Open Geospatial Consortium Inc.

Date: 2007-11-06

Reference number of this OGC® project document: **OGC 07-147**

Version: 0.0.15

Category: OGC® RFC Submission

Editor: Tim Wilson

KML 2.2

Warning

This is an RFC Submission Document. It is <u>not</u> an OGC Standard and may not be referred to as an OGC Standard. It is based on the approved OGC 07-113r1 KML 2.2 – An OGC Best Practice document, and subject to change within the KML 2.2 SWG.

Document type:	OGC® RFC Submission
Document subtype:	
Document stage:	Draft
Document language:	English

Preamble to "KML 2.2"

Google submitted KML (formerly Keyhole Markup Language) to the Open Geospatial Consortium (OGC) to be evolved within the OGC consensus process with the following goal: KML Version 2.2 will be an adopted OGC implementation standard. Future versions may be harmonized with relevant OpenGIS standards that comprise the OGC standards baseline. There are four objectives for this standards work:

- That there be one international standard language for expressing geographic annotation and visualization on existing or future web-based online and mobile maps (2d) and earth browsers (3d).

- That KML be aligned with international best practices and standards, thereby enabling greater uptake and interoperability of earth browser implementations.

- That the OGC and Google will work collaboratively to insure that the KML implementer community is properly engaged in the process and that the KML community is kept informed of progress and issues.

- That the OGC process will be used to insure proper life-cycle management of the KML candidate standard, including such issues as backwards compatibility.

The OGC has developed a broad Standards Baseline. Google and the OGC believe that having KML fit within that family will encourage broader implementation and greater interoperability and sharing of earth browser content and context.

KML is an XML language focused on geographic visualization, including annotation of maps and images. Geographic visualization includes not only the presentation of graphical data on the globe, but also the control of the user's navigation in the sense of where to go and where to look.

From this perspective, KML is complementary to most of the key existing OGC standards including GML (Geography Markup Language), WFS (Web Feature Service) and WMS (Web Map Service). Currently, KML (2.2) utilizes certain geometry elements derived from GML (version 2.1.2). These elements include point, line string, linear ring, and polygon.

The OGC and Google have agreed that there can be additional harmonization of KML with GML (e.g. to use the same geometry representation) in the future. The Mass Market Geo Working Group (MMWG) in the OGC will establish such additional harmonization activities. OGC specifications such as Context and Styled Layer Descriptor (SLD) may be considered.

Google initially submitted the KML 2.1 Reference Manual to the OGC. Carl Reed of OGC reformatted this manual into the OGC Best Practices Document Template. During the April 2007 Technical Committee meetings, the OGC membership approved the OGC 07-039r1 KML 2.1 OGC Best Practices Paper. During the June 2007 Technical Committee meeting the MMWG approved updating this document to KML 2.2 and adding informative text to further describe the KML coordinate reference system (CRS) and geometry models. Google and Galdos Systems Inc. updated the document as such and submitted the resultant OGC 07-113r1 KML 2.2 – An OGC Best Practice document for approval by the OGC Technical Committee at the September 2007 TC Meeting. The OGC 07-113r1 document was subsequently approved by unanimous consent of the TC at this meeting.

This RFC submission document is based primarily on the OGC 07-113r1 KML 2.2 – An OGC Best Practice document. It has been reformatted to support the inclusion of the companion OGC 07-134 KML 2.2 – Abstract Test Suite document as part of the overall RFC submission package. The OGC 07-134 KML 2.2 – Abstract Test Suite document defines the test cases that assert conformance against this RFC submission document.

This RFC submission package will be progressed to the state of an adopted standard within a KML 2.2 Standards Working Group (SWG).

Contents

i.   Preface

This RFC submission document is being submitted by Google, Inc. to the OGC for consideration as an OGC® Implementation Standard. It is based on and supersedes OGC 07-113r1 KML 2.2 – An OGC Best Practice.

ii.   Submitting organizations

The following organizations submitted this Best Practices Paper to the Open Geospatial Consortium Inc.:

a) Google, Inc.

b) Galdos Systems Inc.

iii.   Submission contact points

All questions regarding this submission should be directed to the editor or submitters:

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iv.   Revision history

Date	Release	Author	Paragraph modified	Description
3-7-06	0.0.5	Carl Reed	New	Initial Version
4/17/07	0.0.9	Carl Reed	Various	Updates based on comments received during Mass Market GEO WG meeting as well as a request from Google to remove 3 elements.
5/2/07	0.0.9	Carl Reed	Various	Add preamble and edit document for posting as a BP.
8/1/07	0.0.10	Susan Patch	Various	Corrected all links to target within the document Modified text to include final Google KML 2.2 reference text.
8/29/07	0.0.11	Tim Wilson	Various	Modified text to describe KML in terms of generic earth browsers. Updated text and terminology to OGC 06-135r1 standards.
8/29/07	0.0.12	David Burggraf	Added Section 6, Annex A and various other edits.	Added informative text describing the KML coordinate reference system (CRS) and geometry models in terms of the GML Geometry and Topic 2 (Spatial Referencing). Added GML CRS dictionary to Annex A. Note: Document number changed to 07-113 when submitted to OGC.
9/6/07	0.0.13	David Burggraf, Ron Lake, Tim Wilson, Susan Patch	Various	Modified text for clarity and consistency and to further describe KML in terms of generic earth browsers. New diagrams added to Section 6.
9/10/07	0.0.14	Carl Reed	OGC terminology	Adjusted OGC terminology for new OGC (TBD) policies.
9/11/07	0.0.14	Bent Hagemark, Michael Ashbridge	All	Reviewed for errors and omissions.
9/12/07	0.0.14	David Burggraf	Section 6, geometry elements	Clarification of definitions.
9/12/07	0.0.14	Ron Lake	Camera, PhotoOverlay, Model	Clarification of definitions.
9/14/07	0.0.14	Susan Patch	All	Copy editing and application of OGC styles.
9/14/07	0.0.14	Tim Wilson	All	Corrected errors and improved terminology.
10/15/07	0.0.15	Bent Hagemark	KML Schema	Updated for extension model, changes to Google KML 2.2 beta schema.

Date	Release	Author	Paragraph modified	Description
10/29/07	0.0.15	Tim Wilson, Susan Patch	All	Updated structure sections for revised KML 2.2. schema
10/29/07	0.0.15	Bent Hagemark, Richard Martell, Jeremy Parr-Pearson, Tim Wilson	All	Update assertions corresponding to OGC 07-134 KML 2.2 – Abstract Test Suite
10/29/07	0.0.15	Bent Hagemark, Michael Ashbridge, Josie Wernecke	PhotoOverlay, ImagePyramid	Text on handling and building large image pyramids.
11/02/07	0.0.15	David Burggraf	Section 6, PhotoOverlay	Clarifications.
11/03/07	0.0.15	Tim Wilson	Section 6	Extension mechanism and policy text.
11/04/07	0.0.15	Tim Wilson	All	General edit.

v. Changes to the OGC® Abstract Specification

The OGC® Abstract Specification does not require changes to accommodate this OGC® standard.

Foreword

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. The Open Geospatial Consortium Inc. shall not be held responsible for identifying any or all such patent rights. However, to date, no such rights have been claimed or identified.

Recipients of this document are requested to submit, with their comments, notification of any relevant patent claims or other intellectual property rights of which they may be aware that might be infringed by any implementation of the specification set forth in this document, and to provide supporting documentation.

Introduction

KML is an XML grammar used to encode and transport representations of geographic data for display in an earth browser. Put simply: KML encodes what to show in an earth browser, and how to show it. KML uses a tag-based structure with nested elements and attributes and is based on the XML standard.

The KML community is wide and varied. Casual users create KML Placemarks to identify their homes, describe journeys, and plan cross-country hikes and cycling ventures. Scientists use KML to provide detailed mappings of resources, models, and trends such as volcanic eruptions, weather patterns, earthquake activity, and mineral deposits. Real estate professionals, architects, and city development agencies use KML to propose construction and visualize plans. Students and teachers use KML to explore people, places, and events, both historic and current. Organizations such as National Geographic, UNESCO, and the Smithsonian have all used KML to display their rich sets of global data.

KML documents and their related images (if any) may be compressed using the ZIP format into KMZ archives. KML documents and KMZ archives may be shared by e-mail, hosted locally for sharing within a private internet, or hosted on a web server.

KML 2.2

1   Scope

KML is an XML grammar used to encode and transport representations of geographic data for display in an earth browser, such as a 3D virtual globe, 2D web browser application, or 2D mobile application. A KML instance is processed in much the same way that HTML (and XML) documents are processed by web browsers. Like HTML, KML has a tag-based structure with names and attributes used for specific display purposes.

KML can be used to:

- Annotate the Earth

- Specify icons and labels to identify locations on the surface of the planet

- Create different camera positions to define unique views for KML features

- Define image overlays to attach to the ground or screen

- Define styles to specify KML feature appearance

- Write HTML descriptions of KML features, including hyperlinks and embedded images

- Organize KML features into hierarchies

- Locate and update retrieved KML documents from local or remote network locations

- Define the location and orientation of textured 3D objects

2 Conformance

2.1 Conformance requirements

A KML resource that conforms to this standard shall:

a) satisfy all requirements stipulated in this document;

b) be well-formed (as defined in the W3C XML 1.0 standard);

c) pass all relevant test cases specified by the Abstract Test Suite (ATS) provided in OGC document 07-134.

2.2 Application Profiles

2.2.1 Introduction

An application profile defines a set of elements derived from one or more base standards for the purpose of:

- promoting interoperability; and

- meeting the requirements of a particular application domain.

2.2.2 Rules for Authoring KML Application Profiles

A KML profile can restrict or extend KML to the extent permitted by this standard. The KML schema provides a number of extension points that may be exploited in a profile. While a profile shall not contradict the standard, it may restrict the choice of options or introduce new elements (or do both).

Documents that conform to the KML standard may contain elements and attributes that are not part of the standard but are defined in an application profile. Such elements and attributes—called foreign information items—must not reside within the KML namespace; they shall be placed in another namespace.

Application profiles shall not redefine any KML components (structurally or semantically) within the KML namespace.

Application profiles which extend KML shall:

- define the XML structure of any new elements and attributes in a valid application profile schema that imports the KML schema;

- add new elements to existing concrete KML elements by substitution only, where permitted by the KML schema;

- derive any new complex types of complex content directly or indirectly by extension from kml:AbstractObjectType;

- derive any new complex types of complex content by extension from the relevant KML abstract type whose semantics it shares.

     EXAMPLE: a new feature type shall derive from kml:AbstractFeatureType.

- declare any new elements and attributes as optional, i.e. minOccurs="0", to support the KML update mechanism. This however does not preclude asserting minimum occurrence constraints as conformance rules within supplementary normative application profile documentation.

Application profiles that extend KML should:

- place any extension elements and attributes in a "vendor-neutral" namespace to support any future potential integration with the KML standard, and encourage interoperability in general.

An adopted OGC application profile that extends KML should:

- be based on a source mass market application profile that is supported by running code;

- preferably maintain or else deprecate the namespace of a source application profile from which it derives, if/where the source profile is in popular use within the mass market. This is to ensure backwards compatibility with existing instances and consumers of the source profile;

- provide a structural and semantic mapping between any profile components which have changed from their original source profile.

Authors of application profiles are encouraged to submit their extensions to OGC for standardization. This does not preclude any resulting OGC application profile from being merged later into the KML standard.

3   Normative references

The following normative documents contain provisions that, through reference in this text, constitute provisions of this part of OGC 07113r1. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply; however, parties to agreements based on this part of OGC 07113r1 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies.

OGC 07-134, KML 2.2 - Abstract Test Suite

IETF RFC 4287, Atom Syndication Format. Available from: http://tools.ietf.org/html/rfc4287

OASIS Extensible Address Language (XAL) 2.0. Available from: http://www.oasis-open.org/committees/ciq/download.html

IETF RFC 3966, The tel URI for Telephone Numbers. Available from: http://tools.ietf.org/html/rfc3966

ISO 8601:2004, Data elements and interchange formats — Information interchange — Representation of dates and times

IETF RFC 3986, Uniform Resource Identifier (URI): Generic Syntax. Available from: http://tools.ietf.org/html/rfc3986

W3C HTML 4.01 Specification. Available from: http://www.w3.org/TR/html4/

W3C XHTML 1.0, The Extensible HyperText Markup Language. Available from: http://www.w3.org/TR/xhtml1/

W3C Extensible Markup Language (XML) 1.0. Available from: http://www.w3.org/TR/REC-xml/

W3C Namespaces in XML 1.0. Available from: http://www.w3.org/TR/REC-xml-names/

W3C XML Schema Part 1: Structures. Available from: http://www.w3.org/TR/xmlschema-1/

W3C XML Schema Part 2: Datatypes. Available from: http://www.w3.org/TR/xmlschema-2/

4 Terms and symbols

4.1 Terms and definitions

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

4.1.1

application schema

conceptual schema for data required by one or more applications.

[ISO 19101]

4.1.2

attribute <XML>

name/value pair contained in an element

NOTE: In this document an attribute is an XML attribute unless otherwise specified

4.1.3

boundary

set that represents the limit of an entity

[ISO 19107]

4.1.4

bounding box

minimum volume that encloses a set of objects or data points.

4.1.5

child element <XML>

immediate descendant element

4.1.6

complex element <XML>

element of complex content

4.1.7

coordinate

one of a sequence of n numbers designating the position of a point in n-dimensional space

[ISO 19111]

NOTE: In a coordinate reference system, the n numbers shall be qualified by units.

4.1.8

coordinate reference system

coordinate system that is related to an object by a datum

[ISO 19111]

4.1.9

coordinate system

set of mathematical rules for specifying how coordinates are to be assigned to points

[ISO 19111]

4.1.10

coordinate tuple

tuple composed of a sequence of coordinates

[ISO 19111]

4.1.11

data type

specification of a value domain with operations allowed on values in this domain

[ISO/TS 19103]

EXAMPLE: integer, real, boolean, string, date (conversion of a data into a series of codes).

NOTE: Data types include primitive predefined types and user-definable types. All instances of a data
         types lack identity.

4.1.12

datum

parameter or set of parameters that define the position of the origin, the scale, and the orientation of a coordinate system

[ISO 19111]

NOTE: A datum may be a geodetic datum, a vertical datum, an engineering datum, an image datum or a temporal datum.

4.1.13

document <XML>

well-formed XML instance

4.1.14

earth browser

software for displaying and annotating models of the Earth

4.1.15

element <XML>

basic information item of an XML document containing child elements, attributes and character data

NOTE: From the XML Information Set: "Each XML document contains one or more elements, the boundaries of which are either delimited by start-tags and end-tags, or, for empty elements, by an empty-element tag. Each element has a type, identified by name, sometimes called its 'generic identifier' (GI), and may have a set of attribute specifications. Each attribute specification has a name and a value."

4.1.16

field

child element of simple content

4.1.17

field type

XML Schema simple type defined in the KML schema document

4.1.18

geodetic datum

datum describing the relationship of a 2- or 3-dimensional coordinate system to the Earth

[ISO 19111]

4.1.19

geographic view

display of geographic KML elements

4.1.20

interior

set of all points that are on a geometric object but which are not on its boundary

4.1.21

line string

curve composed of straight-line segments

4.1.22

list view

display of one or more hierarchies of KML Features

4.1.23

namespace <XML>

collection of names, identified by a URI reference, which are used in XML documents as element names and attribute names [W3C XML Namespaces]

4.1.24

plate carrée projection

A simple cylindrical projection in which the target plane has a horizontal axis representing longitude (standard parallel is the Equator) and vertical axis representing latitude. Otherwise known as equi-rectangular, plane chart, or unprojected map projection.

4.1.25

point

0-dimensional geometric primitive, representing a position

[ISO 19107]

NOTE: The boundary of a point is the empty set.

4.1.26

polygon

planar surface defined by 1 exterior boundary and 0 or more interior boundaries

4.1.27

resource

network data object or service that is identified by a URL

4.1.28

schema

formal description of a model

[ISO 19101]

NOTE: In general, a schema is an abstract representation of an object's characteristics and relationship to other objects. An XML schema represents the relationship between the attributes and elements of an XML object (for example, a document or a portion of a document)

4.1.29

schema <XML Schema>

collection of schema components within the same target namespace

EXAMPLE: Schema components of W3C XML Schema are types, elements, attributes, groups, etc.

4.1.30

schema document <XML Schema>

XML document containing schema component definitions and declarations

NOTE: The W3C XML Schema provides an XML interchange format for schema information. A single schema document provides descriptions of components associated with a single XML namespace, but several documents may describe components in the same schema, i.e. the same target namespace.

4.1.31

simple element <XML>

element of simple content

4.1.32

tag <XML>

markup in an XML document delimiting the content of an element

NOTE: A tag with no forward slash (e.g. <Placemark>) is called a start-tag (also opening tag), and one
         with a forward slash (e.g. </Placemark> is called an end-tag (also closing tag).

4.1.33

tuple

ordered list of values

4.1.34

Uniform Resource Identifier (URI)

unique identifier for a resource, structured in conformance with IETF RFC 2396

NOTE: The general syntax is <scheme>::<scheme-specific-part>. The hierarchical syntax with a
         namespace is <scheme>://<authority><path>?<query> – see [RFC 2396].

4.2   Acronyms (and abbreviated terms)

Some frequently used abbreviated terms:

COTS   Commercial Off The Shelf

CRS   Coordinate Reference System

CS   Coordinate System

CSV   Comma Separated Values

CT   Coordinate Transformation

DTD   Document Type Definition

EPSG   European Petroleum Survey Group

GIS   Geographic Information System

GML   Geography Markup Language

NOTE: The acronym GML was previously used in ISO also as Generalized Markup Language (which led
         to SGML Standard Generalized Markup Language, ISO 8879).

HTTP   Hypertext Transfer Protocol

IETF   Internet Engineering Task Force

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ISO	International Organization for Standardization
KMZ	KML Archive File
OGC	Open Geospatial Consortium
RFC	Request for Comments
URI	Uniform Resource Identifier
URL	Uniform Resource Locator
URN	Uniform Resource Name
W3C	World Wide Web Consortium
xAL	eXtensible Address Language
XML	eXtended Markup Language
XSD	XML Schema Definition
0D	Zero Dimensional
1D	One Dimensional
2D	Two Dimensional
3D	Three Dimensional

5   Conventions

5.1   UML Notation

There is no UML associated with this candidate specification.

5.2   XML Namespaces

All components of the KML schema are defined in the namespace with the identifier "`http://www.opengis.net/kml/2.2`", for which the prefix `kml` or the default namespace is used within this Candidate Standard.

The `atom:author` and `atom:link` components described by the Atom Syndication Format are defined in the namespace with the identifier "`http://www.w3.org/2005/Atom`", for which the prefix `atom` is used within this Candidate Standard.

NOTE The schema components from these namespaces are documented in XML Schema documents in Annex A.

The `xAL:AddressDetails` component described by the eXtensible Address Language is defined in the namespace with the identifier "`urn:oasis:names:tc:ciq:xsdschema:xAL:2.0`", for which the prefix xAL is used within this Candidate Standard.

5.3   XML Schema

KML uses the W3C XML Schema language to describe the grammar of conformant KML data instances. The KML schema document is included in Annex A and forms a normative part of this Candidate Standard.

The normative KML schema includes deprecated schema components that KML producers are advised to not use; they may be removed in a subsequent major revision.

5.4   Versioning

Each schema document specifying components of the KML schema shall carry a version attribute as defined in the XML Schema Recommendation. The format of the version attribute string is x.y.z where x denotes the major version number, y denotes a minor version number, and z denotes a bug fix release for that document. All versions with the same major version shall be compatible, except for any change in the version namespace. In practice this means that minor versions shall add optional content only.

Major revisions shall maintain the highest level of achievable backwards compatibility to a previous release, except for any change in the version namespace.

5.5   Deprecated parts of previous versions of KML

The verb "deprecate" provides notice that the referenced portion of this Candidate Standard is being retained for backwards compatibility with earlier versions but may be removed from a subsequent major revision.

5.6 Documentation

Clauses 7 to 15 specify the content model for each KML element. The KML content model is defined in terms of child elements and attributes. Where a child element is defined in a separate subclause, a link is provided to it.

Throughout this document, the following conventions are used:

- Concrete element and attribute names used within the text are formatted in `Courier New` and abstract elements in *`Courier New Italic`*, except in the case of headings and references to them.

- A value from an enumerated set is in **bold**.

- Child element content is specified within the element subclause whose type declares such children.

- The prefix "xsd:" is used to identify types that are defined by XML Schema, for example xsd:string.

- The use of abstract substitution elements within the text refers to the concrete elements that substitute for them. For example, *`kml:AbstractContainerGroup`* refers to the `kml:Document` and `kml:Folder` elements that substitute for it. Element substitution is described for each element where applicable.

- The term `kml:Document` is a KML element; the term "KML document" refers to an XML instance of KML.

- Default values for simple elements are listed under relevant Content subclauses. Unless otherwise stated, default values for optional elements shall apply when such elements are empty or absent.

- The term "KML resource" refers to a local or remote KML or KMZ instance.

Each element subclause includes a XML structure section that shows the content model for the described element as a representative XML instance, using the following conventions:

- The minimum and maximum occurrence of elements and attributes required by its schema type are shown in square brackets, for example [0..1]. Such occurrence requirements are necessary but insufficient in that additional occurrence requirements are asserted within this Candidate Standard.

- Elements are listed in the required document order.

- Choice model group information is represented by "Start Choice ... End Choice".

- Where the type for an element derives by extension from a base type, the elements and attributes that have been added to the base type's content are shown in **bold**.

6   KML Model Overview

6.1   KML Architecture

This section provides an overview of the KML schema type hierarchy. While element names are used, they represent the schema types that define their content. As KML is an XML grammar, element names are case-sensitive and must appear exactly as specified in the KML schema document.

In KML, some types are derived from a parent type. A derived type inherits all of the elements of its parent type and may add some specific element content of its own. KML also includes abstract elements whose type is also abstract. Such abstract types are used to establish schema type hierarchies. Abstract elements may serve as placeholders for elements that substitute for them in the XML Schema sense.

The core KML type hierarchy is represented in the following nested list. It shows the abstract KML elements that serve as the head of a substitution group for its corresponding type (in brackets). The abstract elements themselves follow an identical substitution hierarchy. For example, *kml:AbstractContainerGroup* substitutes for *kml:AbstractFeatureGroup*, which in turn substitutes for *kml:AbstractObjectGroup*.

- *kml:AbstractObjectGroup (kml:AbstractObjectType)*

  - *kml:AbstractFeatureGroup (kml:AbstractFeatureType)*

    - *AbstractContainerGroup (kml:AbstractContainerType)*

    - *AbstractOverlayGroup (kml:AbstractOverlayType)*

  - *AbstractGeometryGroup (kml:AbstractGeometryType)*

  - *AbstractStyleSelectorGroup (kml:AbstractStyleSelectorType)*

  - *AbstractSubStyleGroup (kml:AbstractSubStyleType)*

    - *AbstractColorStyleGroup (kml:AbstractColorStyleType)*

  - *AbstractLatLonBox (kml:AbstractLatLonBoxType)*

- *AbstractViewGroup (kml: AbstractViewType)*

- *AbstractTimePrimitiveGroup (kml:AbstractTimePrimitiveType)*

These abstract elements and their associated base types define the core of the language.

All concrete elements derived from *kml:AbstractObjectGroup* may have an assigned identifier.

Simple elements are generally referred to as KML fields. Such elements are of XML Schema simple types or KML field types defined in the KML schema. KML field types are specified in clause 16 Field Types.

6.2   Coordinate Reference System

Each element that extends the `kml:AbstractGeometryGroup` element defines a spatial extent of a `kml:Placemark`. The spatial extent may include the location of an anchor point on the earth to serve as an origin for a 3D object as in the case of the kml:Model element, or may include the encoding of explicit coordinate tuples in the kml:coordinates element in the case of the `kml:Point`, `kml:LineString`, and `kml:LinearRing` elements.

The KML encoding of every `kml:Location` and coordinate tuple uses geodetic longitude, geodetic latitude, and altitude as defined in Annex A by the GML Coordinate Reference System (CRS) with identifier LonLat84_5773. Note that altitude is measured from the vertical datum, which is the WGS84 EGM96 Geoid. The altitude measurement (orthometric *H*) is illustrated in Figure 1.
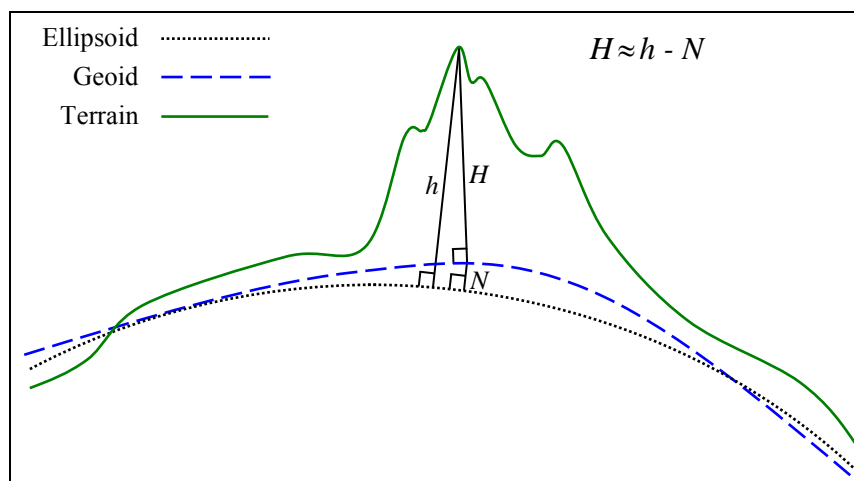
Figure 1: Altitude H is Measured from the Vertical Datum (Geoid) and is Compared to the Ellipsoid Height h and the Geoid Undulation N.

6.3 Geometry Interpolation for 3D Earth Browsers

6.3.1 Interpolated Points

Geometric points which are not explicitly encoded are called interpolated points. The following subclauses describe the interpolation schemes for the `kml:LineString`, `kml:LinearRing`, and `kml:Polygon` elements.

6.3.2 kml:LineString and kml:LinearRing

The type of interpolation used for the `kml:LineString` and `kml:LinearRing` elements depend on the values of the child `kml:altitudeMode` and `kml:tessellate` elements. If the `kml:altitudeMode` value is not **clampToGround** then the interpolation between two consecutive control points is a straight line segment in the 3D WGS 84 geocentric coordinate reference system (urn:x-ogc:def:crs:EPSG:6.12:4978). This straight line segment will be referred to as *L* in Table 1, which summarizes the `kml:LineString` and `kml:LinearRing` interpolation scheme for the various combinations of `kml:altitudeMode` and `kml:tessellate` values.

