component prescribes the parts for describing direction.

Determined by vector value or angle degree, the direction element can be indicated by the scalar element corresponding to that direction.

**3.6.2 Composition** Root elements of XML elements pertaining to the direction most minimal component are Direction elements. Direction is coded by the Scalar Quantity (Scalar) element and one of the Vector or Angle elements, which are child elements. The Vector element and the Angle element respectively indicate direction indicated by vector value and direction indicated by angle. The Scalar Quantity element indicates the scalar quantity corresponding to the direction indicated by the Vector element or the Angle element, for example, in the same way as wind speed corresponds to wind direction.

A list of elements constituting the direction most minimal component is shown in **Annex 2 Table 6**.

**Annex 2 Table 6 List of elements**

Element	Attribute	Details
Direction element	angle unit (unit.angle) attribute, angle accuracy (accuracy.angle) attribute, certainty attribute	Refer to <b>3.35 of Annex 3</b>
Vector element	equatorial direction attribute, meridian direction attribute, plumb direction attribute	Refer to <b>3.69 of Annex 3</b>
Angle element	None	Refer to <b>3.71 of Annex 3</b>
Scalar Quantity (Scalar) element	name attribute, location unit (unit.location) attribute, speed unit (unit.speed) attribute, user define unit (unit.userdefine) attribute, horizontal location accuracy (accuracy.location.horizontal) attribute, vertical location accuracy (accuracy.location.vertical) attribute, speed accuracy (accuracy.speed) attribute, user define accuracy (accuracy.userdefine) attribute	Refer to <b>3.70 of Annex 3</b>

### 3.7 Status most minimal component

**3.7.1 Definition** The G-XML most minimal component prescribes the parts for describing the mover status. Status is prescribed by the direction or speed of the mover in addition to property indicating the method of moving, amongst others.

**3.7.2 Composition** Root elements of XML elements pertaining to the status most minimal component are Status elements. Status is coded by the Direction element and the Property element. The Direction element indicates the direction of movement and the speed. Amongst others, the Property element indicates the method of movement.

A list of elements constituting the status most minimal component is shown in **Annex 2 Table 7**.

**Annex 2 Table 7 List of elements**

Element	Attribute	Details
Status element	None	Refer to <b>3.83 of Annex 3</b>
Direction element	angle unit (unit.angle) attribute, angle accuracy (accuracy.angle) attribute, certainty attribute	Refer to <b>3.35 of Annex 3</b>
Property element	property type name attribute, data type attribute	Refer to <b>3.9 of Annex 3</b>

### 3.8 Property most minimal component

**3.8.1 Definition** The G-XML most minimal component prescribes the parts for describing information enabling expression by a combination of name, type, and value.

Property is determined by the combination of name, type, and value.

**3.8.2 Composition** Root elements of XML elements pertaining to the property most minimal component are Property elements while property is coded by a combination of these elements and attributes.

A list of elements constituting the property most minimal component is shown in **Annex 2 Table 8**.

**Annex 2 Table 8 List of elements**

Element	Attribute	Details
Property element	property type name attribute, data type attribute	Refer to <b>3.9 of Annex 3</b>

### 3.9 Name most minimal component

**3.9.1 Definition** The G-XML most minimal component prescribes the parts for describing name.

Name is determined by a simple character string.

**3.9.2 Composition** Root elements of XML elements pertaining to the name most minimal component are Name elements while as for the contents of these elements, the name is coded by described character strings.

A list of elements constituting the name most minimal component is shown in **Annex 2 Table 9**.

**Annex 2 Table 9 List of elements**

Element	Attribute	Details
Name element	name type attribute, ruby attribute	Refer to <b>3.5 of Annex 3</b>

### 3.10 Description most minimal component

**3.10.1 Definition** The G-XML most minimal component prescribes the parts for describing description.

Description is determined by a simple character string.

**3.10.2 Composition** Root elements of XML elements pertaining to the description most minimal component are Description elements while as for the contents of these elements, the description is coded by described character strings.