Table 1: Interpolation scheme for kml:LineString and kml:LinearRing

<altitudeMode>	*<tessellate>*	*Interpolation between control points*
relativeToGround or absolute	0 (false) or 1 (true)	A straight line segment *L* in the 3D WGS 84 geocentric coordinate reference system (urn:x-ogc:def:crs:EPSG:6.12:4978)
clampToGround	1 (true)	Project each point of *L* to the terrain surface along a line through the earth's center of mass
clampToGround	0 (false)	First project each control point to the terrain surface along a line through the earth's center of mass, then interpolate between the projected control points along a straight line segment in the 3D WGS 84 geocentric coordinate reference system (urn:x-ogc:def:crs:EPSG:6.12:4978)

For example, in the following KML instance the `kml:LineString` coordinates element has two control points (–135,30,500000) and (–80,30,500000) of the form (long,lat,altitude) in the CRS defined in with gml:id="LonLat84_5773".

```
<kml xmlns="http://www.opengis.net/kml/2.2">
  <Document>
    <Placemark>
      <LineString>
        <altitudeMode>absolute</altitudeMode>
        <coordinates>-135,30,500000 -80,30,500000</coordinates>
      </LineString>
    </Placemark>
  </Document>
</kml>
```

Since the kml:altitudeMode is **absolute**, the interpolation between these two control points is the straight line segment *L* shown in Figure 2 in the 3D WGS 84 geocentric CRS, which does not follow the earth's curvature and cuts through the earth's terrain.
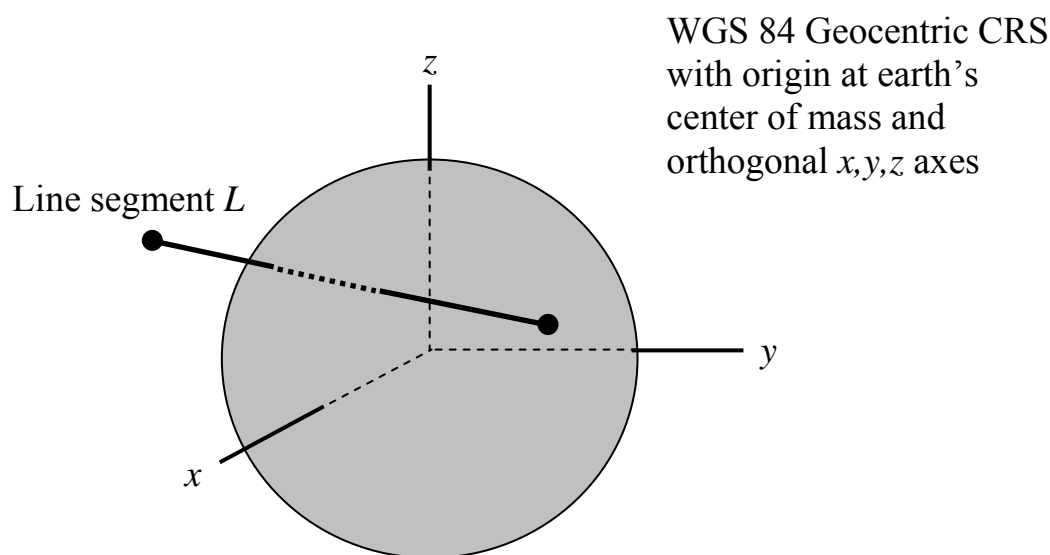
Figure 2: A kml:LineString Comprised of Two Control Points and a Single Line Segment Interpolated in the WGS 84 Geocentric CRS

The line segment *L* will be projected to the terrain surface if kml:altitudeMode and kml:tessellate are set as in the following kml:LineString instance. In this case the projected kml:LineString will follow the earth's curvature as shown in Figure 3

```
<kml xmlns="http://www.opengis.net/kml/2.2">
  <Document>
    <Placemark>
      <LineString>
        <tessellate>true</tessellate>
        <altitudeMode>clampToGround</altitudeMode>
        <coordinates>-135,30,500000 -80,30,500000</coordinates>
      </LineString>
    </Placemark>
  </Document>
</kml>
```
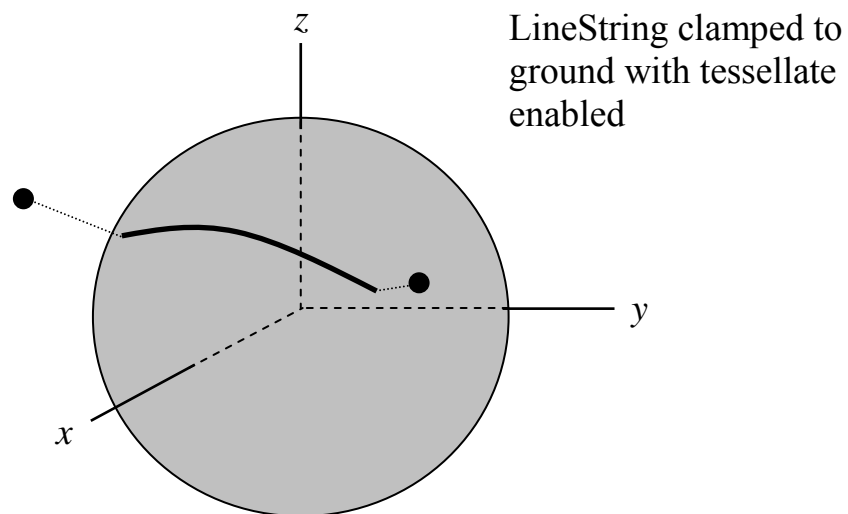
Figure 3: A Line Segment Interpolated in the WGS 84 Geocentric CRS

If kml:altitudeMode and kml:tessellate are set as in the following kml:LineString instance, then the only the control points are projected to the terrain and the interpolalation between the projected control points is a straight line segment in the WGS 84 Geocentric CRS as shown in Figure 4.

```
<kml xmlns="http://www.opengis.net/kml/2.2">
  <Document>
    <Placemark>
      <LineString>
        <tessellate>false</tessellate>
        <altitudeMode>clampToGround</altitudeMode>
        <coordinates>-135,30,500000 -80,30,500000</coordinates>
      </LineString>
    </Placemark>
  </Document>
</kml>
```
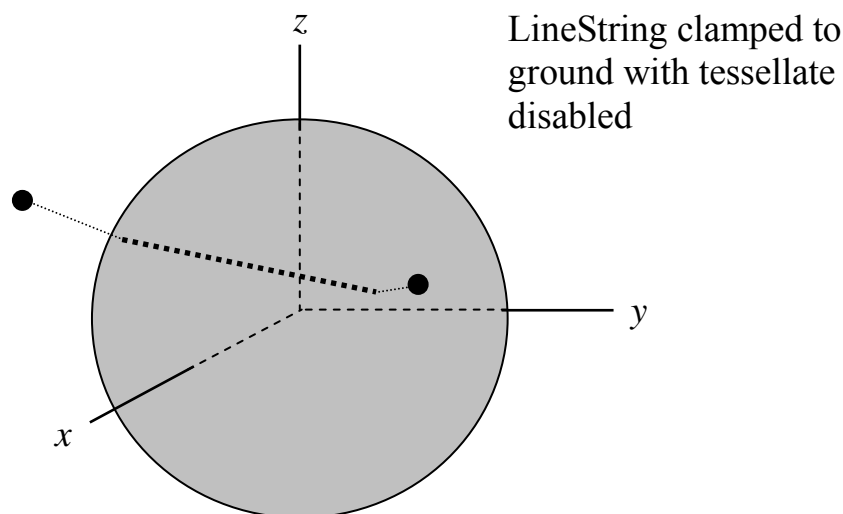

Figure 4: A Line Segment Interpolated in the WGS 84 Geocentric CRS

6.3.3   kml:Polygon

The type of interpolation used for the kml:Polygon element also depends on the values of the child kml:altitudeMode and kml:tessellate elements. If the kml:altitudeMode value is not **clampToGround** then the interpolation of the kml:Polygon boundary comprised of the descendent kml:LinearRing elements is as described previously in Table 1. The remaining interior points of the kml:Polygon are then filled in linearly in the 3D WGS 84 geocentric CRS, i.e. they must lie on the plane that passes through all the control points of each kml:LinearRing.

NOTE: The control points of every kml:LinearRing must lie on a common plane.

Table 2 summarizes the `kml:Polygon` interpolation scheme for the various combination of `kml:altitudeMode` and `kml:tessellate` values.

Table 2: Interpolation scheme for kml:Polygon

<altitudeMode>	*<tessellate>*	*Interpolation between control points*
relativeToGround or absolute	0 (false) or 1 (true)	Boundary points of the kml:Polygon in the descendent kml:LinearRing(s) are interpolated as in Table 1 and the interior points are filled in linearly in the 3D WGS 84 geocentric coordinate reference system (urn:x-ogc:def:crs:EPSG:6.12:4978), i.e. they must lie on a plane.
clampToGround	0 (false)	The boundary control points of each descendent kml:LinearRing are first projected to the plate carrée plane (where altitude is dropped), then straight line segment interpolation in the plate carrée (long,lat) plane is used between consecutive control points. The interior points are then filled in linearly in the plate carrée plane. Finally, the (long,lat) points of the polygon in the plate carrée plane are mapped back to (long.lat,alt) points on the earth's terrain surface model

For example, the following kml:Polygon encodes five control points in its outer boundary in the CRS defined in Annex A with gml:id="LonLat84_5773".

```
<kml xmlns="http://www.opengis.net/kml/2.2">
  <Document>
    <Placemark>
      <Polygon>
        <altitudeMode>absolute</altitudeMode>
        <outerBoundaryIs>
          <LinearRing>
            <coordinates>
-135,50,300000 -135,40,450000 -80,40,450000 -80,50,300000 -135,50,300000
            </coordinates>
          </LinearRing>
        </outerBoundaryIs>
      </Polygon>
    </Placemark>
  </Document>
</kml>
```

Since the kml:altitudeMode is **absolute**, the outer boundary points of the polygon that are interpolated between the control points in the kml:LinearRing form a quadrilateral perimeter in the 3D WGS 84 geocentric CRS. The interior points of this 4 sided polygon are filled in linearly in the 3D WGS 84 geocentric CRS and form the plane region inside the perimeter. Note that the plane region does not follow the earth's curvature and cuts through the surface of the earth as shown in Figure 5.
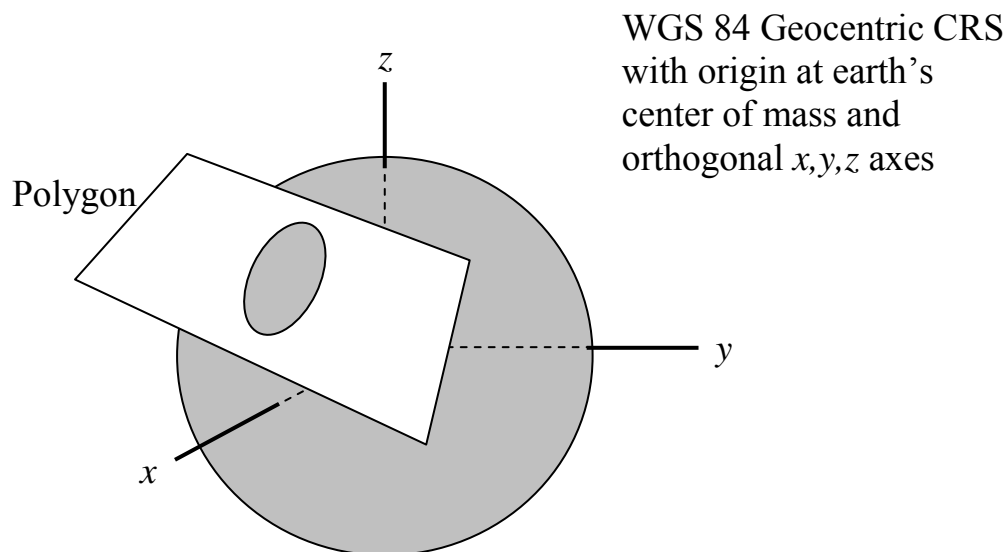
Figure 5: KML Polygon interpolation in the WGS 84 Geocentric CRS

In the following kml:Polygon instance the kml:altitudeMode is set to **clampToGround**.

```
<kml xmlns="http://www.opengis.net/kml/2.2">
  <Document>
    <Placemark>
      <Polygon>
        <altitudeMode>clampToGround</altitudeMode>
        <outerBoundaryIs>
          <LinearRing>
            <coordinates>-135,78.5,300000 -135,12.5,300000 -45,12.5,300000 -
45,78.5,300000 -135,78.5,300000</coordinates>
          </LinearRing>
        </outerBoundaryIs>
      </Polygon>
    </Placemark>
  </Document>
</kml>
```

The outer boundary points of the polygon that are interpolated between the control points in the kml:LinearRing form a rectangular perimeter in the plate carrée plane. Then the interior points of the rectangle are filled in linearly in this plane. Finally each (long,lat) point of the rectangle is mapped to a (long,lat,alt) point on the earth terrain surface as shown in Figure 6.
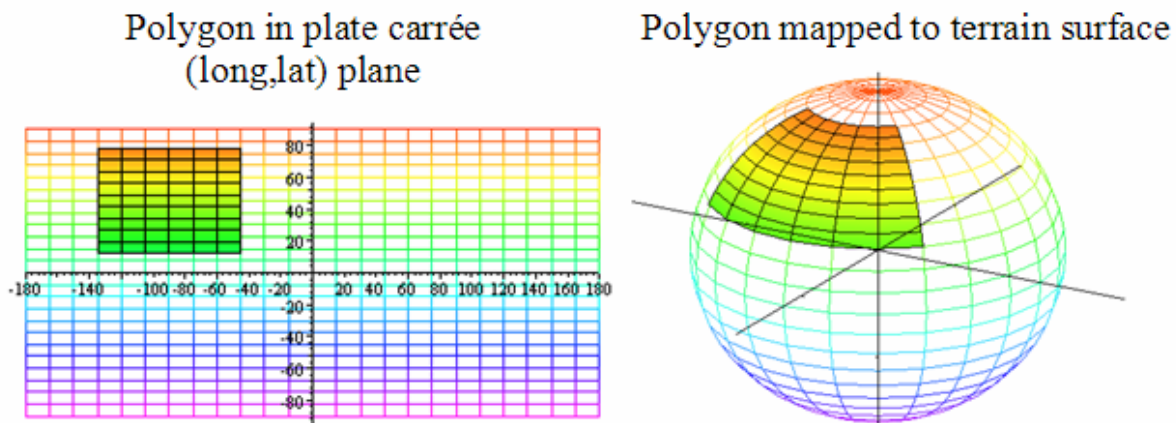
Figure 6: KML Polygon Interpolation in the Plate Carrée Plane

6.3.4   kml:GroundOverlay and kml:Region

The latitude and longitude boundaries for both kml:GroundOverlay and kml:Region are specified by the elements kml:west, kml:east, kml:south, and kml:north. In the case of

`kml:GroundOverlay` constant lines of longitude demarcate the portion of the `kml:LatLonBox` boundary corresponding to the values of `kml:west`, `kml:east` and constant lines of latitude demarcate the portion of the boundary corresponding to the values of `kml:south`, `kml:north`. If `kml:altitudeMode` value is not `clampToGround`, as in the following KML example, then the altitude of the `kml:GroundOverlay` is determined by the `kml:altitude` element.

```
<kml>
  <GroundOverlay>
    <altitude>500000</altitude>
    <altitudeMode>absolute</altitudeMode>
    <LatLonBox>
      <north>80.0</north>
      <south>60.0</south>
      <east>60.0</east>
      <west>-60.0</west>
    </LatLonBox>
  </GroundOverlay>
</kml>
```

The KML example above is shown in Figure 7. If `kml:altitudeMode` value is **clampToGround** then the `kml:GroundOverlay` is projected onto the earth's terrain surface model similar to the case of the `kml:Polygon` shown on the right hand side of Figure 6.
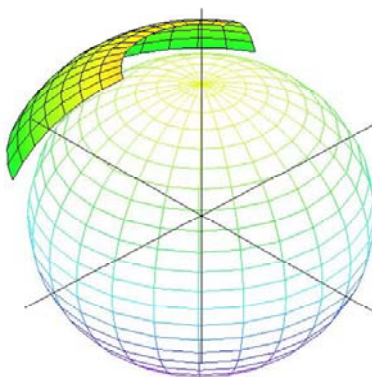
Figure 7: KML GroundOverlay when value of `kml:altitudeMode` is not clampToGround

In the case of `kml:Region` the values of `kml:west`, `kml:east` of `kml:LatLonAltBox` determine the boundary surfaces of constant longitude and the values of `kml:south`, `kml:north` determine the boundary surfaces of constant latitude. The values of `kml:minAltitude` and `kml:maxAltitude` in the `kml:LatLonAltBox` determine the lower and upper bounding surfaces of constant altitude, respectively.

```
<kml>
  <Region>
    <LatLonAltBox>
      <north>80.0</north>
      <south>60.0</south>
      <east>60.0</east>
      <west>-60.0</west>
      <minAltitude>500000</minAltitude>
      <maxAltitude>2000000</maxAltitude>
      <altitudeMode>absolute</altitudeMode>
    </LatLonAltBox>
  </Region>
</kml>
```

The spatial extent of the sample `kml:Region` encoded above is depicted in Figure 8.
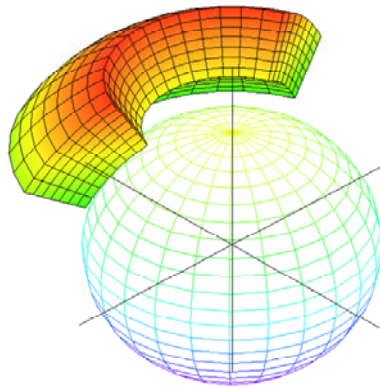
Figure 8: KML Region when value of `kml:altitudeMode` is not clampToGround

6.4   Shared Styles

A `kml:Style` or `kml:StyleMap` element contained by a *kml:AbstractFeatureGroup* element is an "inline style" and shall apply only to the *kml:AbstractFeatureGroup* that contains it. When these elements are encoded as the child of a `kml:Document` element they are called a "shared style." A shared style shall have an `id` value. A shared style applies to any *kml:AbstractFeatureGroup* that references the style from its child `kml:styleUrl` element.

If a *kml:AbstractFeatureGroup* is associated with both an inline and shared style, the inline style shall take precedence.

Shared styles shall only be encoded within a Document. Shared styles are not inherited by any child *kml:AbstractFeatureGroup* elements of a kml:Document.

For a kml:Style or kml:StyleMap that applies to a kml:Document, the kml:Document itself must explicitly reference a shared style. For example:

```
<Document>
  <Style id="myPrettyDocument">
   <ListStyle> ... </ListStyle>

  </Style>
  <styleUrl#myPrettyDocument">
   ...
</Document>
```

The following example illustrates the use of a shared style.

```
<kml xmlns="http://www.opengis.net/kml/2.2">
<Document>
  <name>Document.kml</name>
  <open>1</open>
  <Style id="exampleStyleDocument">
    <LabelStyle>
      <color>ff0000cc</color>
    </LabelStyle>
  </Style>
  <Placemark>
    <name>Document Feature 1</name>
    <styleUrl>#exampleStyleDocument</styleUrl>
    <Point>
      <coordinates>-122.371,37.816,0</coordinates>
    </Point>
  </Placemark>
  <Placemark>
    <name>Document Feature 2</name>
    <styleUrl>#exampleStyleDocument</styleUrl>
    <Point>
      <coordinates>-122.370,37.817,0</coordinates>
    </Point>
  </Placemark>
</Document>
</kml>
```

6.5   Entity Replacement

Entity substitution is employed as a template mechanism within the kml:BalloonStyle kml:text element. Individual values shall be substituted for each instance of the entity, or a null string if no value exists. The source of values for entity substitution is local to the *kml:AbstractFeatureGroup* being styled and any kml:Schema elements associated with it. Entity syntax for identifying a substitution value is as follows:

1. **$[element_or_attribute_name]**, where "element_or_attribute_name" is the name of a field element or attribute of the *kml:AbstractFeatureGroup*. This identifies the value of the field element or attribute.

2. **$[name_attribute_of_Data_element]**, where "name_attribute_of_Data_element" is the value of the kml:name attribute of a descendant kml:Data element of the *kml:AbstractFeatureGroup*. This identifies the value of the child kml:value element of the kml:Data element.

3. **$[name_attribute_of_Data_element/displayName]**, where "name_attribute_of_Data_element" is the value of the kml:name attribute of a descendant kml:Data element of the *kml:AbstractFeatureGroup*; "/" is a separator; and "displayName" is the value of the kml:displayName attribute of the kml:Data element. This identifies the value of the kml:displayName attribute.

4. **$[TYPENAME/TYPEFIELD]**, where "TYPENAME" is the value of the kml:name attribute of a descendant kml:Schema element of the *kml:AbstractFeatureGroup*; "/" is a separator; and "TYPEFIELD" is the value of the kml:name attribute of a child kml:SimpleField element of the kml:Schema element . This identifies the value of a descendant kml:SimpleData element of the *kml:AbstractFeatureGroup* that references the kml:SimpleField element.

5. **$[TYPENAME/TYPEFIELD/displayName]**, where "TYPENAME" is the value of the kml:name attribute of a descendant kml:Schema element of the *kml:AbstractFeatureGroup*; "/" is a separator; and "TYPEFIELD" is the value of the kml:name attribute of a child kml:SimpleField element of the kml:Schema element; and "displayName" is the value of the child kml:displayName element of the kml:SimpleField element. This identifies the value of the kml:displayName element.

For example, the **$[name]** and **$[description]** entities in the following `kml:BalloonStyle` `kml:text` element shall be replaced by the `kml:name` and `kml:description` values of *kml:AbstractFeatureGroup* elements associated with the `kml:BalloonStyle`:

```
<text>This is $[name], whose description is:<br/>$[description]</text>
```

6.6   Extension Model

6.6.1   Introduction

The KML schema provides several mechanisms to extend KML within application profiles. All KML extensions shall conform to the extension profile requirements discussed in 2.2 Application Profiles.

6.6.2   Extension by Inheritance

The KML schema defines abstract base types (e.g. `kml:AbstractFeatureType`), concrete types (e.g. `kml:PlacemarkType`), and abstract elements that act as the head of substitution groups (e.g. *kml:AbstractFeatureGroup*). While further derivation of all KML concrete complex types is prohibited, new schema types may be derived from the core abstract base types (see 6.1).

6.6.3   Extension by Composition

6.6.3.1   Simple Element Substitution

A simple element whose type derives from `xsd:anySimpleType` may be declared to substitute for a KML abstract head element whose type is of `xsd:anySimpleType`. Such head elements have a naming convention whereby their local name ends with "SimpleExtensionGroup" (e.g. `kml:AbstractFeatureSimpleExtensionGroup`).

6.6.3.2   Complex Element Substitution

A complex element may substitute for a KML abstract head element that is:

- of a core abstract base type (e.g. `kml:AbstractFeatureType)`.

- of `xsd:anyType` and substitutes for `kml:AbstractObjectGroup`. Substituting for such an element requires a type definition that derives from

kml:AbstractObjectGroup. All such head elements have a local name that ends with "ObjectExtensionGroup" (e.g. kml:AbstractFeatureObjectExtensionGroup).

- head elements that are of xsd:anyType and declare no substitution group. These have a local name that ends with "Extension" (e.g. kml:DataExtension).

Usage examples:

- a new element whose type derives by extension from kml:AbstractFeatureType and substitutes for *kml:AbstractFeatureGroup* would be available wherever *kml:AbstractFeatureGroup* is permitted; that is, as a child of kml:Document, kml:Folder, kml:kml or kml:Delete.

- a new element whose type derives by extension from kml:AbstractObjectType and substitutes for kml:AbstractFeatureObjectExtensionGroup would be available wherever kml:AbstractFeatureObjectExtensionGroup is permitted; that is, as a child of kml:Document, kml:Folder, kml:GroundOverlay, kml:ScreenOverlay, kml:PhotoOverlay, kml:Placemark, and kml:NetworkLink.

- a new element whose type is of xsd:anyType and substitutes for kml:DataExtension would be available wherever kml:DataExtension is permitted; that is, as a child of kml:Data.

7 Root Element

7.1 kml

7.1.1 Structure

```
<kml:kml
 hint="string [0..1]">
    <kml:NetworkLinkControl> ... </kml:NetworkLinkControl> [0..1]
    <kml:AbstractFeatureGroup> ... </kml:AbstractFeatureGroup> [0..1]
    <kml:KmlSimpleExtensionGroup> ... </kml:KmlSimpleExtensionGroup> [0..*]
    <kml:KmlObjectExtensionGroup> ... </kml:KmlObjectExtensionGroup> [0..*]
</kml:kml>
```

7.1.2 Description

The root element of a KML document instance. It should contain at least one of its child elements.

7.1.3 Content

7.1.3.1 kml:NetworkLinkControl

See 13.2 kml:NetworkLinkControl.

7.1.3.2 kml:AbstractFeatureGroup

See 9.1 kml:AbstractFeatureGroup.

7.1.3.3 kml:KmlSimpleExtensionGroup

See 6.6.3.1 Simple Element Substitution.

7.1.3.4 kml:KmlObjectExtensionGroup

See 6.6.3.2 Complex Element Substitution.

7.1.4   Attributes

7.1.4.1   hint

7.1.4.1.1   Description

The hint attribute may be used to provide information on how to process the KML document instance.

7.1.4.1.2   Content

Type: xsd:string
Default Value: none

7.1.5   Example

```
<kml xmlns="http://www.opengis.net/kml/2.2">
  <NetworkLinkControl> ... </NetworkLinkControl>
  <Document> ... </Document>
</kml>
```

8   Object

8.1   kml:AbstractObjectGroup

8.1.1   Structure

```
<kml:AbstractObjectGroup
 id="ID [0..1]"
 targetId="NCName [0..1]">
    <kml:ObjectSimpleExtensionGroup> ... </kml:ObjectSimpleExtensionGroup> [0..*]
</kml:AbstractObjectGroup>
```

8.1.2   Description

Abstract: yes

The following elements can be used wherever this element is referenced:

- *kml:AbstractFeatureGroup*
- kml:Document
- *kml:AbstractOverlayGroup*
- kml:ScreenOverlay
- kml:Placemark
- *kml:AbstractViewGroup*
- kml:Camera
- kml:Data
- kml:MultiGeometry
- kml:LineString
- kml:Polygon
- *kml:AbstractStyleSelectorGroup*
- kml:StyleMap
- kml:TimeStamp
- kml:Region
- kml:Lod
- kml:Link
- kml:Orientation

- *kml:AbstractContainerGroup*
- kml:Folder
- kml:GroundOverlay
- kml:PhotoOverlay
- kml:NetworkLink
- kml:LookAt
- kml:SchemaData
- *kml:AbstractGeometryGroup*
- kml:Point
- kml:LinearRing
- kml:Model
- kml:Style
- *kml:AbstractTimePrimitiveGroup*
- kml:TimeSpan
- kml:LatLonAltBox
- kml:Icon
- kml:Location
- kml:Scale

- kml:ResourceMap
- *kml:AbstractLatLonBox*
- kml:ViewVolume
- kml:Pair
- *kml:AbstractColorStyleGroup*
- kml:LabelStyle
- kml:PolyStyle
- kml:ListStyle

- kml:Alias
- kml:LatLonBox
- kml:ImagePyramid
- *kml:AbstractSubStyleGroup*
- kml:IconStyle
- kml:LineStyle
- kml:BalloonStyle
- kml:ItemIcon

8.1.3   Attributes

8.1.3.1   id

8.1.3.1.1   Description

The `id` attribute may be used to specify a unique identifier for the *kml:AbstractObjectGroup* within the KML document instance.

If a *kml:AbstractObjectGroup* is not being used for update purposes (not a descendant of `kml:Update`) and it is empty then it shall have an `id` attribute. This facilitates updating the object to include content at a later point in time.

8.1.3.1.2   Content

    Type: xsd:ID
    Default Value: none

8.1.3.2   targetId

8.1.3.2.1   Description

The optional `targetId` attribute may be used to encode the id value of another *kml:AbstractObjectGroup*.

If a *kml:AbstractObjectGroup* is being used for update purposes (is a grandchild of `kml:Update`) then it shall have a `targetId` attribute referencing the

kml:AbstractObjectGroup element to be updated. Otherwise, outside of an update context `targetId` has no meaning.

See also 13.3 kml:Update.

8.1.3.2.2   Content

Type: xsd:NCName
Default Value: none

8.1.3.3   kml:AbstractObjectGroupSimpleExtensionGroup

See 6.6.3.1 Simple Element Substitution.

9   Features

9.1   kml:AbstractFeatureGroup

9.1.1   Structure

```
<kml:AbstractFeatureGroup
 id="ID [0..1]"
 targetId="NCName [0..1]">
    <kml:ObjectSimpleExtensionGroup> ... </kml:ObjectSimpleExtensionGroup> [0..*]
    <kml:name> ... </kml:name> [0..1]
    <kml:visibility> ... </kml:visibility> [0..1]
    <kml:open> ... </kml:open> [0..1]
    <atom:author> ... </atom:author> [0..1]
    <atom:link> ... </atom:link> [0..1]
    <kml:address> ... </kml:address> [0..1]
    <xal:AddressDetails> ... </xal:AddressDetails> [0..1]
    <kml:phoneNumber> ... </kml:phoneNumber> [0..1]
    <kml:snippet> ... </kml:snippet> [0..1]
    <kml:description> ... </kml:description> [0..1]
    <kml:AbstractViewGroup> ... </kml:AbstractViewGroup> [0..1]
    <kml:AbstractTimePrimitiveGroup> ... </kml:AbstractTimePrimitiveGroup> [0..1]
    <kml:styleUrl> ... </kml:styleUrl> [0..1]
    <kml:AbstractStyleSelectorGroup> ... </kml:AbstractStyleSelectorGroup> [0..*]
    <kml:Region> ... </kml:Region> [0..1]
    <kml:ExtendedData> ... </kml:ExtendedData> [0..1]
    <kml:AbstractFeatureSimpleExtensionGroup> ...
</kml:AbstractFeatureSimpleExtensionGroup> [0..*]
    <kml:AbstractFeatureObjectExtensionGroup> ...
</kml:AbstractFeatureObjectExtensionGroup> [0..*]
</kml:AbstractFeatureGroup>
```

9.1.2   Description

Abstract: yes

This element can be used wherever the following element is referenced:

- *kml:AbstractObjectGroup*

The following elements can be used wherever this element is referenced:

- *kml:AbstractContainerGroup*
- kml:Folder
- kml:GroundOverlay

- kml:Document
- *kml:AbstractOverlayGroup*
- kml:ScreenOverlay

- kml:PhotoOverlay
- kml:NetworkLink

- kml:Placemark
-

9.1.3   Content

9.1.3.1   kml:name

9.1.3.1.1   Description

Specifies a label for the *kml:AbstractFeatureGroup*.

9.1.3.1.2   Content

Type: xsd:string
Default Value: none

9.1.3.2   kml:visibility

9.1.3.2.1   Description

Specifies whether the *kml:AbstractFeatureGroup* shall be drawn in the geographic view when it is initially loaded (1 or true), or not (0 or false). In order for a *kml:AbstractFeatureGroup* to be visible, the kml:visibility tag of all its ancestors shall also be set to 1 or true.

9.1.3.2.2   Content

Type: xsd:boolean
Default Value: 1 or true

9.1.3.3   kml:open

9.1.3.3.1   Description

Specifies whether a *kml:AbstractContainerGroup* appears expanded (1 or true) or collapsed (0 or false) when first loaded into the list view.

See also 12.13 kml:ListStyle.

9.1.3.3.2 Content

Type: xsd:boolean
Default Value: 0 or false

9.1.3.4 atom:author

9.1.3.4.1 Description

Specifies the author of the *kml:AbstractFeatureGroup*.

See also 9.6 kml:AbstractContainerGroup regarding the inheritance of the `atom:author` within KML feature hierarchies.

9.1.3.4.2 Content

See IETF RFC 4287, 4.2.1.

9.1.3.5 atom:link

9.1.3.5.1 Description

Specifies the URL of the source resource that contains the *kml:AbstractFeatureGroup*. The URL is encoded as the value of the `kml:href` attribute.

The `atom:link rel` attribute shall be present and its value shall be **related**.

See also 9.6 kml:AbstractContainerGroup regarding the inheritance of the `atom:link` within KML feature hierarchies.

9.1.3.5.2 Content

See IETF RFC 4287, 4.2.7.

9.1.3.6   kml:address

9.1.3.6.1   Description

A string value representing an unstructured address for the *kml:AbstractFeatureGroup* such as street, city, state address, and/or a postal code. This may be used to geocode the location of a *kml:AbstractFeatureGroup* if it does not contain a *kml:AbstractGeometryGroup* element.

9.1.3.6.2   Content

Type:	xsd:string
Default Value:	none

9.1.3.7   xal:AddressDetails

9.1.3.7.1   Description

A structured address for the *kml:AbstractFeatureGroup* formatted according to xAL 2.0. This may be used to geocode the location of a *kml:AbstractFeatureGroup* if it does not contain a *kml:AbstractGeometryGroup* element.

9.1.3.7.2   Content

See OASIS Extensible Address Language (XAL) 2.0.

9.1.3.8   kml:phoneNumber

9.1.3.8.1   Description

A value representing a telephone number. The number should be formatted according to IETF RFC 3966.

9.1.3.8.2   Content

Type:	xsd:string
Default Value:	none

9.1.3.9   kml:snippet

9.1.3.9.1   Description

Specifies a short description of the *kml:AbstractFeatureGroup*. This is used instead of `kml:description` in the list view if it exists.

The text may include HTML content that is encoded as well-formed XML using HTML entity references or by enclosing the HTML within a CDATA section.

9.1.3.9.2   Content

Type:	xsd:string
Default Value:	none

9.1.3.10   kml:description

9.1.3.10.1   Description

Specifies a description of the *kml:AbstractFeatureGroup*. This should be displayed in the description balloon.

The text may include HTML content that is encoded as well-formed XML using HTML entity references or by enclosing the HTML within a CDATA section.

If the description includes the HTML `<a href="..." type="...">` tag, it should have an HTML `href` and `type` attribute and be interpreted as follows:

- The `href` attribute specifies a URL.

- If the target of the href is a KML resource, an earth browser should load the resource if the link is activated.

The `href` may reference another *kml:AbstractFeatureGroup* if its value is the fragment component of a URL (see 12.9.3.1). If such a link is activated the geographic view should fly to the *kml:AbstractFeatureGroup* whose ID matches the fragment. If this *kml:AbstractFeatureGroup* has a `kml:LookAt` or `kml:Camera` element, it shall be viewed from the specified viewpoint.

Special processing is required for embedded HTML links that append a display directive to the fragment component of the URL; such a directive (e.g. ";flyto") must be removed from the fragment component in order to obtain the shorthand pointer. Available directives are:

- ;flyto (default) – fly to the `kml:AbstractFeatureGroup`

- ;balloon – open the `kml:AbstractFeatureGroup's` balloon but do not fly to the `kml:AbstractFeatureGroup`

- ;balloonFlyto – open the `kml:AbstractFeatureGroup's` balloon and fly to the `kml:AbstractFeatureGroup`

For example, the following code indicates to open the resource *CraftsFairs.kml* resource, fly to the `kml:Placemark` whose ID is "Albuquerque," and open its balloon:

```
<description>
  <a href="http://myServer.com/CraftsFairs.kml#Albuquerque;balloonFlyto">
      One of the Best Art Shows in the West</a>
</description>
```

The `type` attribute specifies the MIME type for the target resource. An earth browser should interpret the target resource according to this specified MIME type when attempting to load it. To indicate that the target resource is KML specify the following MIME type:

```
type="application/vnd.google-earth.kml+xml"
```

To indicate that the target resource is a KMZ archive specify the following MIME type:

```
type="application/vnd.google-earth.kmz"
```

For example, the type attribute below indicates that an earth browser should attempt to load the target as a KML resource even though the file extension is *.php*:

```
<a href="myserver.com/cgi-bin/generate-kml.php#placemark123"
   type="application/vnd.google-earth.kml+xml"
```

9.1.3.10.2   Content

      Type: xsd:string
      Default Value: none

9.1.3.11   kml:AbstractViewGroup

Specifies a viewpoint for the `kml:AbstractFeatureGroup.`

See 14.1 AbstractViewGroup.

9.1.3.12   kml:AbstractTimePrimitiveGroup

Affects the visibility of the *kml:AbstractFeatureGroup.*

See 15.1 kml:AbstractTimePrimitiveGroup.

9.1.3.13   kml:styleURL

9.1.3.13.1   Description

Specifies a reference to a `kml:Style` or `kml:StyleMap`. The reference shall be encoded as a URL with a fragment component (see 12.9.3.1). The value of the fragment shall be the **id** of a `kml:Style` or `kml:StyleMap` defined in a `kml:Document`.

See also 12.2 kml:Style; 12.3 kml:StyleMap, and 6.4 Shared Styles.

9.1.3.13.2   Content

>   Type: xsd:anyURI
>   Default Value: none

9.1.3.13.3   Example

To reference a `kml:Style` or `kml:StyleMap` in the same document:

```
<styleUrl>#myIconStyleID</styleUrl>
```

To reference a `kml:Style` or `kml:StyleMap` in a hosted document:

```
<styleUrl>http://someserver.com/somestylefile.xml#restaurant</styleUrl>
```

9.1.3.14   kml:AbstractStyleSelectorGroup

One or more `kml:Styles` or `kml:StyleMaps` used to style the *kml:Feature.*

See also 12.1 kml:AbstractStyleSelectorGroup and 6.4 Shared Styles.

9.1.3.15   kml:Region

Affects the visibility of the *kml:AbstractFeatureGroup* .

See 9.13 kml:Region.

9.1.3.16   kml:ExtendedData

Allows for the addition of user-defined data.

See 9.2 ExtendedData.

9.1.3.17   kml:AbstractFeatureSimpleExtensionGroup

See 6.6.3.1 Simple Element Substitution.

9.1.3.18   kml:AbstractFeatureObjectExtensionGroup

See 6.6.3.2 Complex Element Substitution.

9.1.4   Examples

9.1.4.1   Sample Use of HTML Elements within a Description

```
<kml xmlns="http://www.opengis.net/kml/2.2">
<Placemark>
  <name>Feature.kml</name>
  <Snippet maxLines="4">
    The snippet is a way of
    providing an alternative
    description that will be
    shown in the List view.
  </Snippet>
  <description>
    <![CDATA[
      Styles: <i>Italics</i>, <b>Bold</b>, <u>Underlined</u>,
      <s>Strike Out</s>, subscript<sub>subscript</sub>,
      superscript<sup>superscript</sup>,
      <big>Big</big>, <small>Small</small>, <tt>Typewriter</tt>,
      <em>Emphasized</em>, <strong>Strong</strong>, <code>Code</code>
      <hr />
      Fonts:
      <font color="red">red by name</font>,
      <font color="#408010">leaf green by hexadecimal RGB</font>,
      <font size=1>size 1</font>, <font size=2>size 2</font>,
      <font size=3>size 3</font>, <font size=4>size 4</font>,
      <font size=5>size 5</font>, <font size=6>size 6</font>,
      <font size=7>size 7</font>,
      <font face=times>Times</font>,
      <font face=verdana>Verdana</font>,
      <font face=arial>Arial</font>
      <br/>
      <hr />
      Links:
      <a href="http://doc.trolltech.com/3.3/qstylesheet.html">
      QT Rich Text Rendering
      </a>
      <br />
      <hr />
      Alignment:
      <br />
      <p align=left>left</p><p align=center>center</p>
      <p align=right>right</p>
      <hr />
      Ordered Lists:
      <br />
      <ol><li>First</li><li>Second</li><li>Third</li></ol>
      <ol type="a"><li>First</li><li>Second</li><li>Third</li></ol>
      <ol type="A"><li>First</li><li>Second</li><li>Third</li></ol>
      <hr />
      Unordered Lists:
      <br />
      <ul><li>A</li><li>B</li><li>C</li></ul>
      <ul type="circle"><li>A</li><li>B</li><li>C</li></ul>
      <ul type="square"><li>A</li><li>B</li><li>C</li></ul>
```

```
      <hr />
      Definitions:
      <br />
      <dl>
      <dt>Scrumpy</dt>
      <dd>Hard English cider from the west country</dd>
      <dt>Pentanque</dt>
      <dd>A form of boules where the goal is to throw metal ball as
      close as possible to a jack</dd>
      </dl>
      <hr />
      Block Quote:
      <br />
      <blockquote>
      We shall not cease from exploration<br />
      And the end of all our exploring<br />
      Will be to arrive where we started<br />
      And know the place for the first time
      </blockquote>
      <br />
      <hr />
      Centered:
      <br />
      <center>See, I have a Rhyme assisting<br />
      my feeble brain,<br />
      its tasks oft-times resisting!</center>
      <hr />
      Headings:
      <br />
      <h1>Header 1</h1>
      <h2>Header 2</h2>
      <h3>Header 3</h3>
      <h3>Header 4</h4>
      <h3>Header 5</h5>
      <hr />
      Images:
      <br />
      <img src="http://www.opengis.net/images/googleearth.gif" />
      <br />
      <i>Scaled image</i>
      <br />
      <img src="http://www.opengis.net/images/googleearth.gif"
      width="100" />
      <br />
      <hr />
      Tables:
      <table border="1" padding="3" width="300">
      <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr>
      <tr><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td></tr>
      </table>
    ]]>
  </description>
  <Point>
    <coordinates>-122.378927,37.826793,0</coordinates>
  </Point>
</Placemark>
</kml>
```

9.1.4.2   Sample Use of Atom Elements

This example shows use of the atom:author, atom:name and atom:link attribution elements from the Atom namespace. In this case, atom:author and atom:link apply to both kml:Placemarks.

```
<kml xmlns="http://www.opengis.net/kml/2.2"
    xmlns:atom="http://www.w3.org/2005/Atom">
  <Document>
    <atom:author>
      <atom:name>J. K. Rowling</atom:name>
    </atom:author>
    <atom:link href="http://www.harrypotter.com" />
    <Placemark>
      <name>Hogwarts</name>
      <Point>
        <coordinates>1,1</coordinates>
      </Point>
    </Placemark>
    <Placemark>
      <name>Little Hangleton</name>
      <Point>
        <coordinates>1,2</coordinates>
      </Point>
    </Placemark>
  </Document>
</kml>
```

9.2   kml:ExtendedData

9.2.1   Structure

```
<kml:ExtendedData>
    <kml:Data> ... </kml:Data> [0..*]
    <kml:SchemaData> ... </kml:SchemaData> [0..*]
    Allow any elements from a namespace other than this schema's namespace (lax
validation). [0..*]
</kml:ExtendedData>
```

9.2.2   Description

The kml:ExtendedData element offers three mechanisms for adding user-defined data to a *kml:AbstractFeatureGroup*. These mechanisms are:

- Adding arbitrary untyped name/value data pairs using the kml:Data element

- Adding instances of typed fields defined in the user-defined kml:Schema element

- Including any XML content defined in namespaces other than the KML namespace and null namespace

These mechanisms can be used concurrently within a single *kml:AbstractFeatureGroup* or KML document.

Child elements of `kml:ExtendedData` support entity substitution. See 6.5 Entity Replacement.

The scope of `kml:ExtendedData` is restricted to its parent *kml:AbstractFeatureGroup* only.

`kml:ExtendedData` should contain at least one child element outside of an update context, that is when not a descendant of `kml:Update`.

9.2.3   Content

9.2.3.1   kml:Data

An untyped name/value pair.

See 9.3 kml:Data.

9.2.3.2   kml:SchemaData

Encodes an instance of a user-defined data type defined by a referenced `kml:Schema`

See 9.4 kml:SchemaData.

9.2.3.3   xsd:any

9.2.3.3.1   Description

`kml:ExtendedData` may include any other well-formed, namespace-qualified XML content that is not from:

- the KML namespace, "`http://www.opengis.net/kml/2.2`"

- the null or empty namespace, ""

9.2.3.3.2   Content

      Type: xsd:anyType
      Default Value: none

9.2.3.3.3   Example

The following example demonstrates the encoding of XML content from the
"`http://www.example.org/app`" namespace:

```
<kml
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns="http://www.opengis.net/kml/2.2"
  xmlns:app="http://www.example.org/app"
  xmlns:gml="http://www.opengis.net/gml">
  <Placemark>
    <name>A road</name>
    <ExtendedData>
      <app:Road>
        <app:numberOfLanes>2</app:numberOfLanes>
        <app:pavement>gravel</app:pavement>
      </app:Road>
    </ExtendedData>
  </Placemark>
</kml>
```

9.3   kml:Data

9.3.1   Structure

```
<kml:Data
 id="ID [0..1]"
 targetId="NCName [0..1]"
name="string [0..1]">
    <kml:ObjectSimpleExtensionGroup> ... </kml:ObjectSimpleExtensionGroup> [0..*]
    <kml:displayName> ... </kml:displayName> [0..1]
    <kml:value> string </kml:value> [1]
    <kml:DataExtension> ... </kml:DataExtension> [0..*]
</kml:Data>
```

9.3.2   Description

This element can be used wherever the following element is referenced:

- *kml:AbstractObjectGroup*

Creates an untyped name/value data pair, where:

- The data pair is identified by the `name` attribute

- The value of the data pair is supplied by `kml:value`

Both `name` and `kml:value` should be encoded. The value of the `name` attribute shall be unique within the context of its parent `kml:ExtendedData` element.

9.3.3   Content

9.3.3.1   kml:displayName

9.3.3.1.1   Description

An alternate display name.

9.3.3.1.2   Content

Type:	xsd:string
Default Value:	none

9.3.3.2   kml:value

9.3.3.2.1   Description

Value of the data pair.

9.3.3.2.2   Content

Type:	xsd:string
Default Value:	none

9.3.3.3   kml:DataExtension

See 6.6.3.2 Complex Element Substitution.

9.3.4   Attributes

9.3.4.1   name

9.3.4.1.1   Description

Name of the data pair.

9.3.4.1.2   Content

Type:	xsd:string
Default Value:	none

9.3.5   Example

```
<Placemark>
  <name>Club house</name>
  <ExtendedData>
    <Data name="holeNumber">
      <value>1</value>
    </Data>
    <Data name="holeYardage">
      <value>234</value>
    </Data>
    <Data name="holePar">
      <value>4</value>
    </Data>
  </ExtendedData>
</Placemark>
```

9.4   kml:SchemaData

9.4.1   Structure

```
<kml:SchemaData
 id="ID [0..1]"
 targetId="NCName [0..1]"
 schemaUrl="anyURI [0..1]">
    <kml:AbstractObjectGroupSimpleExtensionGroup> ...
</kml:AbstractObjectGroupSimpleExtensionGroup> [0..*]
    <kml:SimpleData> ... </kml:SimpleData> [0..*]
    <kml:SchemaDataExtension> ... </kml:SchemaDataExtension> [0..*]
</kml:SchemaData>
```

9.4.2   Description

This element can be used wherever the following element is referenced:

- *kml:AbstractObjectGroup*

Encodes an instance of a user-defined data type defined by a referenced kml:Schema.

A kml:SchemaData element shall reference a kml:Schema element using the kml:schemaUrl attribute.

9.4.3   Content

9.4.3.1   kml:SimpleData

See 9.5 kml:SimpleData.

9.4.3.2   kml:SchemaDataExtension

See 6.6.3.2 Complex Element Substitution.

9.4.4   Attributes

9.4.4.1   schemaUrl

9.4.4.1.1   Description

The value of `kml:schemaURL` should be a full URL, a reference to a `kml:Schema` **id** attribute defined in an external KML resource, or a reference to a `kml:Schema` **id** defined in the same KML resource.

9.4.4.1.2   Content

Type: xsd:anyURI
Default Value: none

9.4.4.1.3   Examples

All of the following URI values are acceptable:

```
schemaUrl="http://host.com/PlacesIHaveLived.kml#my-schema-id"
```

```
schemaUrl="AnotherFile.kml#my-schema-id"
```

```
schemaUrl="#schema-id"    <!-- same resource -->
```

9.5 kml:SimpleData

9.5.1 Structure

```
<kml:SimpleData
 name="string [1]">
    string
</kml:SimpleData>
```

9.5.2 Description

Encodes an instance of a user-defined field defined by a referenced `kml:SimpleField`.

The value of `kml:SimpleData` shall be of the data type defined by the referenced `kml:SimpleField`.

The required `name` attribute shall be used to identify the `kml:SimpleField` by name. The identified `kml:SimpleField` shall be declared within the `kml:Schema` element that is referenced from the `kml:SchemaURL` attribute.

9.5.3 Content

Type: xsd:string
Default Value: none

9.5.4 Attributes

9.5.4.1 name

9.5.4.1.1 Description

Name acting as an identifier.

9.5.4.1.2 Content

Type: xsd:string
Default Value: none

9.5.5 Example

Here is an example of encoding two user-defined data elements:

```
<kml xmlns="http://earth.google.com/kml/2.2">
  <Document>
    <name>ExtendedData+SchemaData</name>
    <open>1</open>
    <!-- Create a balloon template referring to the user-defined type -->
    <Style id="trailhead-balloon-template">
      <BalloonStyle>
        <text>
          <![CDATA[
            <h2>My favorite trails!</h2>
            <br/><br/>
            The $[TrailHeadType/TrailHeadName/displayName] is
<i>$[TrailHeadType/TrailHeadName]</i>.
            The trail is $[TrailHeadType/TrailLength] miles.<br/>
            The climb is $[TrailHeadType/ElevationGain] meters.<br/><br/>
          ]]>
        </text>
      </BalloonStyle>
    </Style>

    <!-- Declare the type "TrailHeadType" with 3 fields -->
    <Schema name="TrailHeadType" id="TrailHeadTypeId">
      <SimpleField type="string" name="TrailHeadName">
        <displayName><![CDATA[<b>Trail Head Name</b>]]></displayName>
      </SimpleField>
      <SimpleField type="double" name="TrailLength">
        <displayName><![CDATA[<i>The length in miles</i>]]></displayName>
      </SimpleField>
      <SimpleField type="int" name="ElevationGain">
        <displayName><![CDATA[<i>change in altitude</i>]]></displayName>
      </SimpleField>
    </Schema>
```

```
      <!-- Instantiate some Placemarks extended with TrailHeadType fields -->
      <Placemark>
        <name>Easy trail</name>
        <styleUrl>#trailhead-balloon-template</styleUrl>
        <ExtendedData>
          <SchemaData schemaUrl="#TrailHeadTypeId">
            <SimpleData name="TrailHeadName">Pi in the sky</SimpleData>
            <SimpleData name="TrailLength">3.14159</SimpleData>
            <SimpleData name="ElevationGain">10</SimpleData>
          </SchemaData>
        </ExtendedData>
        <Point>
          <coordinates>-122.000,37.002</coordinates>
        </Point>
      </Placemark>
      <Placemark>
        <name>Difficult trail</name>
        <styleUrl>#trailhead-balloon-template</styleUrl>
        <ExtendedData>
          <SchemaData schemaUrl="#TrailHeadTypeId">
            <SimpleData name="TrailHeadName">Mount Everest</SimpleData>
            <SimpleData name="TrailLength">347.45</SimpleData>
            <SimpleData name="ElevationGain">10000</SimpleData>
          </SchemaData>
        </ExtendedData>
        <Point>
          <coordinates>-121.998,37.0078</coordinates>
        </Point>
      </Placemark>
    </Document>
  </kml>
```

9.6   kml:AbstractContainerGroup

9.6.1   Structure

```
<kml:AbstractContainerGroup
 id="ID [0..1]"
 targetId="NCName [0..1]">
    <kml:AbstractObjectGroupSimpleExtensionGroup> ...
</kml:AbstractObjectGroupSimpleExtensionGroup> [0..*]
    <kml:name> ... </kml:name> [0..1]
    <kml:visibility> ... </kml:visibility> [0..1]
    <kml:open> ... </kml:open> [0..1]
    <atom:author> ... </atom:author> [0..1]
    <atom:link> ... </atom:link> [0..1]
    <kml:address> ... </kml:address> [0..1]
    <xal:AddressDetails> ... </xal:AddressDetails> [0..1]
    <kml:phoneNumber> ... </kml:phoneNumber> [0..1]
    <kml:snippet> ... </kml:snippet> [0..1]
    <kml:description> ... </kml:description> [0..1]
    <kml:AbstractViewGroup> ... </kml:AbstractViewGroup> [0..1]
    <kml:AbstractTimePrimitiveGroup> ... </kml:AbstractTimePrimitiveGroup> [0..1]
    <kml:styleUrl> ... </kml:styleUrl> [0..1]
    <kml:AbstractStyleSelectorGroup> ... </kml:AbstractStyleSelectorGroup> [0..*]
```

```
    <kml:Region> ... </kml:Region> [0..1]
    <kml:ExtendedData> ... </kml:ExtendedData> [0..1]
    <kml:AbstractFeatureSimpleExtensionGroup> ...
</kml:AbstractFeatureSimpleExtensionGroup> [0..*]
    <kml:AbstractFeatureObjectExtensionGroup> ...
</kml:AbstractFeatureObjectExtensionGroup> [0..*]
    <kml:AbstractContainerSimpleExtensionGroup> ...
</kml:AbstractContainerSimpleExtensionGroup> [0..*]
    <kml:AbstractContainerObjectExtensionGroup> ...
</kml:AbstractContainerObjectExtensionGroup> [0..*]
</kml:AbstractContainerGroup>
```

9.6.2 Description

Abstract: yes

This element can be used wherever the following element is referenced:

- *kml:AbstractFeatureGroup*

The following elements can be used wherever this element is referenced:

- kml:Document
- kml:Folder

For convenience in constructing KML feature hierarchies, unless overruled by the presence of such elements locally, the value of the following *kml:AbstractFeatureGroup* elements shall be inherited by all *kml:AbstractFeatureGroup* members of a feature hierarchy:

- atom:author

- atom:link

- kml:Region

- *kml:AbstractTimePrimitiveGroup*

Thus it is not necessary for a child *kml:AbstractFeatureGroup* to carry any of these elements where their local value is the same as that of its parent kml:Document or kml:Folder. Inheritance of these elements continues to any depth of nesting, but if overruled by a local declaration, then the new value is inherited by all its children in turn. Notwithstanding this rule, such elements may be used locally even if they have the same value as that of a parent kml:Document or kml:Folder.

9.6.3 Content

9.6.3.1 kml:AbstractContainerSimpleExtensionGroup

See 6.6.3.1 Simple Element Substitution.

9.6.3.2 kml:AbstractContainerObjectExtensionGroup

See 6.6.3.2 Complex Element Substitution.

9.7   kml:Document

9.7.1   Structure

```
<kml:Document
 id="ID [0..1]"
 targetId="NCName [0..1]">
    <kml:AbstractObjectGroupSimpleExtensionGroup> ...
</kml:AbstractObjectGroupSimpleExtensionGroup> [0..*]
    <kml:name> ... </kml:name> [0..1]
    <kml:visibility> ... </kml:visibility> [0..1]
    <kml:open> ... </kml:open> [0..1]
    <atom:author> ... </atom:author> [0..1]
    <atom:link> ... </atom:link> [0..1]
    <kml:address> ... </kml:address> [0..1]
    <xal:AddressDetails> ... </xal:AddressDetails> [0..1]
    <kml:phoneNumber> ... </kml:phoneNumber> [0..1]
    <kml:snippet> ... </kml:snippet> [0..1]
    <kml:description> ... </kml:description> [0..1]
    <kml:AbstractViewGroup> ... </kml:AbstractViewGroup> [0..1]
    <kml:AbstractTimePrimitiveGroup> ... </kml:AbstractTimePrimitiveGroup> [0..1]
    <kml:styleUrl> ... </kml:styleUrl> [0..1]
    <kml:AbstractStyleSelectorGroup> ... </kml:AbstractStyleSelectorGroup> [0..*]
    <kml:Region> ... </kml:Region> [0..1]
    <kml:ExtendedData> ... </kml:ExtendedData> [0..1]
    <kml:AbstractFeatureSimpleExtensionGroup> ...
</kml:AbstractFeatureSimpleExtensionGroup> [0..*]
    <kml:AbstractFeatureObjectExtensionGroup> ...
</kml:AbstractFeatureObjectExtensionGroup> [0..*]
    <kml:AbstractContainerSimpleExtensionGroup> ...
</kml:AbstractContainerSimpleExtensionGroup> [0..*]
    <kml:AbstractContainerObjectExtensionGroup> ...
</kml:AbstractContainerObjectExtensionGroup> [0..*]
    <kml:Schema> ... </kml:Schema> [0..*]
    <kml:AbstractFeatureGroup> ... </kml:AbstractFeatureGroup> [0..*]
    <kml:DocumentSimpleExtensionGroup> ... </kml:DocumentSimpleExtensionGroup>
[0..*]
    <kml:DocumentObjectExtensionGroup> ... </kml:DocumentObjectExtensionGroup>
[0..*]
</kml:Document>
```

9.7.2   Description

This element can be used wherever the following element is referenced:

- *kml:AbstractContainerGroup*

A kml:Document is a container for KML features, shared styles, and user-defined schemas.

See also 6.4 Shared Styles.

9.7.3 Content

9.7.3.1 kml:Schema

Specifies a user-defined schema.

See 9.8 kml:Schema.

9.7.3.2 kml:AbstractFeatureGroup

See 9.1 kml:AbstractFeatureGroup.

9.7.3.3 kml:DocumentSimpleExtensionGroup

See 6.6.3.1 Simple Element Substitution.

9.7.3.4 kml:DocumentObjectExtensionGroup

See 6.6.3.2 Complex Element Substitution.

9.8 kml:Schema

9.8.1 Structure

```
<kml:Schema
 name="string [0..1]"
 id="ID [0..1]">
    <kml:SimpleField> ... </kml:SimpleField> [0..*]
    <kml:SchemaExtension> ... </kml:SchemaExtension> [0..*]
</kml:Schema>
```

9.8.2 Description

Specifies a user-defined schema that is used to add user-defined data encoded within a child `kml:ExtendedData` element of a *kml:AbstractFeatureGroup*. `kml:Schema` shall have an `id` so that instances of it (encoded as `kml:SchemaData`) may reference it.

9.8.3　Content

9.8.3.1　kml:SimpleField

See 9.9 kml:SimpleField.