A list of elements constituting the description most minimal component is shown in **Annex 2 Table 10**.

**Annex 2 Table 10 List of elements**

Element	Attribute	Details
Description element	None	Refer to <b>3.8 of Annex 3</b>

### 3.11 Annotation most minimal component

**3.11.1 Definition** The G-XML most minimal component prescribes the parts for describing annotation of real images in geospace in a Cartesian coordinate system, visualized by character string elements.

Annotation is prescribed by the size of the character string and the contents of the character string, and by the coordinates indicating disposition and location in a Cartesian coordinate system of visualized character strings. As for the coordinates, coordinate values consist of one or two sets. When the coordinate values form one set, the location indicated by this coordinate value expresses the location of a real image of geospace, while expressing the disposition location of character strings at the same time. When the coordinate value consists of two sets, the location indicated by the coordinate value of the first set expresses the location of a real image of geospace, while the location indicated by the coordinate value of the second set expresses the disposition location of character strings. It is also possible to describe the rendering style of annotation.

**3.11.2 Composition** Root elements of XML elements pertaining to the annotation most minimal component are Annotation elements. Coordinates indicating disposition and location in a Cartesian coordinate system of visualized character strings, are coded by Coordinate elements, which are child elements. The size of visualized character strings, are coded by Size elements, which are child elements. The contents of visualized character strings are coded by Content elements, which are child elements. The rendering style for annotation is coded by Rendering Rule elements and Rendering Rule List elements, which are child elements.

A list of elements constituting the annotation most minimal component is shown in **Annex 2 Table 11**.

**Annex 2 Table 11 List of elements**

Element	Attribute	Details
Annotation element	identifier (id) attribute, category attribute	Refer to <b>3.27 of Annex 3</b>
Rendering Rule List element	None	Refer to <b>3.105 of Annex 3</b>
Rendering Rule element	identifier (id) attribute	Refer to <b>3.104 of Annex 3</b>
Coordinates element	decimal point (decimal) attribute, value separator attribute, tuple separator attribute, spatial reference system attribute, location unit (unit.location) attribute, horizontal location accuracy (accuracy.location.horizontal) attribute,	Refer to <b>3.17 of Annex 3</b>

Element	Attribute	Details
	vertical location accuracy (accuracy.location.vertical) attribute	
Size element	width attribute, height attribute, length unit (unit.length) attribute, length accuracy (accuracy.length) attribute	Refer to <b>3.29 of Annex 3</b>
Content element	None	Refer to <b>3.28 of Annex 3</b>

### 3.12 Symbol most minimal component

**3.12.1 Definition** The G-XML most minimal component prescribes the parts for describing symbols symbolizing geospatial real images in a Cartesian coordinate system.

Symbol is prescribed by the symbol name indicating symbol size and symbol type, and by coordinates indicating location in a Cartesian coordinate system.

As for the coordinates, coordinate values consist of one set. It is also possible to describe the rendering style of symbol.

**3.12.2 Composition** Root elements of XML elements pertaining to the symbol most minimal component are Symbol elements. Coordinates indicating location of symbols in a Cartesian coordinate system, are coded by Coordinates elements, which are child elements. The symbol size is coded by Size elements, which are child elements. The symbol name indicating symbol type are coded by Symbol Name elements, which are child elements. The rendering style for symbol is coded by Rendering Rule elements and Rendering Rule List elements, which are child elements.

A list of elements constituting the symbol most minimal component is shown in **Annex 2 Table 12**.

**Annex 2 Table 12 List of elements**

Element	Attribute	Details
Symbol element	identifier (id) attribute, category attribute	Refer to <b>3.30 of Annex 3</b>
Rendering Rule List element	None	Refer to <b>3.105 of Annex 3</b>
Rendering Rule element	identifier (id) attribute	Refer to <b>3.104 of Annex 3</b>
Coordinates element	decimal point (decimal) attribute, value separator attribute, tuple separator attribute, spatial reference system attribute, location unit (unit.location) attribute, horizontal location accuracy (accuracy.location.horizontal) attribute, vertical location accuracy (accuracy.location.vertical) attribute	Refer to <b>3.17 of Annex 3</b>

Element	Attribute	Details
Size element	width attribute, height attribute, length unit (unit.length) attribute, length accuracy (accuracy.length) attribute	Refer to <b>3.29 of Annex 3</b>
Symbol Name element	None	Refer to <b>3.31 of Annex 3</b>

### 3.13 Point most minimal component

**3.13.1 Definition** The G-XML most minimal component prescribes the parts for describing a point, which is one geometry, enabled for rendering in a Cartesian coordinate system.