9.8.3.2　kml:SchemaExtension

See 6.6.3.2 Complex Element Substitution.

9.8.4　Attributes

9.8.4.1　id

9.8.4.1.1　Description

Unique identifier the *kml:AbstractObjectGroup* within the KML document instance.

9.8.4.1.2　Content

Type:　　　　　xsd:ID
Default Value:　　none

9.8.4.2　name

See 9.5.4.1 name.

9.8.5　Example

```
<kml xmlns="http://www.opengis.net/kml/2.2">
<Document>
  <Schema name="TrailHeadType" id="TrailHeadTypeId">
    <SimpleField type="string" name="TrailHeadName">
      <displayName><![CDATA[<b>Trail Head Name</b>]]></displayName>
    </SimpleField>
    <SimpleField type="double" name="TrailLength">
      <displayName><![CDATA[<i>The length in miles</i>]]></displayName>
    </SimpleField>    <SimpleField type="int" name="ElevationGain">
      <displayName><![CDATA[<i>change in altitude</i>]]></displayName>
    </SimpleField>
  </Schema>
</Document>
</kml>
```

9.9　kml:SimpleField

9.9.1　Structure

```
<kml:SimpleField
 type="string [0..1]"
 name="string [0..1]">
    <kml:displayName> ... </kml:displayName> [0..1]
    <kml:SimpleFieldExtension> ... </kml:SimpleFieldExtension> [0..*]
</kml:SimpleField>
```

9.9.2　Description

Specifies a user-defined field. The name and type attributes shall be specified.

9.9.3　Content

9.9.3.1　kml:displayName

See 12.7 kml:displayName.

9.9.3.2　kml:SimpleFieldExtension

See 6.6.3.2 Complex Element Substitution.

9.9.4 Attributes

9.9.4.1 name

See 9.5.4.1 name.

9.9.4.2 type

9.9.4.2.1 Description

Type of the field. The `type` content shall be formatted according to one of the following XML Schema types:

- xsd:string
- xsd:unsignedInt
- xsd:unsignedShort
- xsd:double

- xsd:int
- xsd:short
- xsd:float
- xsd:boolean

9.9.4.2.2 Content

    Type: xsd:string
    Default Value: none

9.10   kml:Folder

9.10.1   Structure

```
<kml:Folder
 id="ID [0..1]"
 targetId="NCName [0..1]">
    <kml:ObjectSimpleExtensionGroup> ... </kml:ObjectSimpleExtensionGroup> [0..*]
    <kml:name> ... </kml:name> [0..1]
    <kml:visibility> ... </kml:visibility> [0..1]
    <kml:open> ... </kml:open> [0..1]
    <atom:author> ... </atom:author> [0..1]
    <atom:link> ... </atom:link> [0..1]
    <kml:address> ... </kml:address> [0..1]
    <xal:AddressDetails> ... </xal:AddressDetails> [0..1]
    <kml:phoneNumber> ... </kml:phoneNumber> [0..1]
    <kml:snippet> ... </kml:snippet> [0..1]
    <kml:description> ... </kml:description> [0..1]
    <kml:AbstractViewGroup> ... </kml:AbstractViewGroup> [0..1]
    <kml:AbstractTimePrimitiveGroup> ... </kml:AbstractTimePrimitiveGroup> [0..1]
    <kml:styleUrl> ... </kml:styleUrl> [0..1]
    <kml:AbstractStyleSelectorGroup> ... </kml:AbstractStyleSelectorGroup> [0..*]
    <kml:Region> ... </kml:Region> [0..1]
    <kml:ExtendedData> ... </kml:ExtendedData> [0..1]
    <kml:AbstractFeatureSimpleExtensionGroup> ...
</kml:AbstractFeatureSimpleExtensionGroup> [0..*]
    <kml:AbstractFeatureObjectExtensionGroup> ...
</kml:AbstractFeatureObjectExtensionGroup> [0..*]
    <kml:AbstractContainerSimpleExtensionGroup> ...
</kml:AbstractContainerSimpleExtensionGroup> [0..*]
    <kml:AbstractContainerObjectExtensionGroup> ...
</kml:AbstractContainerObjectExtensionGroup> [0..*]
    <kml:AbstractFeatureGroup> ... </kml:AbstractFeatureGroup> [0..*]
    <kml:FolderSimpleExtensionGroup> ... </kml:FolderSimpleExtensionGroup> [0..*]
    <kml:FolderObjectExtensionGroup> ... </kml:FolderObjectExtensionGroup> [0..*]
</kml:Folder>
```

9.10.2   Description

This element can be used wherever the following element is referenced:

- *kml:AbstractContainerGroup*

A kml:Folder is used to organize *kml:AbstractFeatureGroup* elements hierarchically.
Contains zero or more *kml:AbstractFeatureGroup* elements and allows the creation of one
or more nested hierarchies of KML features.

kml:Folder should contain at least one child element outside of an update context, that is
when not a descendant of kml:Update.

9.10.3   Content

9.10.3.1   kml:AbstractFeatureGroup

See 9.1 kml:AbstractFeatureGroup.

9.10.3.2   kml:FolderSimpleExtensionGroup

See 6.6.3.1 Simple Element Substitution.

9.10.3.3   kml:FolderObjectExtensionGroup

See 6.6.3.2 Complex Element Substitution.

9.10.4 Example

```
<kml xmlns="http://www.opengis.net/kml/2.2">
<Folder>
  <name>Folder.kml</name>
  <open>1</open>
  <description>
    A folder is a container that can hold multiple other objects
  </description>
  <Placemark>
    <name>Folder object 1 (Placemark)</name>
    <Point>
      <coordinates>-122.377588,37.830266,0</coordinates>
    </Point>
  </Placemark>
  <Placemark>
    <name>Folder object 2 (Polygon)</name>
    <Polygon>
      <outerBoundaryIs>
        <LinearRing>
          <coordinates>
            -122.377830,37.830445,0
            -122.377576,37.830631,0
            -122.377840,37.830642,0
            -122.377830,37.830445,0
          </coordinates>
        </LinearRing>
      </outerBoundaryIs>
    </Polygon>
  </Placemark>
  <Placemark>
    <name>Folder object 3 (Path)</name>
    <LineString>
      <tessellate>1</tessellate>
      <coordinates>
        -122.378009,37.830128,0 -122.377885,37.830379,0
      </coordinates>
    </LineString>
  </Placemark>
</Folder>
</kml>
```

9.11   kml:Placemark

9.11.1   Structure

```
<kml:Placemark
id="ID [0..1]"
 targetId="NCName [0..1]">
    <kml:ObjectSimpleExtensionGroup> ... </kml:ObjectSimpleExtensionGroup> [0..*]
    <kml:name> ... </kml:name> [0..1]
    <kml:visibility> ... </kml:visibility> [0..1]
    <kml:open> ... </kml:open> [0..1]
    <atom:author> ... </atom:author> [0..1]
```

```
    <atom:link> ... </atom:link> [0..1]
    <kml:address> ... </kml:address> [0..1]
    <xal:AddressDetails> ... </xal:AddressDetails> [0..1]
    <kml:phoneNumber> ... </kml:phoneNumber> [0..1]
    <kml:snippet> ... </kml:snippet> [0..1]
    <kml:description> ... </kml:description> [0..1]
    <kml:AbstractViewGroup> ... </kml:AbstractViewGroup> [0..1]
    <kml:AbstractTimePrimitiveGroup> ... </kml:AbstractTimePrimitiveGroup> [0..1]
    <kml:styleUrl> ... </kml:styleUrl> [0..1]
    <kml:AbstractStyleSelectorGroup> ... </kml:AbstractStyleSelectorGroup> [0..*]
    <kml:Region> ... </kml:Region> [0..1]
    <kml:ExtendedData> ... </kml:ExtendedData> [0..1]
    <kml:AbstractFeatureSimpleExtensionGroup> ...
</kml:AbstractFeatureSimpleExtensionGroup> [0..*]
    <kml:AbstractFeatureObjectExtensionGroup> ...
</kml:AbstractFeatureObjectExtensionGroup> [0..*]
    <kml:AbstractGeometryGroup> ... </kml:AbstractGeometryGroup> [0..1]
    <kml:PlacemarkSimpleExtensionGroup> ... </kml:PlacemarkSimpleExtensionGroup>
[0..*]
    <kml:PlacemarkObjectExtensionGroup> ... </kml:PlacemarkObjectExtensionGroup>
[0..*]
</kml:Placemark>
```

9.11.2   Description

This element can be used wherever the following element is referenced:

- *kml:AbstractFeatureGroup*

A `kml:Placemark` is a *kml:AbstractFeatureGroup* with an associated
kml:AbstractGeometryGroup.

A `kml:Placemark` with a `kml:Point` geometry should be drawn with an icon to mark the
`kml:Placemark` in the geographic view. The point itself determines the position of the
`kml:Placemark's` name and display icon.

`kml:Placemark` should contain a `kml:AbstractGeometryGroup` element outside of an
update context, that is when not a descendant of `kml:Update`.

9.11.3   Content

9.11.3.1   kml:AbstractGeometryGroup

See 10.1 kml:AbstractGeometryGroup.

9.11.3.2   kml:PlacemarkSimpleExtensionGroup

See 6.6.3.1 Simple Element Substitution.

9.11.3.3   kml:PlacemarkObjectExtensionGroup

See 6.6.3.2 Complex Element Substitution.

9.11.4   Example

```
<Placemark>
  <name>New Placemark</name>
  <description>Some Descriptive text.</description>
  <LookAt>
    <longitude>-90.86879847669974</longitude>
    <latitude>48.25330383601299</latitude>
    <range>440.8</range>
    <tilt>8.3</tilt>
    <heading>2.7</heading>
  </LookAt>
  <Point>
    <coordinates>-90.86948943473118,48.25450093195546,0</coordinates>
  </Point>
</Placemark>
```

9.12 kml:NetworkLink

9.12.1 Structure

```
<kml:NetworkLink
 id="ID [0..1]"
 targetId="NCName [0..1]">
    <kml:ObjectSimpleExtensionGroup> ... </kml:ObjectSimpleExtensionGroup> [0..*]
    <kml:name> ... </kml:name> [0..1]
    <kml:visibility> ... </kml:visibility> [0..1]
    <kml:open> ... </kml:open> [0..1]
    <atom:author> ... </atom:author> [0..1]
    <atom:link> ... </atom:link> [0..1]
    <kml:address> ... </kml:address> [0..1]
    <xal:AddressDetails> ... </xal:AddressDetails> [0..1]
    <kml:phoneNumber> ... </kml:phoneNumber> [0..1]
    <kml:snippet> ... </kml:snippet> [0..1]
    <kml:description> ... </kml:description> [0..1]
    <kml:AbstractViewGroup> ... </kml:AbstractViewGroup> [0..1]
    <kml:AbstractTimePrimitiveGroup> ... </kml:AbstractTimePrimitiveGroup> [0..1]
    <kml:styleUrl> ... </kml:styleUrl> [0..1]
    <kml:AbstractStyleSelectorGroup> ... </kml:AbstractStyleSelectorGroup> [0..*]
    <kml:Region> ... </kml:Region> [0..1]
    <kml:ExtendedData> ... </kml:ExtendedData> [0..1]
    <kml:AbstractFeatureSimpleExtensionGroup> ...
</kml:AbstractFeatureSimpleExtensionGroup> [0..*]
    <kml:AbstractFeatureObjectExtensionGroup> ...
</kml:AbstractFeatureObjectExtensionGroup> [0..*]
    <kml:refreshVisibility> ... </kml:refreshVisibility> [0..1]
    <kml:flyToView> ... </kml:flyToView> [0..1]
    <kml:Link> ... </kml:Link> [0..1]
    <kml:NetworkLinkSimpleExtensionGroup> ...
</kml:NetworkLinkSimpleExtensionGroup> [0..*]
    <kml:NetworkLinkObjectExtensionGroup> ...
</kml:NetworkLinkObjectExtensionGroup> [0..*]
</kml:NetworkLink>
```

9.12.2 Description

This element can be used wherever the following element is referenced:

- *kml:AbstractFeatureGroup*

References a KML resource on a local or remote network. kml:NetworkLink elements may be used in combination with kml:Region elements to efficiently load and display large datasets.

9.12.3   Content

9.12.3.1   kml:refreshVisibility

9.12.3.1.1   Description

Specifies the control over the visibility of any *kml:AbstractFeatureGroup* elements within the referenced KML resource.

A value of 0 or false shall leave the visibility of any referenced *kml:AbstractFeatureGroup* elements in the geographic view within the control of the earth browser user.

A value of 1 or true shall require any referenced *kml:AbstractFeatureGroup* elements to be visible within the geographic view whenever such *kml:AbstractFeatureGroup* elements are refreshed.

9.12.3.1.2   Content

> Type: xsd:boolean
> Default Value: 0 or false

9.12.3.2   kml:flyToView

9.12.3.2.1   Description

Specifies whether to adjust the geographic view upon kml:NetworkLink activation.

A value of 0 or true indicates that the geographic view shall remain unchanged. A value of 1 or false indicates that the geographic view shall be displayed according to the *kml:AbstractViewGroup* specified by either:

- a kml:NetworkLinkControl

- a child *kml:AbstractFeatureGroup* of kml:kml

if they exist in the referenced KML resource. The *kml:AbstractViewGroup* of the kml:NetworkLinkControl shall take precedence over the *kml:AbstractViewGroup* of the *kml:AbstractFeatureGroup* if they both exist. If neither exists then the view shall remain unchanged.

9.12.3.2.2 Content

    Type: xsd:boolean
    Default Value: 0 or false

9.12.3.3 kml:Link

Spcifies the location of the KML resource fetched by `kml:NetworkLink`.

See 13.1 kml:Link, kml:Icon (kml:LinkType).

9.12.3.4 kml:NetworkLinkSimpleExtensionGroup

See 6.6.3.1 Simple Element Substitution.

9.12.3.5 kml:NetworkLinkObjectExtensionGroup

See 6.6.3.2 Complex Element Substitution.

9.12.4 Example

```
<Document>
  <visibility>1</visibility>
  <NetworkLink>
    <name>NE US Radar</name>
    <refreshVisibility>1</refreshVisibility>
    <flyToView>1</flyToView>
    <Link>...</Link>
  </NetworkLink>
</Document>
```

9.13 kml:Region

9.13.1 Structure

```
<kml:Region
 id="ID [0..1]"
 targetId="NCName [0..1]">
    <kml:ObjectSimpleExtensionGroup> ... </kml:ObjectSimpleExtensionGroup> [0..*]
    <kml:LatLonAltBox> ... </kml:LatLonAltBox> [0..1]
    <kml:Lod> ... </kml:Lod> [0..1]
    <kml:RegionSimpleExtensionGroup> ... </kml:RegionSimpleExtensionGroup> [0..*]
    <kml:RegionObjectExtensionGroup> ... </kml:RegionObjectExtensionGroup> [0..*]
</kml:Region>
```

9.13.2 Description

This element can be used wherever the following element is referenced:

- *kml:AbstractObjectGroup*

Affects the visibility of the *kml:AbstractFeatureGroup*. A *kml:AbstractFeatureGroup* associated with a kml:Region is drawn only when the kml:Region is active.

A kml:Region affects visibility of a *kml:AbstractFeatureGroup*. kml:Regions define both culling and level-of-detail control over the display of the *kml:AbstractFeatureGroup*. A region shall specify a kml:LatLonAltBox element that describes an area of interest defined by geographic coordinates and altitudes. In addition, a kml:Region contains a kml:Lod element that defines a validity range of the associated kml:Region in terms of projected screen size.

Regions are inherited through a *kml:AbstractFeatureGroup* hierarchy and affect the visibility of *kml:AbstractFeatureGroup* elements that are defined lower in the hierarchy.

A kml:Region is said to be "active" when the bounding box is within the user's view and the LOD requirements are met. *kml:AbstractFeatureGroup* elements associated with a

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`kml:Region` are drawn only when the `kml:Region` is active. When the `kml:viewRefreshMode` is **onRegion**, the `kml:Link` or `kml:Icon` is loaded only when the `kml:Region` is active. In a *kml:AbstractContainerGroup* or `kml:NetworkLink` hierarchy, this calculation uses the `kml:Region` that is the closest ancestor in the hierarchy.

See also 9.6 kml:AbstractContainerGroup regarding the inheritance of `kml:Region` within KML feature hierarchies.

`kml:Region` shall contain the `kml:LatLonAltBox` and `kml:Lod` child elements outside of an update context, that is when not a descendant of `kml:Update`.

9.13.3   Content

9.13.3.1   kml:LatLonAltBox

See 9.15 kml:LatLonAltBox.

9.13.3.2   kml:Lod

See 9.18 kml:Lod.

9.13.3.3   kml:RegionSimpleExtensionGroup

See 6.6.3.1 Simple Element Substitution.

9.13.3.4   kml:RegionObjectExtensionGroup

See 6.6.3.2 Complex Element Substitution.

9.13.4 Example

```
<Region>
  <LatLonAltBox>
    <north>50.625</north>
    <south>45</south>
    <east>28.125</east>
    <west>22.5</west>
    <minAltitude>10</minAltitude>
    <maxAltitude>50</maxAltitude>
  </LatLonAltBox>
  <Lod>
    <minLodPixels>128</minLodPixels>
    <maxLodPixels>1024</maxLodPixels>
    <minFadeExtent>128</minFadeExtent>
    <maxFadeExtent>128</maxFadeExtent>
  </Lod>
</Region>
```

9.14 kml:AbstractLatLonAltBox

9.14.1 Structure

```
<kml:AbstractLatLonBox
 id="ID [0..1]"
 targetId="NCName [0..1]">
    <kml:ObjectSimpleExtensionGroup> ... </kml:ObjectSimpleExtensionGroup> [0..*]
    <kml:north> ... </kml:north> [0..1]
    <kml:south> ... </kml:south> [0..1]
    <kml:east> ... </kml:east> [0..1]
    <kml:west> ... </kml:west> [0..1]
    <kml:AbstractLatLonBoxSimpleExtensionGroup> ...
</kml:AbstractLatLonBoxSimpleExtensionGroup> [0..*]
    <kml:AbstractLatLonBoxObjectExtensionGroup> ...
</kml:AbstractLatLonBoxObjectExtensionGroup> [0..*]
</kml:AbstractLatLonBox>
```

9.14.2 Description

Abstract: yes

This element can be used wherever the following element is referenced:

- *kml:AbstractObjectGroup*

9.14.3 Content

9.14.3.1 kml:north

9.14.3.1.1 Description

Specifies the latitude of the north edge of the bounding box, in decimal degrees from 0 to ±90.

9.14.3.1.2 Content

Type:	kml:angle180Type
Default Value:	180.0

9.14.3.2 kml:south

9.14.3.2.1 Description

Specifies the latitude of the south edge of the bounding box, in decimal degrees from 0 to ±90.

9.14.3.2.2 Content

Type:	kml:angle180Type
Default Value:	-180.0

9.14.3.3 kml:east

9.14.3.3.1 Description

Specifies the longitude of the east edge of the bounding box, in decimal degrees from 0 to ±180. For overlays that overlap the meridian of 180° longitude, values can extend beyond that range.

9.14.3.3.2 Content

Type:	kml:angle180Type
Default Value:	180.0

9.14.3.4　kml:west

9.14.3.4.1　Description

Specifies the longitude of the west edge of the bounding box, in decimal degrees from 0 to ±180. For overlays that overlap the meridian of 180° longitude, values can extend beyond that range.

9.14.3.4.2　Content

      Type: kml:angle180Type
      Default Value: -180.0

9.14.3.5　kml:AbstractLatLonBoxSimpleExtensionGroup

See 6.6.3.1 Simple Element Substitution.

9.14.3.6　kml: AbstractLatLonBoxObjectExtensionGroup

See 6.6.3.2 Complex Element Substitution.

9.15 kml:LatLonAltBox

9.15.1 Structure

```
<kml:LatLonAltBox
 id="ID [0..1]"
 targetId="NCName [0..1]">
    <kml:ObjectSimpleExtensionGroup> ... </kml:ObjectSimpleExtensionGroup> [0..*]
    <kml:north> ... </kml:north> [0..1]
    <kml:south> ... </kml:south> [0..1]
    <kml:east> ... </kml:east> [0..1]
    <kml:west> ... </kml:west> [0..1]
    <kml:AbstractLatLonBoxSimpleExtensionGroup> ...
</kml:AbstractLatLonBoxSimpleExtensionGroup> [0..*]
    <kml:AbstractLatLonBoxObjectExtensionGroup> ...
</kml:AbstractLatLonBoxObjectExtensionGroup> [0..*]
    <kml:minAltitude> ... </kml:minAltitude> [0..1]
    <kml:maxAltitude> ... </kml:maxAltitude> [0..1]
    <kml:altitudeModeGroup> ... </kml:altitudeModeGroup> [0..1]
    <kml:LatLonAltBoxSimpleExtensionGroup> ...
</kml:LatLonAltBoxSimpleExtensionGroup> [0..*]
    <kml:LatLonAltBoxObjectExtensionGroup> ...
</kml:LatLonAltBoxObjectExtensionGroup> [0..*]
</kml:LatLonAltBox>
```

9.15.2 Description

This element can be used wherever the following element is referenced:

- *kml:AbstractObjectGroup*

NOTE: The schema type for kml:LatLonAltBox derives by extension from the schema type for
         kml:AbstractLatLonAltBoxGroup, even though it does not substitute for it.

Specifies the extent of a 3D bounding box, such that:

- kml:north is greater than kml:south;

- kml:east is greater than kml:west;

- kml:minAltitude is less than or equal to kml:maxAltitude;

- if kml:minAltitude and kml:maxAltitude are both present, kml:altitudeMode
  shall not have a value of **clampToGround**.

9.15.3 Content

9.15.3.1 minAltitude

9.15.3.1.1 Description

Specified in meters above the vertical datum (and is affected by the `kml:altitudeMode` specification).

9.15.3.1.2 Content

Type: xsd: double
Default Value: 0.0

9.15.3.2 maxAltitude

9.15.3.2.1 Description

Specified in meters above the vertical datum (and is affected by the `kml:altitudeMode` specification).

9.15.3.2.2 Content

Type: xsd: double
Default Value: 0.0

9.15.3.3 altitudeModeGroup

See 9.17 kml:altitudeMode.

9.15.3.4 kml:LatLonAltBoxSimpleExtensionGroup

See 6.6.3.1 Simple Element Substitution.

9.15.3.5 kml:LatLonAltBoxObjectExtensionGroup

See 6.6.3.2 Complex Element Substitution.

9.15.4   Example

```
<LatLonAltBox>
  <north>43.374</north>
  <south>42.983</south>
  <east>-0.335</east>
  <west>-1.423</west>
  <minAltitude>0</minAltitude>
  <maxAltitude>0</maxAltitude>
</LatLonAltBox>
```

9.16   kml:altitudeModeGroup

9.16.1   Structure

```
<kml:altitudeModeGroup> ... </kml:altitudeModeGroup>
```

9.16.2   Description

Abstract: yes

The following elements can be used wherever this element is referenced:

- kml:altitudeMode

Specifies how altitude components are interpreted.

See also 9.17 kml:altitudeMode and 6.3 Geometry Interpolation for 3D Earth Browsers.

9.16.3   Content

Type: xsd:anyType
Default Value: none

9.17 kml:altitudeMode

9.17.1 Structure

```
<kml:altitudeMode> ... </kml:altitudeMode>
```

9.17.2 Description

This element can be used wherever the following element is referenced:

- *kml:altitudeModeGroup*

Specifies how altitude components are interpreted. If kml:altitudeMode is set to **relativeToGround** or **absolute**, altitude components should exist within the coordinate tuples to which it applies.

See also 6.3 Geometry Interpolation for 3D Earth Browsers.

9.17.3 Content

Type:	kml:altitudeModeEnumType
Default Value:	**clampToGround**

9.18 kml:Lod

9.18.1 Structure

```
<kml:Lod
 id="ID [0..1]"
 targetId="NCName [0..1]">
    <kml:ObjectSimpleExtensionGroup> ... </kml:ObjectSimpleExtensionGroup> [0..*]
    <kml:minLodPixels> ... </kml:minLodPixels> [0..1]
    <kml:maxLodPixels> ... </kml:maxLodPixels> [0..1]
    <kml:minFadeExtent> ... </kml:minFadeExtent> [0..1]
    <kml:maxFadeExtent> ... </kml:maxFadeExtent> [0..1]
    <kml:LodSimpleExtensionGroup> ... </kml:LodSimpleExtensionGroup> [0..*]
    <kml:LodObjectExtensionGroup> ... </kml:LodObjectExtensionGroup> [0..*]
</kml:Lod>
```

9.18.2 Description

This element can be used wherever the following element is referenced:

- *kml:AbstractObjectGroup*

Specifies the level of detail to use when displaying a `kml:Region`.

An earth browser should calculate the size of the `kml:Region` when projected onto screen space then compute the square root of the `kml:Region's` area. For example, if an untiled `kml:Region` is square and the viewpoint is directly above the `kml:Region`, this measurement is equal to the width of the projected `kml:Region`. If this measurement falls within the limits defined by `kml:minLodPixels` and `kml:maxLodPixels`, and if the `kml:LatLonAltBox` is in view, then the `kml:Region` should be activated. If this limit is not reached, the associated geometry should not be drawn since it would be too far from the user's viewpoint to be visible.

`kml:minLodPixels` shall be less than `kml:maxLodPixels` (where a value of -1 = infinite). It is also advised that `kml:minFadeExtent` + `kml:maxFadeExtent` is less than or equal to `kml:maxLodPixels` - `kml:minLodPixels`.

The following diagram demonstrates how `kml:Lod` is used in the determination of the visibility of a region:

Visibility of a Region
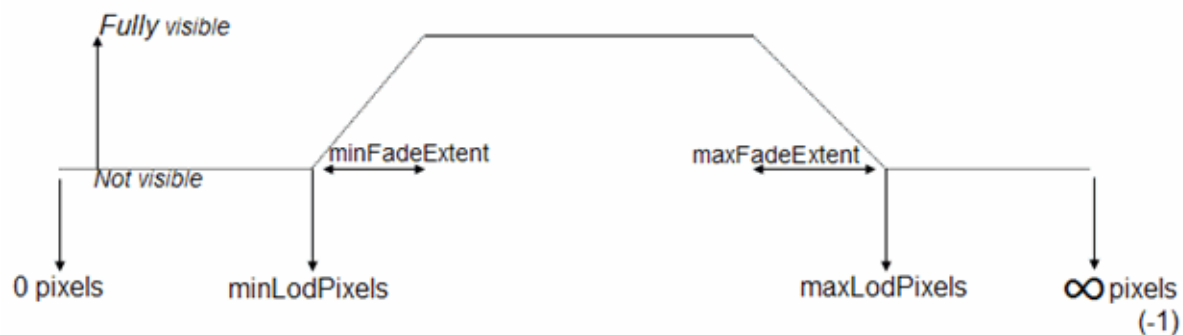
In the following diagram, if *P*=the calculated projected pixel size, the circled numbers indicate the following:

```
if (P < minLodPixels)
  opacity=0                                //#1 in diagram
else if(P < minLodPixels + minFadeExtent)
  opacity=(P - minLodPixels)/minFadeExtent //#2 in diagram
else if (P < maxLodPixels - maxFadeExtent)
  opacity=1                                //#3 in diagram
else if (P < maxLodPixels)
  opacity=(maxLodPixels-P)/maxFadeExtent   //#4 in diagram
else
  opacity=0                                //#5 in diagram
```
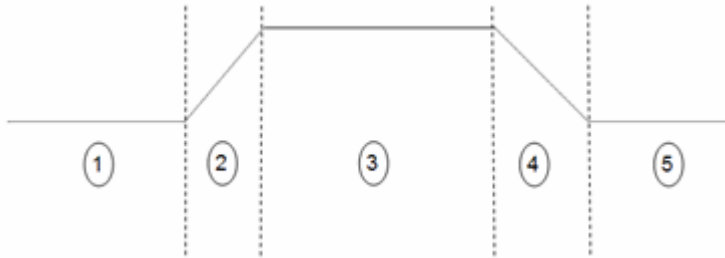

`kml:Lod` shall contain the `kml:minLodPixels` outside of an update context, that is when not a descendant of `kml:Update`.

See also 9.13 kml:Region.

9.18.3   Content

9.18.3.1   kml:minLodPixels

9.18.3.1.1   Description

Measurement in screen pixels that represents the minimum limit of the visibility range for a given `kml:Region`.

9.18.3.1.2   Content

Type:	xsd:double
Default Value:	0.0

9.18.3.2　kml:maxLodPixels

9.18.3.2.1　Description

Measurement in screen pixels that represents the maximum limit of the visibility range for a given `kml:Region`. The default value of −1.0 indicates "active to infinite size."

9.18.3.2.2　Content

    Type: xsd:double
    Default Value: -1.0

9.18.3.3　kml:minFadeExtent

9.18.3.3.1　Description

Distance over which the geometry fades, from fully opaque to fully transparent. This ramp value, expressed in screen pixels, is applied at the minimum end of the LOD (visibility) limits.

9.18.3.3.2　Content

    Type: xsd:double
    Default Value: 0.0

9.18.3.4　kml:maxFadeExtent

9.18.3.4.1　Description

Distance over which the geometry fades, from fully transparent to fully opaque. This ramp value, expressed in screen pixels, is applied at the maximum end of the LOD (visibility) limits.

9.18.3.4.2　Content

    Type: xsd:double
    Default Value: 0.0

9.18.3.5   kml:LodSimpleExtensionGroup

See 6.6.3.1 Simple Element Substitution.

9.18.3.6   kml:LodObjectExtensionGroup

See 6.6.3.2 Complex Element Substitution.

9.18.4   Example

```
<Region>
  <LatLonAltBox>
    <north>50.625</north>
    <south>45</south>
    <east>28.125</east>
    <west>22.5</west>
    <minAltitude>10</minAltitude>
    <maxAltitude>50</maxAltitude>
  </LatLonAltBox>
  <Lod>
    <minLodPixels>128</minLodPixels>
    <maxLodPixels>1024</maxLodPixels>
    <minFadeExtent>128</minFadeExtent>
    <maxFadeExtent>128</maxFadeExtent>
  </Lod>
</Region>
```

10 Geometries

10.1 kml:AbstractGeometryGroup

10.1.1 Structure

```
<kml:AbstractGeometryGroup
 id="ID [0..1]"
 targetId="NCName [0..1]">
    <kml:ObjectSimpleExtensionGroup> ... </kml:ObjectSimpleExtensionGroup> [0..*]
    <kml:AbstractGeometrySimpleExtensionGroup> ...
</kml:AbstractGeometrySimpleExtensionGroup> [0..*]
    <kml:AbstractGeometryObjectExtensionGroup> ...
</kml:AbstractGeometryObjectExtensionGroup> [0..*]
</kml:AbstractGeometryGroup>
```

10.1.2 Description

Abstract: yes

This element can be used wherever the following element is referenced:

- *kml:AbstractObjectGroup*

The following elements can be used wherever this element is referenced:

- kml:MultiGeometry
- kml:Point
- kml:LineString
- kml:LinearRing
- kml:Polygon
- kml:Model

10.1.3 Content

10.1.3.1 kml:AbstractGeometrySimpleExtensionGroup

See 6.6.3.1 Simple Element Substitution.

10.1.3.2 kml:AbstractGeometryObjectExtensionGroup

See 6.6.3.2 Complex Element Substitution.

10.2   kml:MultiGeometry

10.2.1   Structure

```
<kml:MultiGeometry
 id="ID [0..1]"
 targetId="NCName [0..1]">
    <kml:ObjectSimpleExtensionGroup> ... </kml:ObjectSimpleExtensionGroup> [0..*]
    <kml:AbstractGeometrySimpleExtensionGroup> ...
</kml:AbstractGeometrySimpleExtensionGroup> [0..*]
    <kml:AbstractGeometryObjectExtensionGroup> ...
</kml:AbstractGeometryObjectExtensionGroup> [0..*]
    <kml:AbstractGeometryGroup> ... </kml:AbstractGeometryGroup> [0..*]
    <kml:MultiGeometrySimpleExtensionGroup> ...
</kml:MultiGeometrySimpleExtensionGroup> [0..*]
    <kml:MultiGeometryObjectExtensionGroup> ...
</kml:MultiGeometryObjectExtensionGroup> [0..*]
</kml:MultiGeometry>
```

10.2.2   Description

This element can be used wherever the following element is referenced:

- *kml:AbstractGeometryGroup*

A container for zero or more geometry elements associated with the same KML feature.

A kml:MultiGeometry element should contain more than one *kml:AbstractGeometryGroup* element outside of an update context, that is when not a descendant of kml:Update.

10.2.3   Content

10.2.3.1   kml:AbstractGeometryGroup

See 10.1 kml:AbstractGeometryGroup.

10.2.3.2   kml:AbstractGeometrySimpleExtensionGroup

See 6.6.3.1 Simple Element Substitution.

10.2.3.3   kml:AbstractGeometryObjectExtensionGroup

See 6.6.3.2 Complex Element Substitution.

10.2.4   Example

```
<Placemark>
  <name>SF Marina Harbor Master</name>
  <visibility>0</visibility>
  <MultiGeometry>
    <LineString>
      <!-- north wall -->
      <coordinates>
        -122.4425587930444,37.80666418607323,0
        -122.4428379594768,37.80663578323093,0
      </coordinates>
    </LineString>
    <LineString>
      <!-- south wall -->
      <coordinates>
        -122.4425509770566,37.80662588061205,0
        -122.4428340530617,37.8065999493009,0
      </coordinates>
    </LineString>
  </MultiGeometry>
</Placemark>
```

10.3   kml:Point

10.3.1   Structure

```
<kml:Point
 id="ID [0..1]"
 targetId="NCName [0..1]">
    <kml:ObjectSimpleExtensionGroup> ... </kml:ObjectSimpleExtensionGroup> [0..*]
    <kml:AbstractGeometrySimpleExtensionGroup> ...
</kml:AbstractGeometrySimpleExtensionGroup> [0..*]
    <kml:AbstractGeometryObjectExtensionGroup> ...
</kml:AbstractGeometryObjectExtensionGroup> [0..*]
    <kml:extrude> ... </kml:extrude> [0..1]
    <kml:altitudeModeGroup> ... </kml:altitudeModeGroup> [0..1]
    <kml:coordinates> ... </kml:coordinates> [0..1]
    <kml:PointSimpleExtensionGroup> ... </kml:PointSimpleExtensionGroup> [0..*]
    <kml:PointObjectExtensionGroup> ... </kml:PointObjectExtensionGroup> [0..*]
</kml:Point>
```

10.3.2   Description

This element can be used wherever the following element is referenced:

* *kml:AbstractGeometryGroup*

A geographic location defined by a single geodetic longitude, geodetic latitude, and (optional) altitude coordinate tuple.

10.3.3 Content

10.3.3.1 kml:extrude

10.3.3.1.1 Description

Specifies whether to connect the point to the ground with a line when displayed in the geographic view.

See 10.4 kml:extrude.

10.3.3.2 kml:altitudeModeGroup

See 9.16 kml:altitudeModeGroup and 9.17 kml:altitudeMode.

10.3.3.3 kml:coordinates

10.3.3.3.1 Description

A single coordinate tuple.

10.3.3.3.2 Content

Type:	kml:coordinatesType
Default Value:	none

10.3.3.4 kml:PointSimpleExtensionGroup

See 6.6.3.1 Simple Element Substitution.

10.3.3.5 kml:PointObjectExtensionGroup

See 6.6.3.2 Complex Element Substitution.

10.3.4 Example

```
<Point>
  <coordinates>-90.86948943473118,48.25450093195546</coordinates>
</Point>
```

10.4 kml:extrude

10.4.1.1.1 Structure

```
<kml:extrude> ... </kml:extrude>
```

10.4.1.1.2 Description

Specifies whether to connect a geometry to the ground. To extrude a geometry, the `kml:altitudeMode` shall be either **relativeToGround** or **absolute**, and the altitude component within the `kml:coordinates` element should be greater than 0 (that is, in the air).

The geometry is extruded toward the Earth's center of mass.

See also 6.3 Geometry Interpolation for 3D Earth Browsers.

10.4.1.1.3 Content

Type:	xsd:boolean
Default Value:	0 or false

10.5   kml:LinearRing

10.5.1   Structure

```
<kml:LinearRing
 id="ID [0..1]"
 targetId="NCName [0..1]">
    <kml:ObjectSimpleExtensionGroup> ... </kml:ObjectSimpleExtensionGroup> [0..*]
    <kml:AbstractGeometrySimpleExtensionGroup> ...
</kml:AbstractGeometrySimpleExtensionGroup> [0..*]
    <kml:AbstractGeometryObjectExtensionGroup> ...
</kml:AbstractGeometryObjectExtensionGroup> [0..*]
    <kml:extrude> ... </kml:extrude> [0..1]
    <kml:tessellate> ... </kml:tessellate> [0..1]
    <kml:altitudeModeGroup> ... </kml:altitudeModeGroup> [0..1]
    <kml:coordinates> ... </kml:coordinates> [0..1]
    <kml:LinearRingSimpleExtensionGroup> ... </kml:LinearRingSimpleExtensionGroup>
[0..*]
    <kml:LinearRingObjectExtensionGroup> ... </kml:LinearRingObjectExtensionGroup>
[0..*]
</kml:LinearRing>
```

10.5.2   Description

This element can be used wherever the following element is referenced:

- *kml:AbstractGeometryGroup*

Defines a closed line string that should not cross itself.

kml:extrude, kml:tessellate and kml:altitudeModeGroup (kml:altitudeMode) elements should not be specified when kml:LinearRing is used to define a boundary for a kml:Polygon.

10.5.3   Content

10.5.3.1   kml:extrude

See 10.4 kml:extrude.

10.5.3.2   kml:tessellate

See 10.6 kml:tessellate.

10.5.3.3   kml:altitudeModeGroup

See 9.16 kml:altitudeModeGroup and 9.17 kml:altitudeMode.

10.5.3.4   kml:coordinates

10.5.3.4.1   Description

A list of four or more coordinate tuples where the first and last coordinate tuples must be the same.

10.5.3.4.2   Content

    Type: kml:coordinatesType
    Default Value: none

10.5.3.5   kml:LinearRingSimpleExtensionGroup

See 6.6.3.1 Simple Element Substitution.

10.5.3.6   kml:LinearRingObjectExtensionGroup

See 6.6.3.2 Complex Element Substitution.

10.5.4   Example

```
<kml xmlns="http://www.opengis.net/kml/2.2">
<Placemark>
  <name>LinearRing.kml</name>
  <Polygon>
    <outerBoundaryIs>
      <LinearRing>
        <coordinates>
          -122.365662,37.826988,0
          -122.365202,37.826302,0
          -122.364581,37.82655,0
          -122.365038,37.827237,0
          -122.365662,37.826988,0
        </coordinates>
      </LinearRing>
    </outerBoundaryIs>
  </Polygon>
</Placemark>
</kml>
```

10.6   kml:tessellate

10.6.1   Structure

```
<kml:tessellate> ... </kml:tessellate>
```

10.6.2   Description

Specifies whether to drape a geometry over the terrain. A value of 1 or true specifies to drape; a value of 0 or false specifies not to drape. To enable tessellation, the value for `kml:altitudeMode` shall be **clampToGround**.

See also 6.3 Geometry Interpolation for 3D Earth Browsers.

10.6.3   Content

Type:	xsd:boolean
Default Value:	0 or false

10.7   kml:LineString

10.7.1   Structure

```
<kml:LineString
 id="ID [0..1]"
 targetId="NCName [0..1]">
    <kml:ObjectSimpleExtensionGroup> ... </kml:ObjectSimpleExtensionGroup> [0..*]
    <kml:AbstractGeometrySimpleExtensionGroup> ...
</kml:AbstractGeometrySimpleExtensionGroup> [0..*]
    <kml:AbstractGeometryObjectExtensionGroup> ...
</kml:AbstractGeometryObjectExtensionGroup> [0..*]
    <kml:extrude> ... </kml:extrude> [0..1]
    <kml:tessellate> ... </kml:tessellate> [0..1]
    <kml:altitudeModeGroup> ... </kml:altitudeModeGroup> [0..1]
    <kml:coordinates> ... </kml:coordinates> [0..1]
    <kml:LineStringSimpleExtensionGroup> ... </kml:LineStringSimpleExtensionGroup>
[0..*]
    <kml:LineStringObjectExtensionGroup> ... </kml:LineStringObjectExtensionGroup>
[0..*]
</kml:LineString>
```

10.7.2   Description

This element can be used wherever the following element is referenced:

- *kml:AbstractGeometryGroup*

Defines a list of one or more contiguous line segments.

10.7.3   Content

10.7.3.1   kml:extrude

Specifies whether to extend the kml:LineString to the ground when displayed in the geographic view. When a kml:LineString is extruded, the points of each line segment are extended to the terrain toward the Earth's center of mass, forming a polygon that looks like a wall or fence.

See 10.4 kml:extrude.

10.7.3.2   kml:tessellate

See 10.6 kml:tessellate.

10.7.3.3   kml:altitudeModeGroup

See 9.16 kml:altitudeModeGroup and 9.17 kml:altitudeMode.

10.7.3.4   kml:coordinates

10.7.3.4.1   Description

Two or more coordinate tuples.

10.7.3.4.2   Content

Type:	kml:coordinatesType
Default Value:	none

10.7.3.5   kml:LineStringSimpleExtensionGroup

See 6.6.3.1 Simple Element Substitution.

10.7.3.6   kml:LineStringObjectExtensionGroup

See 6.6.3.2 Complex Element Substitution.

10.7.4 Example

```
<kml xmlns="http://www.opengis.net/kml/2.2">
<Document>
  <name>LineString.kml</name>
  <open>1</open>
  <LookAt>
    <longitude>-122.36415</longitude>
    <latitude>37.824553</latitude>
    <altitude>0</altitude>
    <range>150</range>
    <tilt>50</tilt>
    <heading>0</heading>
  </LookAt>
  <Placemark>
    <name>unextruded</name>
    <LineString>
      <extrude>0</extrude>
      <tessellate>1</tessellate>
      <coordinates>
        -122.364383,37.824664,0 -122.364152,37.824322,0
      </coordinates>
    </LineString>
  </Placemark>
  <Placemark>
    <name>extruded</name>
    <LineString>
      <extrude>1</extrude>
      <tessellate>1</tessellate>
      <altitudeMode>relativeToGround</altitudeMode>
      <coordinates>
        -122.364167,37.824787,50 -122.363917,37.824423,50
      </coordinates>
    </LineString>
  </Placemark>
</Document>
</kml>
```

10.8   kml:Polygon

10.8.1   Structure

```
<kml:Polygon
 id="ID [0..1]"
 targetId="NCName [0..1]">
    <kml:ObjectSimpleExtensionGroup> ... </kml:ObjectSimpleExtensionGroup> [0..*]
    <kml:AbstractGeometrySimpleExtensionGroup> ...
</kml:AbstractGeometrySimpleExtensionGroup> [0..*]
    <kml:AbstractGeometryObjectExtensionGroup> ...
</kml:AbstractGeometryObjectExtensionGroup> [0..*]
    <kml:extrude> ... </kml:extrude> [0..1]
    <kml:tessellate> ... </kml:tessellate> [0..1]
```

```
    <kml:altitudeModeGroup> ... </kml:altitudeModeGroup> [0..1]
    <kml:outerBoundaryIs> ... </kml:outerBoundaryIs> [0..1]
    <kml:innerBoundaryIs> ... </kml:innerBoundaryIs> [0..*]
    <kml:PolygonSimpleExtensionGroup> ... </kml:PolygonSimpleExtensionGroup> [0..*]
    <kml:PolygonObjectExtensionGroup> ... </kml:PolygonObjectExtensionGroup> [0..*]
</kml:Polygon>
```

10.8.2   Description

This element can be used wherever the following element is referenced:

- *kml:AbstractGeometryGroup*

A `kml:Polygon` shall have an outer boundary ring outside of an update context, that is when not a descendant of `kml:Update`. It may have 0 or more inner boundary rings. Each ring is defined by a `kml:LinearRing`. It is advised that the rings not cross each other.

10.8.3   Content

10.8.3.1   kml:extrude

10.8.3.1.1   Description

Specifies whether to connect the `kml:Polygon` to the ground when displayed in the geographic view.

When a `kml:Polygon` is extruded, each boundary point is extended to the terrain toward the earth's center of mass, which gives the appearance of a building or a box.

Only the `kml:Polygon` boundary is extruded, not the `kml:Polygon` interior (for example, a rectangle turns into a box with five faces).

See 10.4 kml:extrude.

10.8.3.2   kml:tessellate

See 10.6 kml:tessellate.

10.8.3.3   kml:altitudeModeGroup

See 9.16 kml:altitudeModeGroup and 9.17 kml:altitudeMode.

10.8.3.4   kml:outerBoundaryIs

Specifies the exterior boundary of the `kml:Polygon` defined by a `kml:LinearRing` element.

See 10.5 kml:LinearRing.

10.8.3.5   kml:innerBoundaryIs

Specifies an inner boundary of the `kml:Polygon` defined by a `kml:LinearRing` element.

See 10.5 kml:LinearRing.

10.8.3.6   kml:PolygonSimpleExtensionGroup

See 6.6.3.1 Simple Element Substitution.

10.8.3.7   kml:PolygonObjectExtensionGroup

See 6.6.3.2 Complex Element Substitution.

10.8.4 Example

```
<kml xmlns="http://www.opengis.net/kml/2.2">
<Document>
  <name>Polygon.kml</name>
  <open>0</open>
  <Placemark>
    <name>hollow box</name>
    <Polygon>
      <extrude>1</extrude>
      <altitudeMode>relativeToGround</altitudeMode>
      <outerBoundaryIs>
        <LinearRing>
          <coordinates>
            -122.366278,37.818844,30
            -122.365248,37.819267,30
            -122.365640,37.819861,30
            -122.366669,37.819429,30
            -122.366278,37.818844,30
          </coordinates>
        </LinearRing>
      </outerBoundaryIs>
      <innerBoundaryIs>
        <LinearRing>
          <coordinates>
            -122.366212,37.818977,30
            -122.365424,37.819294,30
            -122.365704,37.819731,30
            -122.366488,37.819402,30
            -122.366212,37.818977,30
          </coordinates>
        </LinearRing>
      </innerBoundaryIs>
    </Polygon>
  </Placemark>
</Document>
</kml>
```

10.9 kml:Model

10.9.1 Structure

```
<kml:Model
 id="ID [0..1]"
 targetId="NCName [0..1]">
    <kml:ObjectSimpleExtensionGroup> ... </kml:ObjectSimpleExtensionGroup> [0..*]
    <kml:AbstractGeometrySimpleExtensionGroup> ...
</kml:AbstractGeometrySimpleExtensionGroup> [0..*]
    <kml:AbstractGeometryObjectExtensionGroup> ...
</kml:AbstractGeometryObjectExtensionGroup> [0..*]
    <kml:altitudeModeGroup> ... </kml:altitudeModeGroup> [0..1]
    <kml:Location> ... </kml:Location> [0..1]
    <kml:Orientation> ... </kml:Orientation> [0..1]
    <kml:Scale> ... </kml:Scale> [0..1]
```

```
    <kml:Link> ... </kml:Link> [0..1]
    <kml:ResourceMap> ... </kml:ResourceMap> [0..1]
    <kml:ModelSimpleExtensionGroup> ... </kml:ModelSimpleExtensionGroup> [0..*]
    <kml:ModelObjectExtensionGroup> ... </kml:ModelObjectExtensionGroup> [0..*]
</kml:Model>
```

10.9.2   Description

This element can be used wherever the following element is referenced:

- *kml:AbstractGeometryGroup*

Specifies the location and orientation of a textured 3D object resource. The structure and appearance of the textured 3D object are not defined in this specification.

A local earth-fixed frame (X'-Y'-Z') is defined as follows.

The Z'-axis is defined by the local surface normal (local to the tangent plane at the location point), the Y'-axis is defined by the intersection of the meridian plane defined by the longitude of the location point, and the tangent plane, and the X'-axis is chosen so that X'-Y'-Z' form a right handed orthogonal frame.

A model-fixed frame (X-Y-Z) is defined as follows. The Y-axis is +ve through the front of the model. The Z-axis is +ve through the top of the model and the X-axis is chosen so that X-Y-Z forms a right handed orthogonal frame.

The orientation of the model is then defined by the orientation of the model-fixed frame (X-Y-Z) relative to the local earth-fixed frame (X'-Y'-Z') as follows:
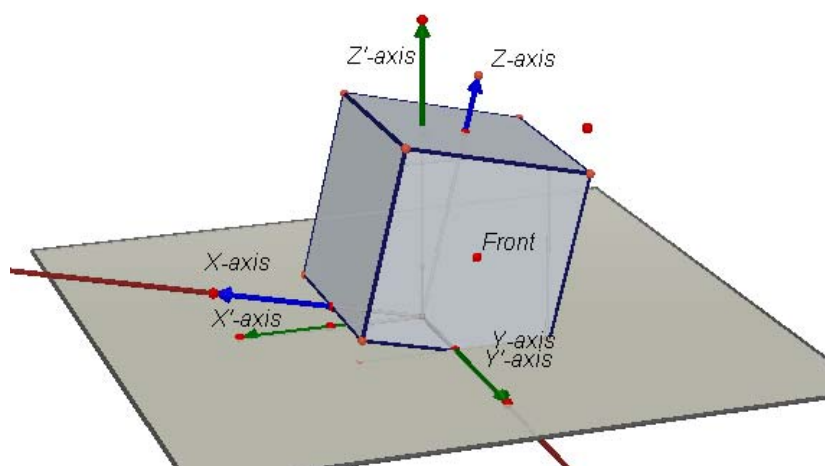
Roll – rotation about the model Y-axis
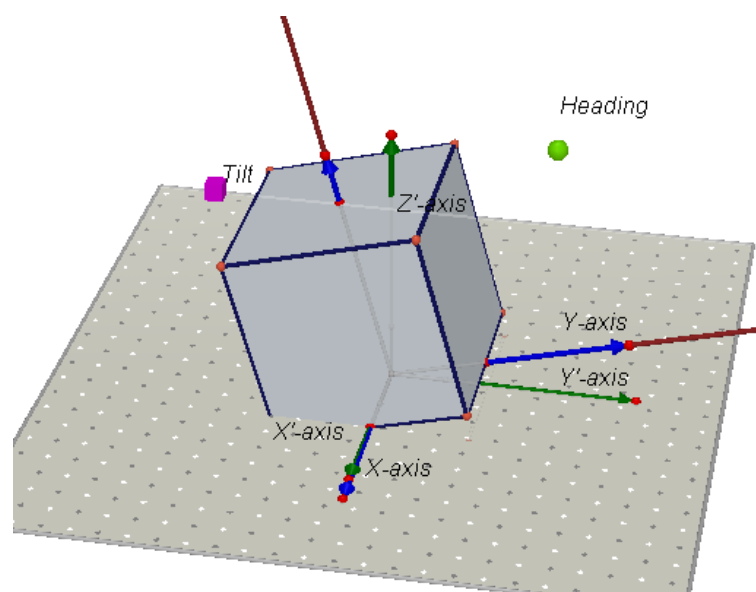
Tilt – rotation about the model X-axis
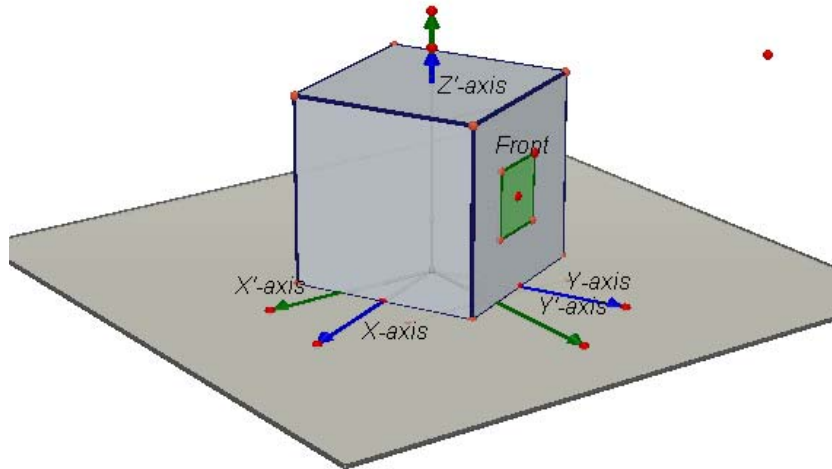
Heading – Rotation about the model Z-axis

kml:Model:

- shall contain kml:Link and kml:Location elements;

- shall contain a kml:ResourceMap element that has a kml:Alias element for each texture file, if the target resource has texture files;

- should contain a kml:Location element;

outside of an update context, that is when not a descendant of kml:Update.

10.9.3   Content

10.9.3.1   kml:altitudeModeGroup

See 9.17 kml:altitudeMode.

10.9.3.2   kml:Location

10.9.3.2.1   Description

Specifies the coordinates of the kml:Model's origin.

See 10.10 kml:Location.

10.9.3.3   kml:Orientation

10.9.3.3.1   Description

Specifies the orientation of the model coordinate axes relative to a local earth-fixed reference frame.

See 10.11 kml:Orientation.

10.9.3.4   kml:Scale

10.9.3.4.1   Description

Scales a model along the *x*, *y*, and *z* axes in the model's coordinate space.

See 10.12 kml:Scale.

10.9.3.5   kml:Link

10.9.3.5.1   Description

Specifies the location of a textured 3D object resource such as a COLLADA file.

See 13.1 kml:Link, kml:Icon (kml:LinkType).

10.9.3.6   kml:ResourceMap

10.9.3.6.1   Description

Specifies 0 or more `kml:Alias` elements, each of which is a mapping for the texture file path from the original textured 3D object file to the KML or KMZ resource that contains the `kml:Model.`

See 10.13 kml:ResourceMap.

10.9.3.7   kml:ModelSimpleExtensionGroup

See 6.6.3.1 Simple Element Substitution.

10.9.3.8   kml:ModelObjectExtensionGroup

See 6.6.3.2 Complex Element Substitution.

10.9.4   Example

```
<Model id="khModel543">
  <altitudeMode>relativeToGround</altitudeMode>
  <Location>
    <longitude>39.55375305703105</longitude>
    <latitude>-118.9813220168456</latitude>
    <altitude>1223</altitude>
  </Location>
  <Orientation>
    <heading>45.0</heading>
    <tilt>10.0</tilt>
    <roll>0.0</roll>
  </Orientation>
  <Scale>
    <x>1.0</x>
    <y>1.0</y>
    <z>1.0</z>
  </Scale>
  <Link>
    <href>house.dae</href>
  </Link>
  <ResourceMap>
    <Alias>
      <targetHref>../files/CU-Macky---Center-StairsnoCulling.jpg</targetHref>
      <sourceHref>CU-Macky---Center-StairsnoCulling.jpg</sourceHref>
    </Alias>
    <Alias>
      <targetHref>../files/CU-Macky-4sideturretnoCulling.jpg</targetHref>
      <sourceHref>CU-Macky-4sideturretnoCulling.jpg</sourceHref>
    </Alias>
    <Alias>
      <targetHref>../files/CU-Macky-Back-NorthnoCulling.jpg</targetHref>
      <sourceHref>CU-Macky-Back-NorthnoCulling.jpg</sourceHref>
    </Alias>
  </ResourceMap>
</Model>
```

10.10   kml:Location

10.10.1 Structure

```
<kml:Location
 id="ID [0..1]"
 targetId="NCName [0..1]">
    <kml:ObjectSimpleExtensionGroup> ... </kml:ObjectSimpleExtensionGroup> [0..*]
    <kml:longitude> ... </kml:longitude> [0..1]
    <kml:latitude> ... </kml:latitude> [0..1]
    <kml:altitude> ... </kml:altitude> [0..1]
    <kml:LocationSimpleExtensionGroup> ... </kml:LocationSimpleExtensionGroup>
[0..*]
    <kml:LocationObjectExtensionGroup> ... </kml:LocationObjectExtensionGroup>
[0..*]
</kml:Location>
```

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10.10.2 Description

This element can be used wherever the following element is referenced:

- *kml:AbstractObjectGroup*

Specifies the coordinates of a location.

A kml:Location element should contain the kml:longitude, kml:latitude child elements outside of an update context, that is when not a descendant of kml:Update.

10.10.3 Content

10.10.3.1 kml:latitude

10.10.3.1.1 Description

Geodetic latitude of origin in decimal degrees.

10.10.3.1.2 Content

Type: kml:angle180Type
Default Value: 0.0

10.10.3.2 kml:longitude

10.10.3.2.1 Description

Geodetic longitude of origin in decimal degrees.