A point is a geometry of 0 dimensions having a location. The location of a point is determined by the coordinates indicating location in a Cartesian coordinate system.

As for the coordinates, coordinate values consist of one set. It is also possible to describe the rendering style of point.

**3.13.2 Composition** Root elements of XML elements pertaining to the point most minimal component are Point elements. Coordinates indicating location of points in a Cartesian coordinate system, are coded by Coordinate elements, which are child elements. The rendering style for point is coded by Rendering Rule elements and Rendering Rule List elements, which are child elements.

A list of elements constituting the point most minimal component is shown in **Annex 2 Table 13**.

**Annex 2 Table 13 List of elements**

Element	Attribute	Details
Point element	identifier (id) attribute, category attribute	Refer to <b>3.18 of Annex 3</b>
Rendering Rule List element	None	Refer to <b>3.105 of Annex 3</b>
Rendering Rule element	identifier (id) attribute	Refer to <b>3.104 of Annex 3</b>
Coordinates element	decimal point (decimal) attribute, value separator attribute, tuple separator attribute, spatial reference system attribute, location unit (unit.location) attribute, horizontal location accuracy (accuracy.location.horizontal) attribute, vertical location accuracy (accuracy.location.vertical) attribute	Refer to <b>3.17 of Annex 3</b>

### 3.14 Line string most minimal component

**3.14.1 Definition** The G-XML most minimal component prescribes the parts for describing a line string, which is one geometry, enabled for rendering in a Cartesian

coordinate system.

A line string is a geometry that connects a side of a limited straight line in a linear way. The location of the endpoint of a side is prescribed by coordinates indicating location in a Cartesian coordinate system. As for the coordinates, coordinate values consist of minimally two sets where the sides are linked in order. It is also possible to describe the rendering style of line string.

**3.14.2 Composition** Root elements of XML elements pertaining to the line string most minimal component are Line String elements. The location of endpoints of a side constituting a line string are coded by Coordinates elements, which are child elements. The rendering style for line string is coded by Rendering Rule elements and Rendering Rule List elements, which are child elements.

A list of elements constituting the line string most minimal component is shown in **Annex 2 Table 14**.

**Annex 2 Table 14 List of elements**

Element	Attribute	Details
Line String element	identifier (id) attribute, category attribute	Refer to <b>3.19 of Annex 3</b>
Rendering Rule List element	None	Refer to <b>3.105 of Annex 3</b>
Rendering Rule element	identifier (id) attribute	Refer to <b>Annex 3 3.104</b>
Coordinates element	decimal point (decimal) attribute, value separator attribute, tuple separator attribute, spatial reference system attribute, location unit (unit.location) attribute, horizontal location accuracy (accuracy.location.horizontal) attribute, vertical location accuracy (accuracy.location.vertical) attribute	Refer to <b>3.17 of Annex 3</b>

### 3.15 Rectangle most minimal component

**3.15.1 Definition** The G-XML most minimal component prescribes the parts for describing a rectangle, which is one geometry, enabled for rendering in a Cartesian coordinate system.

A rectangle is a geometry that connects sides formed by limited straight lines to a rectangular shape, where by each side is parallel to the axis of a Cartesian coordinate system. The location of the endpoint of a side is prescribed by coordinates indicating location in a Cartesian coordinate system. As for the coordinates, coordinate values consist of two sets, with the first set of coordinate values representing the smallest coordinate values which indicate the location of an endpoint of a side constituting the rectangle, and the second set of coordinate values representing the largest coordinate values which indicate the location of an endpoint of a side constituting the rectangle. It is also possible to describe the rendering style of rectangle.