10.10.3.2.2 Content

Type: kml:angle90Type
Default Value: 0.0

10.10.3.3 kml:altitude

10.10.3.3.1 Description

Altitude of origin measured in meters and interpreted according to kml:altitudeMode.

10.10.3.3.2 Content

Type: xsd:double
Default Value: 0.0

10.10.3.4 kml:LocationSimpleExtensionGroup

See 6.6.3.1 Simple Element Substitution.

10.10.3.5 kml:LocationObjectExtensionGroup

See 6.6.3.2 Complex Element Substitution.

10.10.4 Example

```
<Location>
  <longitude>39.55375305703105</longitude>
  <latitude>-118.9813220168456</latitude>
  <altitude>1223</altitude>
</Location>
```

10.11 kml:Orientation

10.11.1 Structure

```
<kml:Orientation
 id="ID [0..1]"
 targetId="NCName [0..1]">
    <kml:ObjectSimpleExtensionGroup> ... </kml:ObjectSimpleExtensionGroup> [0..*]
    <kml:heading> ... </kml:heading> [0..1]
    <kml:tilt> ... </kml:tilt> [0..1]
    <kml:roll> ... </kml:roll> [0..1]
    <kml:OrientationSimpleExtensionGroup> ...
</kml:OrientationSimpleExtensionGroup> [0..*]
    <kml:OrientationObjectExtensionGroup> ...
</kml:OrientationObjectExtensionGroup> [0..*]
</kml:Orientation>
```

10.11.2 Description

This element can be used wherever the following element is referenced:

- *kml:AbstractObjectGroup*

Specifies the orientation of the model coordinate axes relative to a local earth-fixed reference frame.

`kml:Orientation` should contain at least one child element outside of an update context, that is when not a descendant of `kml:Update`. It is advised that `kml:heading`, `kml:tile` and `kml:roll` all be specified.

10.11.3 Content

10.11.3.1 kml:heading

10.11.3.1.1 Description

Rotation about the *z* axis. A value of 0 equals North. A positive rotation is counter clockwise around the positive *z* axis, looking along the *z*-axis away from the origin, and specified in decimal degrees from 0 to ±180.

10.11.3.1.2 Content

    Type: kml:angle360Type
    Default Value: 0.0

10.11.3.2 kml:tilt

10.11.3.2.1 Description

Rotation about the *x* axis. A positive rotation is counter clockwise around the positive *x* axis and specified in decimal degrees from 0 to ±180.

10.11.3.2.2 Content

    Type: kml:anglepos180Type
    Default Value: 0.0

10.11.3.3 kml:roll

10.11.3.3.1 Description

Rotation about the *y* axis. A positive rotation is counter clockwise around the positive *y* axis and specified in decimal degrees from 0 to ±180.

10.11.3.3.2 Content

Type: kml:angle180Type
Default Value: 0.0

10.11.3.4 kml:OrientationSimpleExtensionGroup

See 6.6.3.1 Simple Element Substitution.

10.11.3.5 kml:OrientationObjectExtensionGroup

See 6.6.3.2 Complex Element Substitution.

10.11.4 Defining Orientation

This diagram illustrates the initial orientation of a model's axes:

Creating a typical model:
• +x is to the right
• +y is to the front (and oriented North)
• +z is up

10.11.5 Example

```
<Orientation>
  <heading>45.0</heading>
  <tilt>10.0</tilt>
  <roll>0.0</roll>
</Orientation>
```

10.12 kml:Scale

10.12.1 Structure

```
<kml:Scale
 id="ID [0..1]"
 targetId="NCName [0..1]">
    <kml:ObjectSimpleExtensionGroup> ... </kml:ObjectSimpleExtensionGroup> [0..*]
    <kml:x> ... </kml:x> [0..1]
    <kml:y> ... </kml:y> [0..1]
    <kml:z> ... </kml:z> [0..1]
    <kml:ScaleSimpleExtensionGroup> ... </kml:ScaleSimpleExtensionGroup> [0..*]
    <kml:ScaleObjectExtensionGroup> ... </kml:ScaleObjectExtensionGroup> [0..*]
</kml:Scale>
```

10.12.2 Description

This element can be used wherever the following element is referenced:

- *kml:AbstractObjectGroup*

Scales a model along the x, y, and z axes in the model's coordinate space.

kml:Scale should contain at least one child element outside of an update context, that is when not a descendant of kml:Update. It is advised that kml:x, kml:y, and kml:z all be specified.

10.12.3 Content

10.12.3.1 x

10.12.3.1.1 Description

Scale factor along *x* axis.

10.12.3.1.2 Content

Type:	xsd:double
Default Value:	1.0

10.12.3.2 y

10.12.3.2.1 Description

Scale factor along *y* axis.

10.12.3.2.2 Content

Type:	xsd:double
Default Value:	1.0

10.12.3.3 z

10.12.3.3.1 Description

Scale factor along *z* axis.

10.12.3.3.2 Content

Type:	xsd:double

Default Value: 1.0

10.12.3.4 kml:ScaleSimpleExtensionGroup

See 6.6.3.1 Simple Element Substitution.

10.12.3.5 kml:ScaleObjectExtensionGroup

See 6.6.3.2 Complex Element Substitution.

10.12.4 Example

```
<Scale>
  <x>2.5</x>
  <y>2.5</y>
  <z>3.5</z>
</Scale>
```

10.13 kml:ResourceMap

10.13.1 Structure

```
<kml:ResourceMap
 id="ID [0..1]"
 targetId="NCName [0..1]">
    <kml:ObjectSimpleExtensionGroup> ... </kml:ObjectSimpleExtensionGroup> [0..*]
    <kml:Alias> ... </kml:Alias> [0..*]
    <kml:ResourceMapSimpleExtensionGroup> ...
</kml:ResourceMapSimpleExtensionGroup> [0..*]
    <kml:ResourceMapObjectExtensionGroup> ...
</kml:ResourceMapObjectExtensionGroup> [0..*]
</kml:ResourceMap>
```

10.13.2 Description

This element can be used wherever the following element is referenced:

- *kml:AbstractObjectGroup*

Should specify at least one or more kml:Alias elements outside of an update context, that is when not a descendant of kml:Update. Each kml:Alias element is a mapping for the texture file path from the original textured 3D object file to the KML or KMZ resource that contains the kml:Model. This element allows texture files to be moved and renamed without

having to update the original textured 3D object file that references those textures. One `kml:ResourceMap` element can contain multiple mappings from different source textured object files into the same target resource.

Each child `kml:Alias` element should have a unique child `kml:sourceHref` element .

10.13.3 Content

10.13.3.1 kml:Alias

See 10.14 kml:Alias.

10.13.3.2 kml:ResourceMapSimpleExtensionGroup

See 6.6.3.1 Simple Element Substitution.

10.13.3.3 kml: ResourceMapExtensionGroup

See 6.6.3.2 Complex Element Substitution.

10.14   kml:Alias

10.14.1 Structure

```
<kml:Alias
 id="ID [0..1]"
 targetId="NCName [0..1]">
    <kml:ObjectSimpleExtensionGroup> ... </kml:ObjectSimpleExtensionGroup> [0..*]
    <kml:targetHref> ... </kml:targetHref> [0..1]
    <kml:sourceHref> ... </kml:sourceHref> [0..1]
    <kml:AliasSimpleExtensionGroup> ... </kml:AliasSimpleExtensionGroup> [0..*]
    <kml:AliasObjectExtensionGroup> ... </kml:AliasObjectExtensionGroup> [0..*]
</kml:Alias>
```

10.14.2 Description

This element can be used wherever the following element is referenced:

- *kml:AbstractObjectGroup*

Contains a mapping from `kml:sourceHref` to `kml:targetHref`. Both should be specified ouside of an update context, that is when not a descendant of `kml:Update`.

10.14.3   Content

10.14.3.1   targetHref

10.14.3.1.1   Description

Specifies the textured 3D object file to be fetched by an earth browser. This reference can be a relative reference to an image file within a KMZ file, or it can be an absolute reference to the file (for example, a URL).

10.14.3.1.2   Content

       Type: xsd:anyURI
       Default Value: none

10.14.3.2   sourceHref

10.14.3.2.1   Description

Specifies the path for the texture file within the textured 3D object.

10.14.3.2.2   Content

       Type: xsd:anyURI
       Default Value: none

10.14.3.3   kml:AliasSimpleExtensionGroup

See 6.6.3.1 Simple Element Substitution.

10.14.3.4   kml:AliasObjectExtensionGroup

See 6.6.3.2 Complex Element Substitution.

10.14.4   Example

```
<Alias>
  <targetHref>../images/foo.jpg</targetHref>
  <sourceHref>in-geometry-file/foo.jpg</sourceHref>
</Alias>
```

11   Overlays

11.1   kml:AbstractOverlayGroup

11.1.1   Structure

```
<kml:AbstractOverlayGroup
 id="ID [0..1]"
 targetId="NCName [0..1]">
    <kml:ObjectSimpleExtensionGroup> ... </kml:ObjectSimpleExtensionGroup> [0..*]
    <kml:name> ... </kml:name> [0..1]
    <kml:visibility> ... </kml:visibility> [0..1]
    <kml:open> ... </kml:open> [0..1]
    <atom:author> ... </atom:author> [0..1]
    <atom:link> ... </atom:link> [0..1]
    <kml:address> ... </kml:address> [0..1]
    <xal:AddressDetails> ... </xal:AddressDetails> [0..1]
    <kml:phoneNumber> ... </kml:phoneNumber> [0..1]
    <kml:snippet> ... </kml:snippet> [0..1]
    <kml:description> ... </kml:description> [0..1]
    <kml:AbstractViewGroup> ... </kml:AbstractViewGroup> [0..1]
    <kml:AbstractTimePrimitiveGroup> ... </kml:AbstractTimePrimitiveGroup> [0..1]
    <kml:styleUrl> ... </kml:styleUrl> [0..1]
    <kml:AbstractStyleSelectorGroup> ... </kml:AbstractStyleSelectorGroup> [0..*]
    <kml:Region> ... </kml:Region> [0..1]
    <kml:ExtendedData> ... </kml:ExtendedData> [0..1]
    <kml:AbstractFeatureSimpleExtensionGroup> ...
</kml:AbstractFeatureSimpleExtensionGroup> [0..*]
    <kml:AbstractFeatureObjectExtensionGroup> ...
</kml:AbstractFeatureObjectExtensionGroup> [0..*]
    <kml:color> ... </kml:color> [0..1]
    <kml:drawOrder> ... </kml:drawOrder> [0..1]
    <kml:Icon> ... </kml:Icon> [0..1]
    <kml:AbstractOverlaySimpleExtensionGroup> ...
</kml:AbstractOverlaySimpleExtensionGroup> [0..*]
    <kml:AbstractOverlayObjectExtensionGroup> ...
</kml:AbstractOverlayObjectExtensionGroup> [0..*]
</kml:AbstractOverlayGroup>
```

11.1.2   Description

Abstract: yes

This element can be used wherever the following element is referenced:

- *kml:AbstractFeatureGroup*

The following elements can be used wherever this element is referenced:

- kml:GroundOverlay
- kml: ScreenOverlay

- `kml:PhotoOverlay` •

Specifies how to display an image specified by `kml:Icon`.

A *kml:AbstractOverlayGroup* element should contain the `kml:Icon` element outside of an update context, that is when not a descendant of `kml:Update`.

11.1.3   Content

11.1.3.1   kml:color

11.1.3.1.1   Description

Specifies the color of the graphic element.

11.1.3.1.2   Content

Type: kml:colorType
Default Value: ffffffff

11.1.3.2   kml:drawOrder

11.1.3.2.1   Description

This element defines the stacking order , relative to the *kml:AbstractViewGroup*, for overlapping *kml:AbstractOverlayGroup* elements. *kml:AbstractOverlayGroup* elements with higher `kml:drawOrder` values are drawn on top of overlays with lower `kml:drawOrder` values.

11.1.3.2.2   Content

Type: xsd:int
Default Value: 0

11.1.3.3 kml:Icon

11.1.3.3.1 Description

Specifies the image associated with the *kml:AbstractOverlayGroup*. If no image is specified or located, a rectangle is drawn using the color and size defined by the ground or screen overlay.

See 13.1 kml:Link, kml:Icon (kml:LinkType).
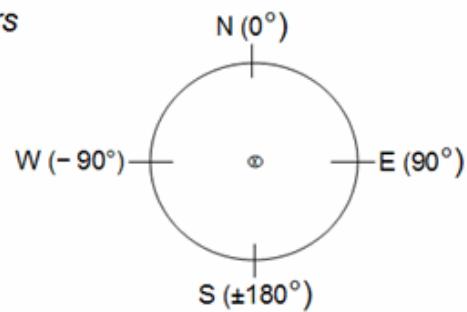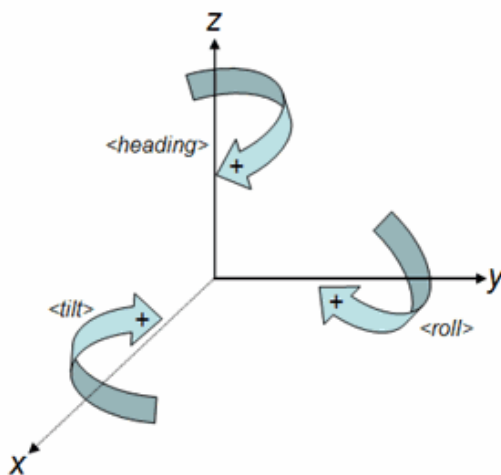
11.1.3.4 kml:AbstractOverlaySimpleExtensionGroup

See 6.6.3.1 Simple Element Substitution.

11.1.3.5 kml:AbstractOverlayObjectExtensionGroup

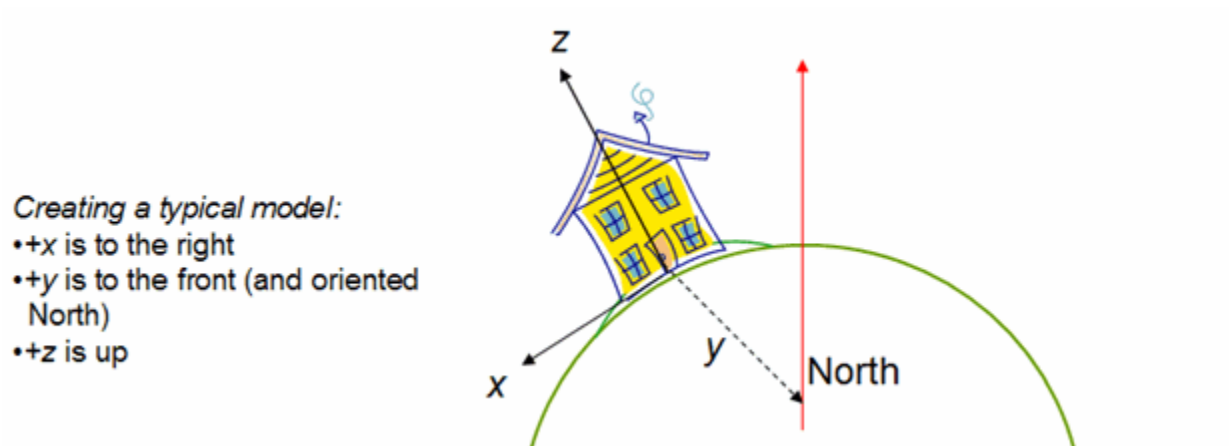See 6.6.3.2 Complex Element Substitution.

11.2 kml:GroundOverlay

11.2.1 Structure

```
<kml:GroundOverlay
 id="ID [0..1]"
 targetId="NCName [0..1]">
    <kml:ObjectSimpleExtensionGroup> ... </kml:ObjectSimpleExtensionGroup> [0..*]
    <kml:name> ... </kml:name> [0..1]
    <kml:visibility> ... </kml:visibility> [0..1]
    <kml:open> ... </kml:open> [0..1]
    <atom:author> ... </atom:author> [0..1]
    <atom:link> ... </atom:link> [0..1]
    <kml:address> ... </kml:address> [0..1]
    <xal:AddressDetails> ... </xal:AddressDetails> [0..1]
    <kml:phoneNumber> ... </kml:phoneNumber> [0..1]
    <kml:snippet> ... </kml:snippet> [0..1]
    <kml:description> ... </kml:description> [0..1]
    <kml:AbstractViewGroup> ... </kml:AbstractViewGroup> [0..1]
    <kml:AbstractTimePrimitiveGroup> ... </kml:AbstractTimePrimitiveGroup> [0..1]
    <kml:styleUrl> ... </kml:styleUrl> [0..1]
    <kml:AbstractStyleSelectorGroup> ... </kml:AbstractStyleSelectorGroup> [0..*]
    <kml:Region> ... </kml:Region> [0..1]
    <kml:ExtendedData> ... </kml:ExtendedData> [0..1]
    <kml:AbstractFeatureSimpleExtensionGroup> ...
</kml:AbstractFeatureSimpleExtensionGroup> [0..*]
    <kml:AbstractFeatureObjectExtensionGroup> ...
</kml:AbstractFeatureObjectExtensionGroup> [0..*]
    <kml:color> ... </kml:color> [0..1]
    <kml:drawOrder> ... </kml:drawOrder> [0..1]
    <kml:Icon> ... </kml:Icon> [0..1]
    <kml:AbstractOverlaySimpleExtensionGroup> ...
</kml:AbstractOverlaySimpleExtensionGroup> [0..*]
    <kml:AbstractOverlayObjectExtensionGroup> ...
</kml:AbstractOverlayObjectExtensionGroup> [0..*]
    <kml:altitude> ... </kml:altitude> [0..1]
    <kml:altitudeModeGroup> ... </kml:altitudeModeGroup> [0..1]
    <kml:LatLonBox> ... </kml:LatLonBox> [0..1]
    <kml:GroundOverlaySimpleExtensionGroup> ...
</kml:GroundOverlaySimpleExtensionGroup> [0..*]
    <kml:GroundOverlayObjectExtensionGroup> ...
</kml:GroundOverlayObjectExtensionGroup> [0..*]
</kml:GroundOverlay>
```

11.2.2 Description

This element can be used wherever the following element is referenced:

- *kml:AbstractOverlayGroup*

Specifies how to display an image draped over the terrain.

11.2.3   Content

11.2.3.1   kml:altitude

11.2.3.1.1   Description

Specifies the distance above the terrain in meters. It shall be interpreted according to `kml:altitudeMode`. Only `kml:altitudeMode` **clampToGround** or **absolute** values shall be encoded for `kml:GroundOverlay`.

A `kml:GroundOverlay` element shall contain the `kml:Icon` and `kml:LatLonBox` child elements outside of an update context, that is when not a descendant of `kml:Update`.

11.2.3.1.2   Content

      Type: xsd:double
      Default Value: 0.0

11.2.3.2   kml:altitudeModeGroup

See 9.16 kml:altitudeModeGroup and 9.17 kml:altitudeMode.

11.2.3.3   kml:LatLonBox

Specifies a bounding box for the overlay.

See 11.3 kml:LatLonBox.

11.2.3.4   kml:GroundOverlaySimpleExtensionGroup

See 6.6.3.1 Simple Element Substitution.

11.2.3.5   kml:GroundOverlayObjectExtensionGroup

See 6.6.3.2 Complex Element Substitution.

11.2.4   Example

```xml
<?xml version="1.0" encoding="UTF-8"?>
<kml xmlns="http://www.opengis.net/kml/2.2">
<GroundOverlay>
   <name>GroundOverlay.kml</name>
   <color>7fffffff</color>
   <drawOrder>1</drawOrder>
   <Icon>
      <href>http://www.google.com/intl/en/images/logo.gif</href>
      <refreshMode>onInterval</refreshMode>
      <refreshInterval>86400</refreshInterval>
      <viewBoundScale>0.75</viewBoundScale>
   </Icon>
   <LatLonBox>
      <north>37.83234</north>
      <south>37.832122</south>
      <east>-122.373033</east>
      <west>-122.373724</west>
      <rotation>45</rotation>
   </LatLonBox>
</GroundOverlay>
</kml>
```

11.3   kml:LatLonBox

11.3.1   Structure

```xml
<kml:LatLonBox
 id="ID [0..1]"
 targetId="NCName [0..1]">
    <kml:ObjectSimpleExtensionGroup> ... </kml:ObjectSimpleExtensionGroup> [0..*]
    <kml:north> ... </kml:north> [0..1]
    <kml:south> ... </kml:south> [0..1]
    <kml:east> ... </kml:east> [0..1]
    <kml:west> ... </kml:west> [0..1]
    <kml:AbstractLatLonBoxSimpleExtensionGroup> ...
</kml:AbstractLatLonBoxSimpleExtensionGroup> [0..*]
    <kml:AbstractLatLonBoxObjectExtensionGroup> ...
</kml:AbstractLatLonBoxObjectExtensionGroup> [0..*]
    <kml:rotation> ... </kml:rotation> [0..1]
    <kml:LatLonBoxSimpleExtensionGroup> ... </kml:LatLonBoxSimpleExtensionGroup>
[0..*]
    <kml:LatLonBoxObjectExtensionGroup> ... </kml:LatLonBoxObjectExtensionGroup>
[0..*]
</kml:LatLonBox>
```

11.3.2   Description

This element can be used wherever the following element is referenced:

- *kml:AbstractObjectGroup*

Specifies the extent of a 2D bounding box. `kml:north`, `kml:south`, `kml:east`, and `kml:west` shall be specified.

11.3.3   Content

11.3.3.1   kml:rotation

11.3.3.1.1   Description

Specifies a rotation of the overlay about its center, in decimal degrees. Values can be ±180, with 0 being North. Rotations are specified in a counterclockwise direction.

11.3.3.1.2   Content

Type:	kml:angle180Type
Default Value:	0.0

11.3.3.2   kml:LatLonBoxSimpleExtensionGroup

See 6.6.3.1 Simple Element Substitution.

11.3.3.3   kml:LatLonBoxObjectExtensionGroup

See 6.6.3.2 Complex Element Substitution.

11.3.4   Example

```
<LatLonBox>
    <north>48.25475939255556</north>
    <south>48.25207367852141</south>
    <east>-90.86591508839973</east>
    <west>-90.8714285289695</west>
    <rotation>39.37878630116985</rotation>
</LatLonBox>
```

11.4   kml:PhotoOverlay

11.4.1   Structure

```
<kml:PhotoOverlay
 id="ID [0..1]"
 targetId="NCName [0..1]">
    <kml:ObjectSimpleExtensionGroup> ... </kml:ObjectSimpleExtensionGroup> [0..*]
    <kml:name> ... </kml:name> [0..1]
    <kml:visibility> ... </kml:visibility> [0..1]
    <kml:open> ... </kml:open> [0..1]
    <atom:author> ... </atom:author> [0..1]
    <atom:link> ... </atom:link> [0..1]
    <kml:address> ... </kml:address> [0..1]
    <xal:AddressDetails> ... </xal:AddressDetails> [0..1]
    <kml:phoneNumber> ... </kml:phoneNumber> [0..1]
    <kml:snippet> ... </kml:snippet> [0..1]
    <kml:description> ... </kml:description> [0..1]
    <kml:AbstractViewGroup> ... </kml:AbstractViewGroup> [0..1]
    <kml:AbstractTimePrimitiveGroup> ... </kml:AbstractTimePrimitiveGroup> [0..1]
    <kml:styleUrl> ... </kml:styleUrl> [0..1]
    <kml:AbstractStyleSelectorGroup> ... </kml:AbstractStyleSelectorGroup> [0..*]
    <kml:Region> ... </kml:Region> [0..1]
    <kml:ExtendedData> ... </kml:ExtendedData> [0..1]
    <kml:AbstractFeatureSimpleExtensionGroup> ...
</kml:AbstractFeatureSimpleExtensionGroup> [0..*]
    <kml:AbstractFeatureObjectExtensionGroup> ...
</kml:AbstractFeatureObjectExtensionGroup> [0..*]
    <kml:color> ... </kml:color> [0..1]
    <kml:drawOrder> ... </kml:drawOrder> [0..1]
    <kml:Icon> ... </kml:Icon> [0..1]
    <kml:AbstractOverlaySimpleExtensionGroup> ...
</kml:AbstractOverlaySimpleExtensionGroup> [0..*]
    <kml:AbstractOverlayObjectExtensionGroup> ...
</kml:AbstractOverlayObjectExtensionGroup> [0..*]
    <kml:rotation> ... </kml:rotation> [0..1]
    <kml:ViewVolume> ... </kml:ViewVolume> [0..1]
    <kml:ImagePyramid> ... </kml:ImagePyramid> [0..1]
    <kml:Point> ... </kml:Point> [0..1]
    <kml:shape> ... </kml:shape> [0..1]
    <kml:PhotoOverlaySimpleExtensionGroup> ...
</kml:PhotoOverlaySimpleExtensionGroup> [0..*]
```

```
    <kml:PhotoOverlayObjectExtensionGroup> ...
</kml:PhotoOverlayObjectExtensionGroup> [0..*]
</kml:PhotoOverlay>
```

11.4.2   Description

This element can be used wherever the following element is referenced:

- *kml:AbstractOverlayGroup*

The kml:PhotoOverlay element is used to position a photograph relative to the camera viewpoint and also to define field-of-view parameters. The kml:PhotoOverlay may be rendered on one of three shapes (as determined by the value of kml:shape): a 2D planar rectangle, a cylinder (for a panoramic photo), or a sphere (for a spherical panorama).

The the photo overlay faces toward the viewpoint and its center is placed at the head of the view vector. The view vector is defined as the vector based at the viewpoint and in the direction specified by the corresponding kml:AbstractView element. The length of the view vector is determined by the value of the kml:near element. The photo overlay is positioned such that the view vector points toward the photo and is orthogonal to the center of the image (see Figure 9).
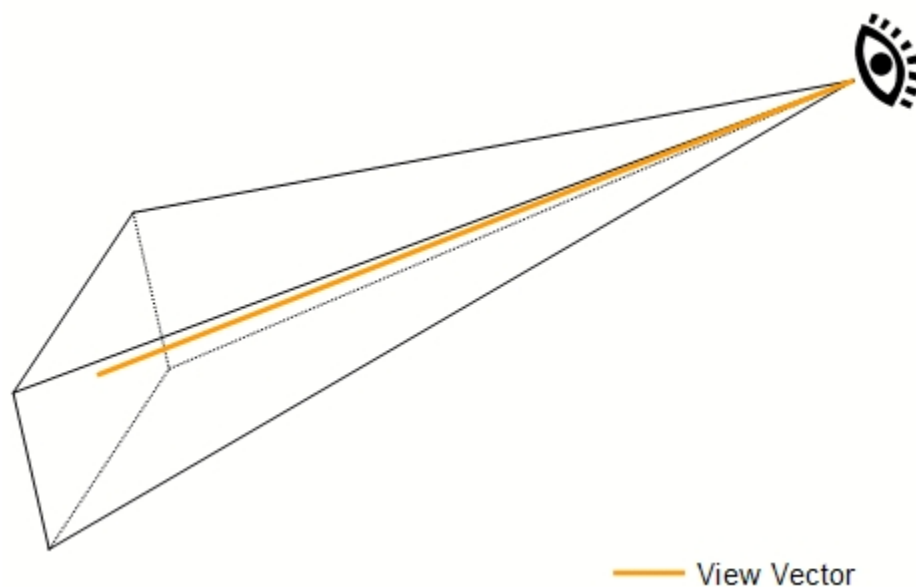
Figure 9: kml:PhotoOverlay View Vector

The URL for the `kml:PhotoOverlay` image is specified in the `kml:Icon` tag, which is inherited from *kml:AbstractOverlayGroup*. The `kml:Icon` tag must contain a `kml:href` element that specifies the image resource to use for the `kml:PhotoOverlay`.

A `kml:PhotoOverlay` element shall contain the `kml:Icon`, `kml:ViewVolume`, `kml:Point`, and `kml:Camera` child elements outside of an update context, that is when not a descendant of `kml:Update`.

11.4.3 Handling large images

For large images an image pyramid (`kml:ImagePyramid`) may be used to specify a hierarchical set of images, each of which is an increasingly lower resolution version of the original image. Each image in the pyramid is subdivided into tiles, so that only the portions in view need to be loaded. An earth browser calculates the current viewpoint and load the tiles that are appropriate to the user's distance from the image. As the viewpoint moves closer to the `kml:PhotoOverlay`, the earth browser loads the higher resolution tiles. Since all the pixels in the original image can't be viewed on the screen at once, this preprocessing allows an earth browser to achieve maximum performance because it loads only the portions of the image that are in view, and only the pixel details that can be discerned by the user at the current viewpoint.

When a `kml:ImagePyramid` is present, the `kml:href` specification in the `kml:Icon` element shall include parameterization to specify the *level*, *x*, and *y* values of the tiles to fetch, where:

- *x* = row position in the grid
- *y* = column position in the grid
- *level* = level in the image pyramid, with 0 being the highest level

For example, the URL for the image might be specified as follows:

```
http://server.company.com/bigphoto/$[level]/row_$[x]_column_[$y].jpg
```

To request the tile in row 2, column 1, at level 3, Google Earth would fetch the following URL:

```
http://server.company.com/bigphoto/3/row_2_column_1.jpg
```

By default, the origin (0,0) is at the lower left of the grid. If an image has an origin in the upper left, the `kml:ImagePyramid` shall specify **topLeft** for the `kml:gridOrigin`.

The following figure illustrates numbering of tiles at level 2 of a 10-megapixel image:
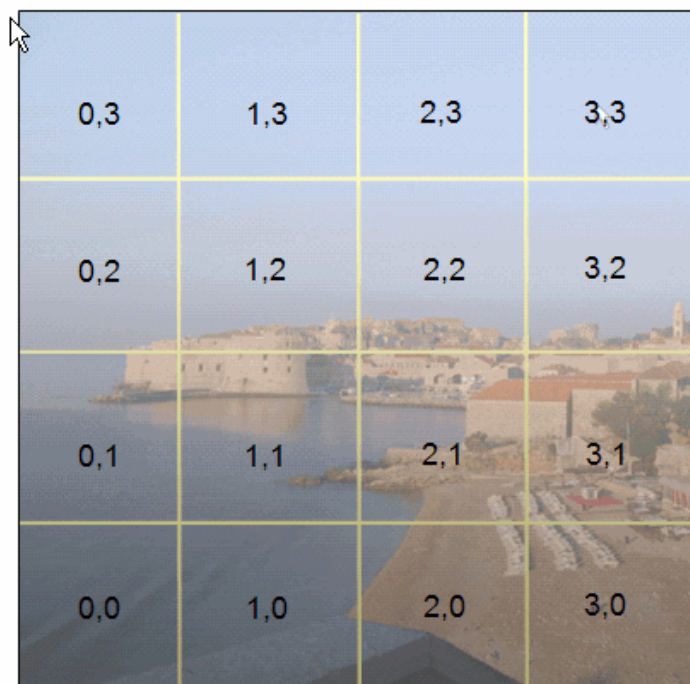
Level 2 *(numbering the tiles)*

See also 13.1 kml:Link, kml:Icon (kml:LinkType), 11.6.3 Creating an Image Pyramid.

11.4.4   Content

11.4.4.1   kml:rotation

See 11.3.3.1 kml:rotation.

11.4.4.2   kml:ViewVolume

11.4.4.2.1   Description

Defines how much of the current scene is visible.

See 11.5 kml:ViewVolume.

11.4.4.3   kml:ImagePyramid

11.4.4.3.1   Description

See 11.6 kml:ImagePyramid.

11.4.4.4   kml:Point

11.4.4.4.1   Description

Specifies the location of an icon associated with the `kml:PhotoOverlay`. The `kml:Point` is styled using associated or default styles.

See 10.3 kml:Point.

11.4.4.5   kml:shape

11.4.4.5.1   Description

The `kml:PhotoOverlay` is projected onto the `kml:shape` as shown in the case of a cylinder in Figure 10.
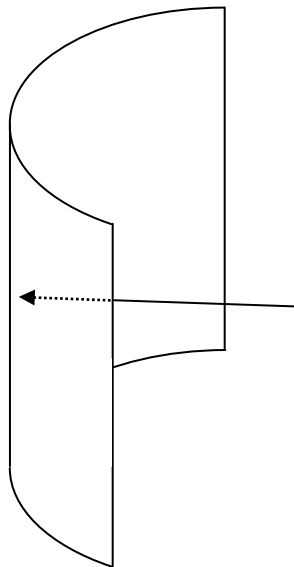
Figure 10: A Cylindrical `kml:shape` Positioned Relative to View Vector

11.4.4.5.2   Content

Type: kml:shapeEnumType
Default Value: **rectangle**

11.4.4.6   kml:PhotoOverlaySimpleExtensionGroup

See 6.6.3.1 Simple Element Substitution.

11.4.4.7   kml:PhotoOverlayObjectExtensionGroup

See 6.6.3.2 Complex Element Substitution.

11.4.5　Example

```
<PhotoOverlay>
  <!-- Feature elements -->
  <name>A simple non-pyramidal photo</name>
  <description>High above the ocean</description>
  <!-- AbstractOverlayGroup elements -->
  <Icon>
  <!-- A simple normal jpeg image -->
  <href>small-photo.jpg</href>
  </Icon>
  <!-- PhotoOverlay elements -->
  <!-- default: <shape> -->
  <ViewVolume>
    <near>1000</near>
    <leftFov>-60</leftFov>
    <rightFov>60</rightFov>
    <bottomFov>-45</bottomFov>
    <topFov>45</topFov>
  </ViewVolume>
  <Point>
    <coordinates>1,1</coordinates>
  </Point>
  <!-- if no ImagePyramid only level 0 is shown,
       fine for a non-pyramidal image -->
</PhotoOverlay>
```

11.5　kml:ViewVolume

11.5.1　Structure

```
<kml:ViewVolume
 id="ID [0..1]"
 targetId="NCName [0..1]">
    <kml:ObjectSimpleExtensionGroup> ... </kml:ObjectSimpleExtensionGroup> [0..*]
    <kml:leftFov> ... </kml:leftFov> [0..1]
    <kml:rightFov> ... </kml:rightFov> [0..1]
    <kml:bottomFov> ... </kml:bottomFov> [0..1]
    <kml:topFov> ... </kml:topFov> [0..1]
    <kml:near> ... </kml:near> [0..1]
    <kml:ViewVolumeSimpleExtensionGroup> ... </kml:ViewVolumeSimpleExtensionGroup>
[0..*]
    <kml:ViewVolumeObjectExtensionGroup> ... </kml:ViewVolumeObjectExtensionGroup>
[0..*]
</kml:ViewVolume>
```

11.5.2　Description

This element can be used wherever the following element is referenced:

- *kml:AbstractObjectGroup*

Defines how much of the current scene in a kml:PhotoOverlay is visible. Specifying the field of view is analogous to specifying the lens opening in a physical camera. A small field of view, like a telephoto lens, focuses on a small part of the scene. A large field of view, like a wide-angle lens, focuses on a large part of the scene.

A kml:ViewVolume element shall contain the kml:leftFov, kml:rightFov, kml:bottomFov, kml:topFov, and kml:near child elements outside of an update context, that is when not a descendant of kml:Update.

11.5.3   Content

11.5.3.1   kml:leftFov

11.5.3.1.1   Description

Angle, in decimal degrees, from the left side of the view volume to the camera's view vector. A negative value of the angle corresponds to a field of view that is 'left' of the view vector.

11.5.3.1.2   Content

Type:	kml:angle180Type
Default Value:	0.0

11.5.3.2   kml:rightFov

11.5.3.2.1   Description

Angle, in decimal degrees, from the camera's view vector to the right side of the view volume. A positive value of the angle corresponds to a field of view that is 'right' of the view vector.

11.5.3.2.2   Content

Type:	kml:angle180Type
Default Value:	0.0

11.5.3.3   kml:bottomFov

11.5.3.3.1   Description

Angle, in decimal degrees, from the the bottom side of the view volume to camera's view vector.

11.5.3.3.2   Content

    Type: kml:angle90Type
    Default Value: 0.0

11.5.3.4   kml:topFov

11.5.3.4.1   Description

Angle, in decimal degrees, from the camera's view vector to the top side of the view volume.

11.5.3.4.2   Content

    Type: kml:angle90Type
    Default Value: 0.0

11.5.3.5   kml:near

11.5.3.5.1   Description

Length in meters of the view vector, which starts from the camera viewpoint and ends at the `kml:PhotoOverlay` shape. The value shall be positive.

11.5.3.5.2   Content

    Type: xsd:double
    Default Value: 0.0

11.5.3.6   kml:ViewVolumeSimpleExtensionGroup

See 6.6.3.1 Simple Element Substitution.

11.5.3.7 kml:ViewVolumeObjectExtensionGroup

See 6.6.3.2 Complex Element Substitution.

11.6 kml:ImagePyramid

11.6.1 Structure

```
<kml:ImagePyramid
 id="ID [0..1]"
 targetId="NCName [0..1]">
    <kml:ObjectSimpleExtensionGroup> ... </kml:ObjectSimpleExtensionGroup> [0..*]
    <kml:tileSize> ... </kml:tileSize> [0..1]
    <kml:maxWidth> ... </kml:maxWidth> [0..1]
    <kml:maxHeight> ... </kml:maxHeight> [0..1]
    <kml:gridOrigin> ... </kml:gridOrigin> [0..1]
    <kml:ImagePyramidSimpleExtensionGroup> ...
</kml:ImagePyramidSimpleExtensionGroup> [0..*]
    <kml:ImagePyramidObjectExtensionGroup> ...
</kml:ImagePyramidObjectExtensionGroup> [0..*]
</kml:ImagePyramid>
```

11.6.2 Description

This element can be used wherever the following element is referenced:

- *kml:AbstractObjectGroup*

Specifies a hierarchical set of images, each of which is an increasingly lower resolution (towards the top of the pyramid). Each image in the pyramid is subdivided into tiles so only the portions in view are loaded.

The pixel size of the original image is specified in the kml:maxWidth and kml:maxHeight elements. The width and height can be any size and do not need to be a power of 2. You can fill out the remaining pixels with blank pixels, as described in.

Tiles must be square, and the kml:tileSize must be a power of 2. A tile size of 256 (the default) or 512 is recommended.

A kml:ImagePyramid element should have the kml:maxWidth and kml:maxHeight child elements present, and, if supplied, the kml:tileSize should be a power of 2.

See also 11.4.3 Handling large images.

11.6.3   Creating an Image Pyramid

An image pyramid should be constructed as follows, assuming the image pixel measurement is a power of 2.

1. Starting with the original, full-size image, divide it into tile-sized pieces—for example, into blocks of 256 * 256 pixels each.

2. Shrink the image by a factor of 2.

3. Divide this new image into tile-sized squares.

4. Repeat steps 2 and 3 until the resulting image fits inside the tile size (for example, 256 * 256 pixels).

If the image pixel measurement is not a power of 2, transparent fill pixels shall be added to make the tile square. Place the image so that the (0,0) tile is at the origin. For example, if the origin is at the lower left, the image should be located in the lower left of the tile grid. The row and columns that might need fill would then be at the right and top of the image. For best filtering, replicate the last row (or column) at the edge of the image. Then add fill (for example, black) to the remaining pixels in the tiles of the row (or column).

For example, consider an image whose dimensions are 3600 * 2700 pixels (roughly 10 megapixels). An image pyramid for this image should be created as follows:

1. Using a tile size of 256 pixels, you can subdivide the original image into a grid of 16 * 16 pixels. (This image ends up as level 4 in the final pyramid.)

2. Fill in the pixels to "square up" the partially filled tiles in the last column (to the right) and the last row (at the top, assuming `kml:gridOrigin` is **lowerLeft**).

3. Scale down the image by a factor of 2.

4. Subdivide this image into 256-pixel tiles. The image at this level consists of a grid of 8 * 8 tiles (level 3).

5. Scale the level 3 image down by a factor of 2.

6. Subdivide into tiles. The image at this level consists of a grid of 4 * 4 tiles (level 2).

7. Scale the level 2 image down by a factor of 2.

8. Subdivide into tiles. The image at this level consists of a grid of 2 * 2 tiles (level 1).

9. Scale the level 1 image down by a factor of 2.

10. The resulting image is 256 * 256 pixels, so this is the last level of the image pyramid (level 0).

The image pyramid for a 4096 * 4096 image has 5 levels, as shown in Table 3.

Table 3: Example of Image Pyramid Levels

Level	Number of Tiles	Size of Image (pixels)
0	1	256 * 256
1	4 (2 * 2 grid)	512 * 512
2	16 (4 * 4 grid)	1024 * 1024
3	64 (8 * 8 grid)	2048 * 2048
4	256 (16 * 16 grid)	4096 * 4096

Level *n* thus has 2^n tiles in each direction.

11.6.4   Transparency

If an image is fully opaque then the image should be encoded in JPEG format. If part of the image is opaque and part is transparent both PNG and JPEG tiles may be specified, with PNG used for tiles that have transparency values. If both formats are used omit the file extension from the `kml:href` specification of the image file and include the file extension in the filename for each tile.

11.6.5   Content

11.6.5.1   kml:tileSize

11.6.5.1.1   Description

Size of the tiles, in pixels. Tiles must be square, and `kml:tileSize` must be a power of 2. A tile size of 256 (the default) or 512 is recommended. The original image is divided into tiles of this size, at varying resolutions.

11.6.5.1.2   Content

Type:	xsd:int
Default Value:	256

11.6.5.2   kml:maxWidth

11.6.5.2.1   Description

Width in pixels of the original image.

11.6.5.2.2   Content

Type:	xsd:int
Default Value:	0

11.6.5.3   kml:maxHeight

11.6.5.3.1   Description

Height in pixels of the original image.

11.6.5.3.2   Content

Type:	xsd:int
Default Value:	0

11.6.5.4 kml:gridOrigin

11.6.5.4.1 Description

Specifies where to begin numbering the tiles in each layer of the pyramid. A value of `lowerLeft` specifies that row 1, column 1 of each layer is in the bottom left corner of the grid.

11.6.5.4.2 Content

Type:	kml:gridOriginEnumType
Default Value:	**lowerLeft**

11.6.5.5 kml:ImagePyramidSimpleExtensionGroup

See 6.6.3.1 Simple Element Substitution.

11.6.5.6 kml:ImagePyramidObjectExtensionGroup

See 6.6.3.2 Complex Element Substitution.

11.7 kml:ScreenOverlay

11.7.1 Structure

```
<kml:ScreenOverlay
 id="ID [0..1]"
 targetId="NCName [0..1]">
    <kml:ObjectSimpleExtensionGroup> ... </kml:ObjectSimpleExtensionGroup> [0..*]
    <kml:name> ... </kml:name> [0..1]
    <kml:visibility> ... </kml:visibility> [0..1]
    <kml:open> ... </kml:open> [0..1]
    <atom:author> ... </atom:author> [0..1]
    <atom:link> ... </atom:link> [0..1]
    <kml:address> ... </kml:address> [0..1]
    <xal:AddressDetails> ... </xal:AddressDetails> [0..1]
    <kml:phoneNumber> ... </kml:phoneNumber> [0..1]
    <kml:snippet> ... </kml:snippet> [0..1]
    <kml:description> ... </kml:description> [0..1]
    <kml:AbstractViewGroup> ... </kml:AbstractViewGroup> [0..1]
    <kml:AbstractTimePrimitiveGroup> ... </kml:AbstractTimePrimitiveGroup> [0..1]
    <kml:styleUrl> ... </kml:styleUrl> [0..1]
    <kml:AbstractStyleSelectorGroup> ... </kml:AbstractStyleSelectorGroup> [0..*]
    <kml:Region> ... </kml:Region> [0..1]
    <kml:ExtendedData> ... </kml:ExtendedData> [0..1]
    <kml:AbstractFeatureSimpleExtensionGroup> ...
</kml:AbstractFeatureSimpleExtensionGroup> [0..*]
    <kml:AbstractFeatureObjectExtensionGroup> ...
</kml:AbstractFeatureObjectExtensionGroup> [0..*]
    <kml:color> ... </kml:color> [0..1]
    <kml:drawOrder> ... </kml:drawOrder> [0..1]
    <kml:Icon> ... </kml:Icon> [0..1]
    <kml:AbstractOverlaySimpleExtensionGroup> ...
</kml:AbstractOverlaySimpleExtensionGroup> [0..*]
    <kml:AbstractOverlayObjectExtensionGroup> ...
</kml:AbstractOverlayObjectExtensionGroup> [0..*]
    <kml:overlayXY> kml:vec2Type </kml:overlayXY> [0..1]
    <kml:screenXY> kml:vec2Type </kml:screenXY> [0..1]
    <kml:rotationXY> kml:vec2Type </kml:rotationXY> [0..1]
    <kml:size> kml:vec2Type </kml:size> [0..1]
    <kml:rotation> ... </kml:rotation> [0..1]
    <kml:ScreenOverlaySimpleExtensionGroup> ...
</kml:ScreenOverlaySimpleExtensionGroup> [0..*]
    <kml:ScreenOverlayObjectExtensionGroup> ...
</kml:ScreenOverlayObjectExtensionGroup> [0..*]
</kml:ScreenOverlay>
```

11.7.2 Description

This element can be used wherever the following element is referenced:

- *kml:AbstractOverlayGroup*

Specifies an image overlay to be displayed fixed to the screen. The image position is determined by mapping a point relative to the image (specified by `kml:overlayXY`) to a point relative to the screen (specified by `kml:screenXY`). The image may be rotated by `kml:rotation` degrees about a point relative to the screen (specified by `kml:rotationXY`). The image sizing is determined using the `kml:size` element.

A `kml:ScreenOverlay` element should contain the `kml:screenXY` element outside of an update context, that is when not a descendant of `kml:Update`.

11.7.3   Content

11.7.3.1   kml:overlayXY

11.7.3.1.1   Description

Specifies a point on (or outside of) the image that is mapped to the screen coordinate (`kml:screenXY`). It requires x and y values, and the units for those values. The origin of the coordinate system is the lower left corner of the icon.

11.7.3.1.2   Content

Type:	kml:vec2Type
Default Value:	See kml:vec2Type

11.7.3.2   kml:screenXY

11.7.3.2.1   Description

Specifies a point relative to the screen origin that the image is mapped to. It requires x and y values, and the units for those values. The origin of the coordinate system is the lower left corner of the screen.

11.7.3.2.2   Content

Type:	kml:vec2Type
Default Value:	See kml:vec2Type

11.7.3.2.3   Example

11.7.3.3   kml:rotationXY

11.7.3.3.1   Description

Point relative to the screen about which the screen overlay is rotated. The origin of the coordinate system is in the lower left corner of the screen.

11.7.3.3.2   Content

Type:	kml:vec2Type
Default Value:	See kml:vec2Type

11.7.3.4   kml:size

11.7.3.4.1   Description

Specifies the size of the image for a `kml:ScreenOverlay`. A value of −1 indicates to use the native dimension; a value of 0 indicates to maintain the aspect ratio; a value of n sets the value of the dimension.

11.7.3.4.2   Content

Type:	kml:vec2Type
Default Value:	See kml:vec2Type

11.7.3.4.3   Example

To force the image to retain its original x and y dimensions, set the values to −1:

```
<size x="-1" y="-1" xunits="fraction" yunits="fraction"/>
```

To force the image to retain its horizontal dimension, but to take up 20 percent of the vertical screen space:

```
<size x="-1" y="0.2" xunits="fraction" yunits="fraction"/>
```

To force the image to resize to 100px by 500px:

```
<size x="100" y="500" xunits="pixels" yunits="pixels"/>
```

11.7.3.5   kml:rotation

11.7.3.5.1   Description

Indicates the angle of rotation, in decimal degrees, of the parent object. A value of 0 means
no rotation. The value is an angle in decimal degrees counterclockwise starting from north.
Use ±180 to indicate the rotation of the parent object from 0. The center of the
`kml:rotation`, if not (.5,.5), is specified in `kml:rotationXY`.

11.7.3.5.2   Content

Type: kml:angle180Type
Default Value: 0.0

11.7.3.5.3   Example
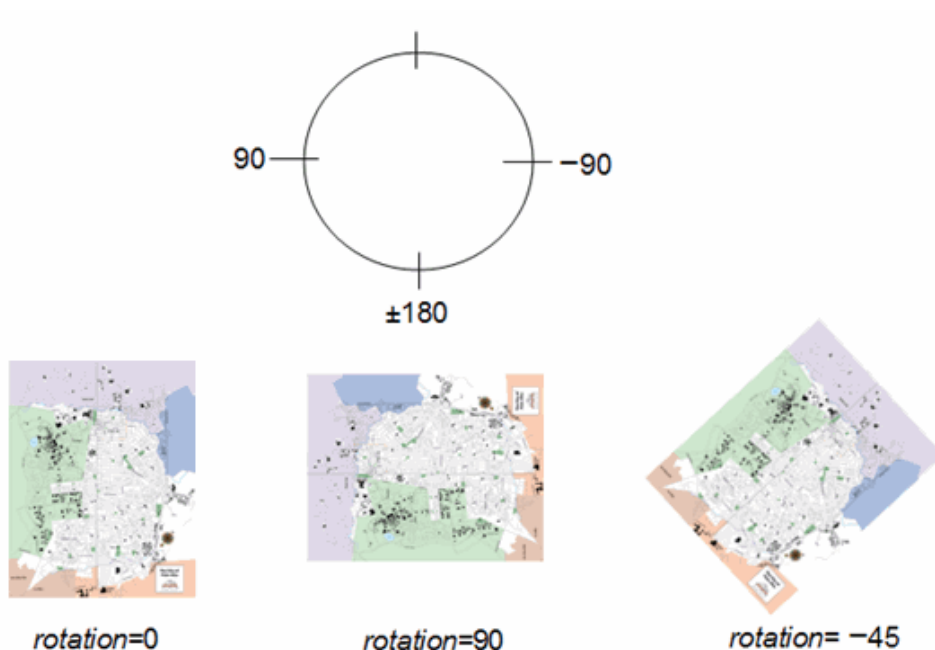
11.7.4   Examples

To center an image on the screen:

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```
<ScreenOverlay>
  <overlayXY x="0.5" y="0.5" xunits="fraction" yunits="fraction"/>
  <screenXY x="0.5" y="0.5" xunits="fraction" yunits="fraction"/>
</ScreenOverlay>
```

To place an image on the top left of the screen:

```
<ScreenOverlay>
  <overlayXY x="0" y="1" xunits="fraction" yunits="fraction"/>
  <screenXY x="0" y="1" xunits="fraction" yunits="fraction"/>
</ScreenOverlay>
```

To place an image at the right of the screen:

```
<ScreenOverlay>
  <overlayXY x="1" y="1" xunits="fraction" yunits="fraction"/>
  <screenXY x="1" y="1" xunits="fraction" yunits="fraction"/>
</ScreenOverlay>
```

The following example places an image at the exact center of the screen, using the original width, height, and aspect ratio of the image.

```
<ScreenOverlay id="khScreenOverlay756">
  <name>Simple crosshairs</name>
  <description>This screen overlay uses fractional positioning
   to put the image in the exact center of the screen</description>
  <Icon>
    <href>http://myserver/myimage.jpg</href>
  </Icon>
  <overlayXY x="0.5" y="0.5" xunits="fraction" yunits="fraction"/>
  <screenXY x="0.5" y="0.5" xunits="fraction" yunits="fraction"/>
  <rotation>39.37878630116985</rotation>
  <size x="0" y="0" xunits="pixels" yunits="pixels"/>
</ScreenOverlay>
```

12 Styles

12.1 kml:AbstractStyleSelectorGroup

12.1.1 Structure

```
<kml:AbstractStyleSelectorGroup
 id="ID [0..1]"
 targetId="NCName [0..1]">
    <kml:ObjectSimpleExtensionGroup> ... </kml:ObjectSimpleExtensionGroup> [0..*]
    <kml:AbstractStyleSelectorSimpleExtensionGroup> ...
</kml:AbstractStyleSelectorSimpleExtensionGroup> [0..*]
    <kml:AbstractStyleSelectorObjectExtensionGroup> ...
</kml:AbstractStyleSelectorObjectExtensionGroup> [0..*]
</kml:AbstractStyleSelectorGroup>
```

12.1.2 Description

Abstract: yes

This element can be used wherever the following element is referenced:

- *kml:AbstractObjectGroup*

The following elements can be used wherever this element is referenced:

- kml:Style
- kml:StyleMap

12.1.3 Content

12.1.3.1 kml:AbstractStyleSelectorSimpleExtensionGroup

See 6.6.3.1 Simple Element Substitution.

12.1.3.2 kml:AbstractStyleSelectorObjectExtensionGroup

See 6.6.3.2 Complex Element Substitution.

12.2   kml:Style

12.2.1   Structure

```
<kml:Style
 id="ID [0..1]"
 targetId="NCName [0..1]">
    <kml:ObjectSimpleExtensionGroup> ... </kml:ObjectSimpleExtensionGroup> [0..*]
    <kml:AbstractStyleSelectorSimpleExtensionGroup> ...
</kml:AbstractStyleSelectorSimpleExtensionGroup> [0..*]
    <kml:AbstractStyleSelectorObjectExtensionGroup> ...
</kml:AbstractStyleSelectorObjectExtensionGroup> [0..*]
    <kml:IconStyle> ... </kml:IconStyle> [0..1]
    <kml:LabelStyle> ... </kml:LabelStyle> [0..1]
    <kml:LineStyle> ... </kml:LineStyle> [0..1]
    <kml:PolyStyle> ... </kml:PolyStyle> [0..1]
    <kml:BalloonStyle> ... </kml:BalloonStyle> [0..1]
    <kml:ListStyle> ... </kml:ListStyle> [0..1]
    <kml:StyleSimpleExtensionGroup> ... </kml:StyleSimpleExtensionGroup> [0..*]
    <kml:StyleObjectExtensionGroup> ... </kml:StyleObjectExtensionGroup> [0..*]
</kml:Style>
```

12.2.2   Description

This element can be used wherever the following element is referenced:

- *kml:AbstractStyleSelectorGroup*

Specifies a container of zero or more `kml:AbstractColorStyleGroup` elements that can referenced from a `kml:StyleMap` or *kml:AbstractFeatureGroup*. Styles affect how a *kml:AbstractGeometryGroup* is presented in the geographic view and how a *kml:AbstractFeatureGroup* appears in the list view.

`kml:Scale` should contain at least one child element outside of an update context, that is when not a descendant of `kml:Update`. It is advised that `kml:x`, `kml:y`, and `kml:z` all be specified.

12.2.3   Content

12.2.3.1   kml:IconStyle

See 12.8 kml:IconStyle.

12.2.3.2   kml:LabelStyle

See 12.10 kml:LabelStyle.

12.2.3.3   kml:LineStyle

See 12.11 kml:LineStyle.

12.2.3.4   kml:PolyStyle

See 12.12 kml:PolyStyle.

12.2.3.5   kml:BalloonStyle

See 12.6 kml:BalloonStyle.

12.2.3.6   kml:ListStyle

See 12.13 kml:ListStyle.

12.2.3.7   kml:StyleSimpleExtensionGroup

See 6.6.3.1 Simple Element Substitution.

12.2.3.8   kml:StyleObjectExtensionGroup

See 6.6.3.2 Complex Element Substitution.

12.2.4   Example

```
<Document>
  <!-- Begin Style Definitions -->
  <Style id="myDefaultStyles">
    <IconStyle>
      <color>a1ff00ff</color>
      <scale>1.399999976158142</scale>
      <Icon>
        <href>http://myserver.com/icon.jpg</href>
      </Icon>
    </IconStyle>
    <LabelStyle>
      <color>7fffaaff</color>
      <scale>1.5</scale>
    </LabelStyle>
    <LineStyle>
      <color>ff0000ff</color>
      <width>15</width>
    </LineStyle>
    <PolyStyle>
      <color>7f7faaaa</color>
      <colorMode>random</colorMode>
    </PolyStyle>
  </Style>
  <!-- End Style Definitions -->
  <!-- Placemark #1 -->
  <Placemark>
    <name>Google Earth - New Polygon</name>
    <description>Here is some descriptive text</description>
    <styleUrl>#myDefaultStyles</styleUrl>
    . . .
  </Placemark>
  <!-- Placemark #2 -->
  <Placemark>
    <name>Google Earth - New Path</name>
    <styleUrl>#myDefaultStyles</styleUrl>
    . . . .
  </Placemark>
</Document>
</kml>
```

12.3   kml:StyleMap

12.3.1   Structure

```
<kml:StyleMap
 id="ID [0..1]"
 targetId="NCName [0..1]">
    <kml:ObjectSimpleExtensionGroup> ... </kml:ObjectSimpleExtensionGroup> [0..*]
    <kml:AbstractStyleSelectorSimpleExtensionGroup> ...
</kml:AbstractStyleSelectorSimpleExtensionGroup> [0..*]
```