**3.15.2 Composition** Root elements of XML elements pertaining to the rectangle most minimal component are Rectangle elements. The location of endpoints of a side constituting a rectangle are coded by Coordinates elements, which are child elements. The rendering style for rectangle is coded by Rendering Rule elements and Rendering Rule List elements, which are child elements.

A list of elements constituting the rectangular most minimal component is shown in **Annex 2 Table 15**.

**Annex 2 Table 15 List of elements**

Element	Attribute	Details
Rectangle element	identifier (id) attribute, category attribute	Refer to <b>3.16 of Annex 3</b>
Rendering Rule List element	None	Refer to <b>3.105 of Annex 3</b>
Rendering Rule element	identifier (id) attribute	Refer to <b>3.104 of Annex 3</b>
Coordinates element	decimal point (decimal) attribute, value separator attribute, tuple separator attribute, spatial reference system attribute, location unit (unit.location) attribute, horizontal location accuracy (accuracy.location.horizontal) attribute, vertical location accuracy (accuracy.location.vertical) attribute	Refer to <b>3.17 of Annex 3</b>

### 3.16 Linear ring most minimal component

**3.16.1 Definition** The G-XML most minimal component prescribes the parts for describing a linear ring, which is one geometry, enabled for rendering in a Cartesian coordinate system.

A linear ring is a geometry that connects a side formed by limited straight line in a circular way. The location of the endpoints of a side is determined by coordinates indicating location in a Cartesian coordinate system. Sides can not mutually intersect. As for the coordinates, coordinate values consist of minimally four sets. The respective values of the first set of coordinate values and the last set of coordinate values must be equal. In addition, the sides are linked in order of the coordinate values. It is also possible to describe the rendering style of linear ring.

**3.16.2 Composition** Root elements of XML elements pertaining to the linear ring most minimal component are Linear Ring elements. The location of endpoints of a side constituting a linear ring are coded by Coordinates elements, which are child elements. The rendering style for linear ring is coded by Rendering Rule elements and Rendering Rule List elements, which are child elements.

A list of elements constituting the linear ring most minimal component is shown in **Annex 2 Table 16**.

**Annex 2 Table 16 List of elements**

Element	Attribute	Details
Linear Ring element	identifier (id) attribute, category attribute	Refer to <b>3.23 of Annex 3</b>
Rendering Rule List element	None	Refer to <b>3.105 of Annex 3</b>
Rendering Rule element	identifier (id) attribute	Refer to <b>3.104 of Annex 3</b>
Coordinates element	decimal point (decimal) attribute, value separator attribute, tuple separator attribute, spatial reference system attribute, location unit (unit.location) attribute, horizontal location accuracy (accuracy.location.horizontal) attribute, vertical location accuracy (accuracy.location.vertical) attribute	Refer to <b>3.17 of Annex 3</b>

### 3.17 Polygon most minimal component

**3.17.1 Definition** The G-XML most minimal component prescribes the parts for describing a polygon, which is one geometry, enabled for rendering in a Cartesian coordinate system.

A polygon is a geometry that is surrounded by a linear ring. There is only one outer boundary. There are 0, 1, or more inner boundaries. Boundaries can not intersect with one another. It is also possible to describe the rendering style of polygon.

**3.17.2 Composition** Root elements of XML elements pertaining to the polygon most minimal component are Polygon elements. The outer boundary is coded by the Outer Boundary elements, which are child elements. The inner boundary is coded by the Inner Boundary elements, which are child elements. The rendering style for polygon is coded by Rendering Rule elements and Rendering Rule List elements, which are child elements.

A list of elements constituting the polygon most minimal component is shown in **Annex 2 Table 17**.

**Annex 2 Table 17 List of elements**

Element	Attribute	Details
Polygon element	identifier (id) attribute, category attribute	Refer to <b>3.20 of Annex 3</b>
Rendering Rule List element	None	Refer to <b>3.105 of Annex 3</b>
Rendering Rule element	identifier (id) attribute	Refer to <b>3.104 of Annex 3</b>
Outer Boundary element	identifier (id) attribute	Refer to <b>3.21 of Annex 3</b>
Inner Boundary element	identifier (id) attribute	Refer to <b>3.22 of Annex 3</b>

### 3.18 Circle most minimal component

**3.18.1 Definition** The G-XML most minimal component prescribes the parts for describing a circle, which is one geometry, enabled for rendering in a Cartesian coordinate system.

A circle is determined by three different points on a circumference expressed by coordinates displaying a location in a Cartesian coordinate system and a combination of a radius and a center indicated by coordinates displaying a location in a Cartesian coordinate system. As for the coordinates, coordinate values consist of one or three sets. When there is one set of coordinate values, the location indicated by these coordinate values expresses the center of the circle. When there are three sets of coordinate values, the respective locations shown by these coordinate values express points of a circumference. It is also possible to describe the rendering style of circle.

**3.18.2 Composition** Root elements of XML elements pertaining to the circle most minimal component are Circle elements. The location of the center of the circle or the three different points of a circumference are coded by the Coordinates elements, which are child elements. The radius is coded by the Radius elements, which are child elements. The rendering style for circle is coded by Rendering Rule elements and Rendering Rule List elements, which are child elements.

A list of elements constituting the circle most minimal component is shown in **Annex 2 Table 18**.

**Annex 2 Table 18 List of elements**

Element	Attribute	Details
Circle element	identifier (id) attribute, category attribute	Refer to <b>3.24 of Annex 3</b>
Rendering Rule List element	None	Refer to <b>3.105 of Annex 3</b>
Rendering Rule element	identifier (id) attribute	Refer to <b>3.104 of Annex 3</b>
Coordinates element	decimal point (decimal) attribute, value separator attribute, tuple separator attribute, spatial reference system attribute, location unit (unit.location) attribute, horizontal location accuracy (accuracy.location.horizontal) attribute, vertical location accuracy (accuracy.location.vertical) attribute	Refer to <b>3.17 of Annex 3</b>
Radius element	length unit (unit.length) attribute, length accuracy (accuracy.length) attribute	Refer to <b>3.26 of Annex 3</b>

### 3.19 Arc most minimal component

**3.19.1 Definition** The G-XML most minimal component prescribes the parts for describing an arc, which is one geometry, enabled for rendering in a Cartesian coordinate system.

An arc is a geometry pertaining to one part of a circle. An arc is prescribed by three different points on an arc expressed by coordinates displaying a location in a Cartesian coordinate system or a combination of the center of a circle and the angle of the arc as viewed from that center, indicated by coordinates displaying a location in a Cartesian coordinate system.

As for the coordinates, coordinate values consist of one or three sets. When there is one set of coordinate values, the location indicated by these coordinate values expresses the center of a part of the arc forming a circle. When there are three sets of

coordinate values, the respective locations shown by these coordinate values express two endpoints and a different point of the arc. It is also possible to describe the rendering style of arc.

**3.19.2 Composition** Root elements of XML elements pertaining to the arc most minimal component are Arc elements. The angle of the arc as viewed from the center of the circle, is specified by attributes of the Arc element. The location of the center of the circle of which the arc forms a part, or the three different points of the arc are coded by the Coordinates elements, which are child elements. The radius of the circle of which the arc forms one part, is coded by the Radius elements, which are child elements. The rendering style for arc is coded by Rendering Rule elements and Rendering Rule List elements, which are child elements.

A list of elements constituting the arc most minimal component is shown in **Annex 2 Table 19**.

**Annex 2 Table 19 List of elements**

Element	Attribute	Details
Arc element	identifier (id) attribute, category attribute, start angle attribute, end angle attribute, angle unit (unit.angle) attribute, angle accuracy (accuracy.angle) attribute	Refer to <b>3.25 of Annex 3</b>
Rendering Rule List element	None	Refer to <b>3.105 of Annex 3</b>
Rendering Rule element	identifier (id) attribute	Refer to <b>3.104 of Annex 3</b>

Element	Attribute	Details
Coordinates element	decimal point (decimal) attribute, value separator attribute, tuple separator attribute, spatial reference system attribute, location unit (unit.location) attribute, horizontal location accuracy (accuracy.location.horizontal) attribute, vertical location accuracy (accuracy.location.vertical) attribute	Refer to <b>3.17 of Annex 3</b>
Radius element	None	Refer to <b>3.26 of Annex 3</b>

### 3.20 Rendering rule most minimal component

**3.20.1 Definition** The G-XML most minimal component prescribes the parts for describing the specification rules for rendering geospatial data described by G-XML on a computer system.

The rendering rules are prescribed by directions enabling rendering in correspondence with the rendering equipment of the computer system.

**3.20.2 Composition** Root elements of XML elements pertaining to the rendering rule most minimal component are Rendering Rule elements. Rendering rules are coded by a combination of Point Style elements, Line Style elements, Face Style elements, Text Style elements, Symbol Style elements as well as Picture Style elements, which are child elements. These elements respectively indicate the point rendering rules, the line rendering rules, face rendering rules, character rendering rules, symbol rendering rules, and the picture rendering rules.

A list of elements constituting the rendering rule most minimal component is shown in **Annex 2 Table 20**.

**Annex 2 Table 20 List of elements**

Element	Attribute	Details
Rendering Rule element	identifier (id) attribute	Refer to <b>3.104 of Annex 3</b>
Point Style element	identifier (id) attribute, style name attribute, color attribute, size attribute, length unit (unit.length) attribute	Refer to <b>3.97 of Annex 3</b>
Line Style element	identifier (id) attribute, style name attribute, color attribute, line pattern attribute, length unit (unit.length) attribute	Refer to <b>3.98 of Annex 3</b>
Face Style element	identifier (id) attribute, style name attribute, foreground color attribute, background color attribute, face pattern attribute, length unit (unit.length) attribute	Refer to <b>3.99 of Annex 3</b>

Element	Attribute	Details
Text Style element	identifier (id) attribute, style name attribute, base line angle (baseangle) attribute, foreground color attribute, background color attribute, display size attribute, display lower limit attribute, font name (fontface) attribute, font style attribute, angle unit (unit.angle) attribute, length unit (unit.length) attribute, disposition attribute	Refer to <b>3.100 of Annex 3</b>
Symbol Style element	identifier (id) attribute, style name attribute, rotation angle attribute, foreground color attribute, background color attribute, display size attribute, display lower limit attribute, angle unit (unit.angle) attribute, length unit (unit.length) attribute, disposition attribute	Refer to <b>3.101 of Annex 3</b>
Picture Style element	identifier (id) attribute, style name attribute, transparency factor (alphavalue) attribute	Refer to <b>3.102 of Annex 3</b>

### 3.21 Rendering rule list most minimal component

**3.21.1 Definition** The G-XML most minimal component prescribes the parts for describing a list of rendering rules referred to when applying rendering rules to geospatial data described by G-XML.

The rendering rule list is prescribed by conditions prescribing applying rendering rules and conditions prescribing geospatial data described by G-XML targeting the application of rendering rules.

**3.21.2 Composition** Root elements of XML elements pertaining to the rendering rule list most minimal component are Rendering Rule List elements. Reference conditions of geospatial data described by G-XML targeting the application of rendering rules, are coded by Object Reference elements. Reference conditions of rendering rules are coded by Rendering Rule Reference elements.

A list of elements constituting the rendering rule list most minimal component is shown in **Annex 2 Table 21**.

**Annex 2 Table 21 List of elements**

Element	Attribute	Details
Rendering Rule element	None	Refer to <b>3.105 of Annex 3</b>
Object Reference element	Object reference type attribute	Refer to <b>3.106 of Annex 3</b>
Rendering Rule Reference element	Rendering rule reference type attribute	Refer to <b>3.107 of Annex 3</b>

## 3.22 Location relationship most minimal component

**3.22.1 Definition** The G-XML most minimal component prescribes the parts for describing the location relationship of a different object as viewed from a certain object in geospace.

The location relationship element enables the establishment of a location relationship between two objects in geospace, described as unrelated in the Cartesian coordinate system. There are three types of location relationship in geospace: First, whether another object is in the neighborhood or not. Second, whether two nodes in topological geospace linked by edges flank each other or not. Third, whether nodes exist in the vicinity in corners that are between two objects in topological geospace.

**3.22.2 Composition** Root elements of XML elements pertaining to the location relationship most minimal component are Location Relationship elements. Three types of location relationship are coded by Neighborhood element, Side element, and Corner element. These elements respectively indicate whether another object as viewed from a certain object in geospace is in the neighborhood or not, whether two nodes in topological geospace linked by edges flank each other or not, or whether nodes exist in the vicinity in corners that are between two objects in topological geospace.

A list of elements constituting the location relationship most minimal component is shown in **Annex 2 Table 22**.

**Annex 2 Table 22 List of elements**

Element	Attribute	Details
Location Relationship element	Myidreference attribute, youridreference attribute	Refer to <b>3.77 of Annex 3</b>
Neighborhood element	Yourtype attribute	Refer to <b>3.78 of Annex 3</b>
Side element	Yourtype attribute, myposition attribute	Refer to <b>3.79 of Annex 3</b>
Coner element	Yourtype attribute, clockwisenextedge attribute, anticlockwisenextedge attribute	Refer to <b>3.80 of Annex 3</b>

## 3.23 Coordinates most minimal component

**3.23.1 Definition** The G-XML most minimal component prescribes the parts for describing coordinates to express a location in metric space.

Coordinates are composed of one or more coordinate sets enabling positioning in metric geospace based on a specified coordinate system.

**3.23.2 Composition** Root elements of XML elements pertaining to the coordinates most minimal component are Coordinates elements which code coordinates. Separations between a row of sets of coordinate values and separations between digits constituting coordinate values, are specified by attributes of Coordinates elements.

A list of elements constituting the coordinates most minimal component is shown in **Annex 2 Table 4**.

**Annex 2 Table 23 List of elements**

Element	Attribute	Details
Coordinates element	decimal point (decimal) attribute, value separator attribute, tuple separator attribute, spatial reference system attribute, location unit (unit.location) attribute, horizontal location accuracy (accuracy.location.horizontal) attribute, vertical location accuracy (accuracy.location.vertical) attribute	Refer to <b>3.17 of Annex 3</b>

### 3.24 Transformation most minimal component

**3.24.1 Definition** The G-XML most minimal component prescribes the parts for describing a method for projecting an object in a local Cartesian coordinate system in metric geospace.

The transformation method is prescribed by indicating a coefficient required for matrix calculation for transformation, or by indicating the original local Cartesian coordinate system in which an object exists and from where transformation is to be initiated, as well as the coordinate system of metric geospace to which transformation is to take place.

**3.24.2 Composition** Root elements of XML elements pertaining to the transformation most minimal component are Transformation elements. The transformation method is coded by Diagonal Transformation elements and Matrix Transformation elements, which are child elements. Diagonal Transformation elements indicate the original local Cartesian coordinate system in which an object exists and from where transformation is to be initiated, as well as the coordinate system of metric geospace to which transformation is to take place. Matrix Transformation elements indicate coefficients required for matrix calculation for transformation.

A list of elements constituting the transformation most minimal component is shown in **Annex 2 Table 24**.

Annex 2 Table 24 List of elements

Element	Attribute	Details
Transformation element	None	Refer to <b>3.88 of Annex 3</b>
Diagonal Transformation element	None	Refer to <b>3.89 of Annex 3</b>
Matrix Transformation element	coefficient a (a) attribute, coefficient b (b) attribute, coefficient c (c) attribute, coefficient d (d) attribute, coefficient e (e) attribute, coefficient f (f) attribute, location unit (unit.location) attribute	Refer to <b>3.92 of Annex 3</b>