```
    <kml:AbstractStyleSelectorObjectExtensionGroup> ...
</kml:AbstractStyleSelectorObjectExtensionGroup> [0..*]
    <kml:Pair> ... </kml:Pair> [0..*]
    <kml:StyleMapSimpleExtensionGroup> ... </kml:StyleMapSimpleExtensionGroup>
[0..*]
    <kml:StyleMapObjectExtensionGroup> ... </kml:StyleMapObjectExtensionGroup>
[0..*]
</kml:StyleMap>
```

12.3.2   Description

This element can be used wherever the following element is referenced:

- *kml:AbstractStyleSelectorGroup*

Specifies a mapping between two kml:Styles using a key/value pair that maps a mode to the predefined kml:styleUrl. A kml:StyleMap may be used to provide separate normal and highlighted styles for a kml:Placemark.

kml:StyleMap should have two kml:Pair elements, one with a kml:key value of **normal** and the other with a value of **highlight,** outside of an update context, that is when not a descendant of kml:Update.

12.3.3   Content

12.3.3.1   kml:Pair

See 12.4 kml:Pair.

12.3.3.2   kml:StyleMapSimpleExtensionGroup

See 6.6.3.1 Simple Element Substitution.

12.3.3.3   kml:StyleMapObjectExtensionGroup

See 6.6.3.2 Complex Element Substitution.

12.3.4　Example

```
<kml xmlns="http://www.opengis.net/kml/2.2">
<Document>
  <name>StyleMap.kml</name>
  <open>1</open>
  <Style id="normalState">
    <IconStyle>
      <scale>1.0</scale>
      <Icon>
        <href>http://maps.google.com/mapfiles/kml/pal3/icon55.png</href>
      </Icon>
    </IconStyle>
    <LabelStyle>
      <scale>1.0</scale>
    </LabelStyle>
  </Style>
  <Style id="highlightState">
    <IconStyle>
      <Icon>
        <href>http://maps.google.com/mapfiles/kml/pal3/icon60.png</href>
      </Icon>
      <scale>1.1</scale>
    </IconStyle>
    <LabelStyle>
      <scale>1.1</scale>
      <color>ff0000c0</color>
    </LabelStyle>
  </Style>
  <StyleMap id="styleMapExample">
    <Pair>
      <key>normal</key>
      <styleUrl>#normalState</styleUrl>
    </Pair>
    <Pair>
      <key>highlight</key>
      <styleUrl>#highlightState</styleUrl>
    </Pair>
  </StyleMap>
  <Placemark>
    <name>StyleMap example</name>
    <styleUrl>#styleMapExample</styleUrl>
    <Point>
      <coordinates>-122.368987,37.817634,0</coordinates>
    </Point>
  </Placemark>
</Document>
</kml>
```

12.4　kml:Pair

12.4.1　Structure

```
<kml:Pair
 id="ID [0..1]"
 targetId="NCName [0..1]">
    <kml:ObjectSimpleExtensionGroup> ... </kml:ObjectSimpleExtensionGroup> [0..*]
    <kml:key> ... </kml:key> [0..1]
    <kml:styleUrl> ... </kml:styleUrl> [0..1]
    <kml:AbstractStyleSelectorGroup> ... </kml:AbstractStyleSelectorGroup> [0..1]
    <kml:PairSimpleExtensionGroup> ... </kml:PairSimpleExtensionGroup> [0..*]
    <kml:PairObjectExtensionGroup> ... </kml:PairObjectExtensionGroup> [0..*]
</kml:Pair>
```

12.4.2   Description

This element can be used wherever the following element is referenced:

- *kml:AbstractObjectGroup*

Defines a key/value pair that maps a mode (normal or highlight) to the predefined kml:styleUrl and/or a kml:AbstractStyleSelectorGroup. If both kml:styleUrl and kml:AbstractStyleSelectorGroup exist then their styles shall be merged.

A kml:Pair element shall contain kml:key and kml:styleUrl or kml:AbstractStyleSelectorGroup child elements outside of an update context, that is when not a descendant of kml:Update.

12.4.3   Content

12.4.3.1   kml:key

12.4.3.1.1   Description

Identifies a key whose value is either **normal** or **highlighted**.

12.4.3.1.2   Content

Type: kml:styleStateEnumType
Default Value: **normal**

12.4.3.2   kml:styleURL

See 9.1.3.13 kml:styleURL.

12.4.3.3   kml:AbstractStyleSelectorGroup

See 12.1 kml:AbstractStyleSelectorGroup, 12.2 kml:Style12.3, and kml:StyleMap.

12.4.3.4   kml:PairSimpleExtensionGroup

See 6.6.3.1 Simple Element Substitution.

12.4.3.5   kml:PairObjectExtensionGroup

See 6.6.3.2 Complex Element Substitution.

12.4.4   Example

```
<Pair>
  <key>normal</key>
  <styleUrl>http://myserver.com/population.xml#example_style_off</styleUrl>
</Pair>
```

12.5   kml:AbstractSubStyleGroup

12.5.1   Structure

```
<kml:AbstractSubStyleGroup
 id="ID [0..1]"
 targetId="NCName [0..1]">
    <kml:AbstractObjectGroupSimpleExtensionGroup> ...
</kml:AbstractObjectGroupSimpleExtensionGroup> [0..*]
    <kml:AbstractSubStyleSimpleExtensionGroup> ...
</kml:AbstractSubStyleSimpleExtensionGroup> [0..*]
    <kml:AbstractSubStyleObjectExtensionGroup> ...
</kml:AbstractSubStyleObjectExtensionGroup> [0..*]
</kml:AbstractSubStyleGroup>
```

12.5.2   Description

Abstract: yes

This element can be used wherever the following element is referenced:

- *kml:AbstractObjectGroup*

The following elements can be used wherever this element is referenced:

- *kml:AbstractColorStyleGroup*
- kml:BalloonStyle
- kml:IconStyle
- kml:ListStyle

- kml:LabelStyle
- kml:LineStyle
- kml:PolyStyle

12.5.3 Content

12.5.3.1 kml:AbstractSubStyleSimpleExtensionGroup

See 6.6.3.1 Simple Element Substitution.

12.5.3.2 kml:AbstractSubStyleObjectExtensionGroup

See 6.6.3.2 Complex Element Substitution.

12.6 kml:BalloonStyle

12.6.1 Structure

```
<kml:BalloonStyle
  id="ID [0..1]"
targetId="NCName [0..1]">
    <kml:ObjectSimpleExtensionGroup> ... </kml:ObjectSimpleExtensionGroup> [0..*]
    <kml:AbstractSubStyleSimpleExtensionGroup> ...
</kml:AbstractSubStyleSimpleExtensionGroup> [0..*]
    <kml:AbstractSubStyleObjectExtensionGroup> ...
</kml:AbstractSubStyleObjectExtensionGroup> [0..*]
    <kml:bgColor> ... </kml:bgColor> [0..1]
    <kml:textColor> ... </kml:textColor> [0..1]
    <kml:text> ... </kml:text> [0..1]
    <kml:displayMode> ... </kml:displayMode> [0..1]
    <kml:BalloonStyleSimpleExtensionGroup> ...
</kml:BalloonStyleSimpleExtensionGroup> [0..*]
    <kml:BalloonStyleObjectExtensionGroup> ...
</kml:BalloonStyleObjectExtensionGroup> [0..*]
</kml:BalloonStyle>
```

12.6.2 Description

This element can be used wherever the following element is referenced:

- *kml:AbstractSubStyleGroup*

Specifies how the description balloon for a *kml:AbstractFeatureGroup* is drawn.

`kml:BalloonStyle` should contain at least one child element outside of an update context, that is when not a descendant of `kml:Update`.

12.6.3 Content

12.6.3.1 kml:bgColor

12.6.3.1.1 Description

Specifies the background color of the graphic element.

12.6.3.1.2 Content

    Type: kml:colorType
    Default Value: **ffffffff**

12.6.3.2 kml:textColor

12.6.3.2.1 Description

Specifies the foreground color of the text.

12.6.3.2.2 Content

    Type: kml:colorType
    Default Value: **ffffffff**

12.6.3.3 kml:text

12.6.3.3.1 Description

Specifies the text displayed in the balloon.

The text may include HTML content that is encoded as well-formed XML using HTML entity references or by enclosing the HTML within a CDATA section.

`kml:text` shall support entity substitution as defined in 6.5 Entity Replacement.

12.6.3.3.2 Content

Type: xsd:string
Default Value: none

12.6.3.4   kml:displayMode

12.6.3.4.1   Description

Controls whether the balloon is displayed or hidden. If kml:displayMode is **default**, the balloon shall be displayed. If kml:displayMode is **hide**, the balloon shall not be displayed.

12.6.3.4.2 Content

Type: kml:displayModeEnumType
Default Value: **default**

12.6.3.5   kml:BalloonStyleSimpleExtensionGroup

See 6.6.3.1 Simple Element Substitution.

12.6.3.6   kml:BalloonStyleObjectExtensionGroup

See 6.6.3.2 Complex Element Substitution.

12.6.4 Example

```
<kml xmlns="http://www.opengis.net/kml/2.2">
<Document>
  <name>BalloonStyle.kml</name>
  <open>1</open>
  <Style id="exampleBalloonStyle">
    <BalloonStyle>
      <!-- a background color for the balloon -->
      <bgColor>ffffffbb</bgColor>
      <!-- styling of the balloon text -->
      <text><![CDATA[
      <b><font color="#CC0000" size="+3">$[name]</font></b>
      <br/><br/>
      <font face="Courier">$[description]</font>
      <br/><br/>
      Extra text that will appear in the description balloon
      <br/><br/>
      <!-- insert the to/from hyperlinks -->
      $[geDirections]
      ]]></text>
    </BalloonStyle>
  </Style>
  <Placemark>
    <name>BalloonStyle</name>
    <description>An example of BalloonStyle</description>
    <styleUrl>#exampleBalloonStyle</styleUrl>
    <Point>
      <coordinates>-122.370533,37.823842,0</coordinates>
    </Point>
  </Placemark>
</Document>
</kml>
```

12.7 kml:AbstractColorStyleGroup

12.7.1 Structure

```
<kml:AbstractColorStyleGroup
 id="ID [0..1]"
 targetId="NCName [0..1]">
    <kml:AbstractObjectGroupSimpleExtensionGroup> ...
</kml:AbstractObjectGroupSimpleExtensionGroup> [0..*]
    <kml:AbstractSubStyleSimpleExtensionGroup> ...
</kml:AbstractSubStyleSimpleExtensionGroup> [0..*]
    <kml:AbstractSubStyleObjectExtensionGroup> ...
</kml:AbstractSubStyleObjectExtensionGroup> [0..*]
    <kml:color> ... </kml:color> [0..1]
    <kml:colorMode> ... </kml:colorMode> [0..1]
    <kml:AbstractColorStyleSimpleExtensionGroup> ...
</kml:AbstractColorStyleSimpleExtensionGroup> [0..*]
```

```
    <kml:AbstractColorStyleObjectExtensionGroup> ...
</kml:AbstractColorStyleObjectExtensionGroup> [0..*]
</kml:AbstractColorStyleGroup>
```

12.7.2 Description

Abstract: yes

This element can be used wherever the following element is referenced:

- *kml:AbstractSubStyleGroup*

The following elements can be used wherever this element is referenced:

- kml:IconStyle
- kml:LineStyle

- kml:LabelStyle
- kml:PolyStyle

Provides elements for specifying the color and color mode of style types that derive from it.

12.7.3 Content

12.7.3.1 kml:color

12.7.3.1.1 Description

Specifies the color of the graphic element.

12.7.3.1.2 Content

Type: kml:colorType
Default Value: **ffffffff**

12.7.3.2 kml:colorMode

12.7.3.2.1 Description

Specifies the color mode of the graphic element.

12.7.3.2.2 Content

Type: kml:colorModeEnumType
Default Value: **normal**

12.7.3.3   kml:AbstractColorStyleSimpleExtensionGroup

See 6.6.3.1 Simple Element Substitution.

12.7.3.4   kml:AbstractColorStyleObjectExtensionGroup

See 6.6.3.2 Complex Element Substitution.

12.8   kml:IconStyle

12.8.1   Structure

```
<kml:IconStyle
 id="ID [0..1]"
 targetId="NCName [0..1]">
    <kml:ObjectSimpleExtensionGroup> ... </kml:ObjectSimpleExtensionGroup> [0..*]
    <kml:AbstractSubStyleSimpleExtensionGroup> ...
</kml:AbstractSubStyleSimpleExtensionGroup> [0..*]
    <kml:AbstractSubStyleObjectExtensionGroup> ...
</kml:AbstractSubStyleObjectExtensionGroup> [0..*]
    <kml:color> ... </kml:color> [0..1]
    <kml:colorMode> ... </kml:colorMode> [0..1]
    <kml:AbstractColorStyleSimpleExtensionGroup> ...
</kml:AbstractColorStyleSimpleExtensionGroup> [0..*]
    <kml:AbstractColorStyleObjectExtensionGroup> ...
</kml:AbstractColorStyleObjectExtensionGroup> [0..*]
    <kml:scale> ... </kml:scale> [0..1]
    <kml:heading> ... </kml:heading> [0..1]
    <kml:Icon> kml:BasicLinkType </kml:Icon> [0..1]
    <kml:hotSpot> ... </kml:hotSpot> [0..1]
    <kml:IconStyleSimpleExtensionGroup> ... </kml:IconStyleSimpleExtensionGroup>
[0..*]
    <kml:IconStyleObjectExtensionGroup> ... </kml:IconStyleObjectExtensionGroup>
[0..*]
</kml:IconStyle>
```

12.8.2   Description

This element can be used wherever the following element is referenced:

- *kml:AbstractColorStyleGroup*

Specifies how icons for kml:Placemarks and kml:PhotoOverlay with a kml:Point geometry are drawn in an earth browser's list and geographic views. The color specified in the kml:color element of kml:IconStyle is blended with the color of the icon.

`kml:IconStyle` should contain at least one child element outside of an update context, that is when not a descendant of `kml:Update`.

12.8.3 Content

12.8.3.1 kml:scale

12.8.3.1.1 Description

Specifies a scale factor that shall be applied to the graphic element.

12.8.3.1.2 Content

Type:	xsd:double
Default Value:	1.0

12.8.3.2 kml:heading

12.8.3.2.1 Description

Direction (North, South, East, West), in decimal degrees. Values range from 0 (North) to 360 degrees.

12.8.3.2.2 Content

Type:	kml:angle360Type
Default Value:	0.0

12.8.3.3 kml:Icon

See 12.9 kml:Icon (kml:BasicLinkType).

12.8.3.4 kml:hotSpot

12.8.3.4.1 Description

Specifies the position of the reference point on the icon that is anchored to the `kml:Point` specified in the `kml:Placemark`. The origin of the image coordinate system is in the lower left corner of the icon.

12.8.3.4.2 Content

Type: kml:vec2Type
Default Value: See kml:vec2Type

12.8.3.5 kml:IconStyleSimpleExtensionGroup

See 6.6.3.1 Simple Element Substitution.

12.8.3.6 kml:IconStyleObjectExtensionGroup

See 6.6.3.2 Complex Element Substitution.

12.8.4 Example

```
<kml xmlns="http://www.opengis.net/kml/2.2">
<Document>
   <Style id="randomColorIcon">
      <IconStyle>
         <color>ff00ff00</color>
         <colorMode>random</colorMode>
         <scale>1.1</scale>
         <Icon>
            <href>http://maps.google.com/mapfiles/kml/pal3/icon21.png</href>
         </Icon>
      </IconStyle>
   </Style>
   <Placemark>
      <name>IconStyle.kml</name>
      <styleUrl>#randomColorIcon</styleUrl>
      <Point>
         <coordinates>-122.36868,37.831145,0</coordinates>
      </Point>
   </Placemark>
</Document>
</kml>
```

12.9   kml:Icon (kml:BasicLinkType)

12.9.1   Structure

```
<kml:Icon
 id="ID [0..1]"
 targetId="NCName [0..1]">
    <kml:ObjectSimpleExtensionGroup> ... </kml:ObjectSimpleExtensionGroup> [0..*]
    <kml:href> ... </kml:href> [0..1]
    <kml:BasicLinkSimpleExtensionGroup> ... </kml:BasicLinkSimpleExtensionGroup>
[0..*]
    <kml:BasicLinkObjectExtensionGroup> ... </kml:BasicLinkObjectExtensionGroup>
[0..*]
</kml:Icon>
```

12.9.2   Description

This element can be used wherever the following element is referenced:

- *kml:AbstractObjectGroup*

Specifies an icon resource location.

kml:Icon should contain the kml:href child element outside of an update context, that is when not a descendant of kml:Update.

12.9.3   Content

12.9.3.1   kml:href

12.9.3.1.1   Description

Specifies the the resource location as a URL. The URL may contain a fragment component that allows indirect identification of some portion or subset of a resource. As defined in RFC 3986, a fragment identifier is indicated by the presence of a number sign ("#") character and terminated by the end of the URL.

The format and semantics of a fragment identifier is dependent on the media type of the resource. The W3C XPointer framework specifies a standard syntax for referring to fragments of XML resources. An element within a KML resource may be referenced using a shorthand pointer that identifies at most one element; specifically, the kml:AbstractObjectGroup element (if any) that has a matching NCName as the value of the id attribute.

EXAMPLE: `http://www.example.org/path/kml-resource#placemark-1`

12.9.3.1.2   Content

    Type: xsd:string
    Default Value: none

12.9.3.2   kml:BasicLinkSimpleExtensionGroup

See 6.6.3.1 Simple Element Substitution.

12.9.3.3   kml:BasicLinkObjectExtensionGroup

See 6.6.3.2 Complex Element Substitution.

12.10   kml:LabelStyle

12.10.1   Structure

```
<kml:LabelStyle
 id="ID [0..1]"
 targetId="NCName [0..1]">
    <kml:ObjectSimpleExtensionGroup> ... </kml:ObjectSimpleExtensionGroup> [0..*]
    <kml:AbstractSubStyleSimpleExtensionGroup> ...
</kml:AbstractSubStyleSimpleExtensionGroup> [0..*]
    <kml:AbstractSubStyleObjectExtensionGroup> ...
</kml:AbstractSubStyleObjectExtensionGroup> [0..*]
    <kml:color> ... </kml:color> [0..1]
    <kml:colorMode> ... </kml:colorMode> [0..1]
    <kml:AbstractColorStyleSimpleExtensionGroup> ...
</kml:AbstractColorStyleSimpleExtensionGroup> [0..*]
    <kml:AbstractColorStyleObjectExtensionGroup> ...
</kml:AbstractColorStyleObjectExtensionGroup> [0..*]
    <kml:scale> ... </kml:scale> [0..1]
    <kml:LabelStyleSimpleExtensionGroup> ... </kml:LabelStyleSimpleExtensionGroup>
[0..*]
    <kml:LabelStyleObjectExtensionGroup> ... </kml:LabelStyleObjectExtensionGroup>
[0..*]
</kml:LabelStyle>
```

12.10.2   Description

This element can be used wherever the following element is referenced:

- *kml:AbstractColorStyleGroup*

Specifies how the name of a *kml:AbstractFeatureGroup* is drawn in the geographic view. A user-defined color, color mode, and scale for the value of the name can be specified.

kml:LabelStyle should contain at least one child element outside of an update context, that is when not a descendant of kml:Update.

12.10.3   Content

12.10.3.1   kml:scale

12.10.3.1.1   Description

Specifies a scale factor to be applied to the label.

12.10.3.1.2 Content

Type: xsd: double
Default Value: 1.0

12.10.4 Example

```
<kml xmlns="http://www.opengis.net/kml/2.2">
<Document>
   <Style id="randomLabelColor">
      <LabelStyle>
         <color>ff0000cc</color>
         <colorMode>random</colorMode>
         <scale>1.5</scale>
      </LabelStyle>
   </Style>
   <Placemark>
      <name>LabelStyle.kml</name>
      <styleUrl>#randomLabelColor</styleUrl>
      <Point>
         <coordinates>-122.367375,37.829192,0</coordinates>
      </Point>
   </Placemark>
</Document>
</kml>
```

12.11 kml:LineStyle

12.11.1 Structure

```
<kml:LineStyle
 id="ID [0..1]"
 targetId="NCName [0..1]">
    <kml:ObjectSimpleExtensionGroup> ... </kml:ObjectSimpleExtensionGroup> [0..*]
    <kml:AbstractSubStyleSimpleExtensionGroup> ...
</kml:AbstractSubStyleSimpleExtensionGroup> [0..*]
    <kml:AbstractSubStyleObjectExtensionGroup> ...
</kml:AbstractSubStyleObjectExtensionGroup> [0..*]
    <kml:color> ... </kml:color> [0..1]
    <kml:colorMode> ... </kml:colorMode> [0..1]
    <kml:AbstractColorStyleSimpleExtensionGroup> ...
</kml:AbstractColorStyleSimpleExtensionGroup> [0..*]
    <kml:AbstractColorStyleObjectExtensionGroup> ...
</kml:AbstractColorStyleObjectExtensionGroup> [0..*]
    <kml:width> ... </kml:width> [0..1]
    <kml:LineStyleSimpleExtensionGroup> ... </kml:LineStyleSimpleExtensionGroup>
[0..*]
    <kml:LineStyleObjectExtensionGroup> ... </kml:LineStyleObjectExtensionGroup>
[0..*]
</kml:LineStyle>
```

12.11.2 Description

This element can be used wherever the following element is referenced:

- *kml:AbstractColorStyleGroup*

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Specifies the drawing style (color, color mode, and line width) for all line geometry. Line geometry includes the `kml:Polygon` boundaries (`kml:LinearRings`) for which the applicable `kml:PolyStyle` outline element value is 1 or "true", and lines connecting extruded `kml:Placemarks` with a `kml:Point` geometry to the ground. Use `kml:LineStyle` to specify the color, color mode, and width of the line. For extruded `kml:LineStrings`, the line itself uses the current `kml:LineStyle`, and the extrusion uses the current `kml:PolyStyle`.

12.11.3 Content

12.11.3.1 kml:width

12.11.3.1.1 Description

Width of the line, in pixels.

12.11.3.1.2 Content

Type:	xsd:double
Default Value:	1.0

12.11.3.2 kml:LineStyleSimpleExtensionGroup

See 6.6.3.1 Simple Element Substitution.

12.11.3.3 kml:LineStyleObjectExtensionGroup

See 6.6.3.2 Complex Element Substitution.

12.11.4 Example

```
<kml xmlns="http://www.opengis.net/kml/2.2">
<Document>
  <name>LineStyle.kml</name>
  <open>1</open>
  <Style id="linestyleExample">
    <LineStyle>
      <color>7f0000ff</color>
      <width>4</width>
    </LineStyle>
  </Style>
  <Placemark>
    <name>LineStyle Example</name>
    <styleUrl>#linestyleExample</styleUrl>
    <LineString>
      <extrude>1</extrude>
      <tessellate>1</tessellate>
      <coordinates>
        -122.364383,37.824664,0 -122.364152,37.824322,0
      </coordinates>
    </LineString>
  </Placemark>
</Document>
</kml>
```

12.12 kml:PolyStyle

12.12.1 Structure

```
<kml:PolyStyle
 id="ID [0..1]"
 targetId="NCName [0..1]">
    <kml:ObjectSimpleExtensionGroup> ... </kml:ObjectSimpleExtensionGroup> [0..*]
    <kml:AbstractSubStyleSimpleExtensionGroup> ...
</kml:AbstractSubStyleSimpleExtensionGroup> [0..*]
    <kml:AbstractSubStyleObjectExtensionGroup> ...
</kml:AbstractSubStyleObjectExtensionGroup> [0..*]
    <kml:color> ... </kml:color> [0..1]
    <kml:colorMode> ... </kml:colorMode> [0..1]
    <kml:AbstractColorStyleSimpleExtensionGroup> ...
</kml:AbstractColorStyleSimpleExtensionGroup> [0..*]
    <kml:AbstractColorStyleObjectExtensionGroup> ...
</kml:AbstractColorStyleObjectExtensionGroup> [0..*]
    <kml:fill> ... </kml:fill> [0..1]
    <kml:outline> ... </kml:outline> [0..1]
    <kml:PolyStyleSimpleExtensionGroup> ... </kml:PolyStyleSimpleExtensionGroup>
[0..*]
    <kml:PolyStyleObjectExtensionGroup> ... </kml:PolyStyleObjectExtensionGroup>
[0..*]
</kml:PolyStyle>
```

12.12.2 Description

This element can be used wherever the following element is referenced:

- *kml:AbstractColorStyleGroup*

Specifies the drawing style for a kml:Polygon, including a kml:Polygon and the extruded portion of a kml:Polygon or kml:LineString.

kml:PolyStyle should contain at least one child element outside of an update context, that is when not a descendant of kml:Update.

12.12.3   Content

12.12.3.1   kml:fill

12.12.3.1.1   Description

Specifies whether to fill the polygon. 1 or true specifies to fill the polygon; 0 or false specifies to not fill the polygon.

12.12.3.1.2   Content

Type: xsd:boolean
Default Value: 1 or true

12.12.3.2   kml:outline

12.12.3.2.1   Description

Specifies whether to outline the polygon. 1 or true specifies to draw the polygon boundaries; 0 or false specifies to not draw the polygon boundaries.

NOTE: Polygon outlines are styled using the current LineStyle.

12.12.3.2.2   Content

Type: xsd:boolean
Default Value: 1 or true

12.12.3.3   kml:PolyStyleSimpleExtensionGroup

See 6.6.3.1 Simple Element Substitution.

12.12.3.4   kml:PolyStyleObjectExtensionGroup

See 6.6.3.2 Complex Element Substitution.

12.12.4 Example

```
<kml xmlns="http://www.opengis.net/kml/2.2">
<Document>
  <name>PolygonStyle.kml</name>
  <open>1</open>
  <Style id="examplePolyStyle">
    <PolyStyle>
      <color>ff0000cc</color>
      <colorMode>random</colorMode>
    </PolyStyle>
  </Style>
  <Placemark>
    <name>hollow box</name>
    <styleUrl>#examplePolyStyle</styleUrl>
    <Polygon>
      <extrude>1</extrude>
      <altitudeMode>relativeToGround</altitudeMode>
      <outerBoundaryIs>
        <LinearRing>
          <coordinates>
            -122.3662784465226,37.81884427772081,30
            -122.3652480684771,37.81926777010555,30
            -122.365640222455,37.81986126286519,30
            -122.36666937925,37.81942987753481,30
            -122.3662784465226,37.81884427772081,30
          </coordinates>
        </LinearRing>
      </outerBoundaryIs>
      <innerBoundaryIs>
        <LinearRing>
          <coordinates>
            -122.366212593918,37.81897719083808,30
            -122.3654241733188,37.81929450992014,30
            -122.3657048517827,37.81973175302663,30
            -122.3664882465854,37.81940249291773,30
            -122.366212593918,37.81897719083808,30
          </coordinates>
        </LinearRing>
      </innerBoundaryIs>
    </Polygon>
  </Placemark>
</Document>
</kml>
```

12.13 kml:ListStyle

12.13.1 Structure

```
<kml:ListStyle
 id="ID [0..1]"
 targetId="NCName [0..1]">
```

```
    <kml:ObjectSimpleExtensionGroup> ... </kml:ObjectSimpleExtensionGroup> [0..*]
    <kml:AbstractSubStyleSimpleExtensionGroup> ...
</kml:AbstractSubStyleSimpleExtensionGroup> [0..*]
    <kml:AbstractSubStyleObjectExtensionGroup> ...
</kml:AbstractSubStyleObjectExtensionGroup> [0..*]
    <kml:listItemType> ... </kml:listItemType> [0..1]
    <kml:bgColor> ... </kml:bgColor> [0..1]
    <kml:ItemIcon> ... </kml:ItemIcon> [0..*]
    <kml:maxSnippetLines> ... </kml: maxSnippetLines> [0..1]
    <kml:ListStyleSimpleExtensionGroup> ... </kml:ListStyleSimpleExtensionGroup>
[0..*]
    <kml:ListStyleObjectExtensionGroup> ... </kml:ListStyleObjectExtensionGroup>
[0..*]
</kml:ListStyle>
```

12.13.2 Description

This element can be used wherever the following element is referenced:

- *kml:AbstractColorStyleGroup*

Specifies how a *kml:AbstractFeatureGroup* is displayed in the list view.

kml:ListStyle should contain at least one child element outside of an update context, that is when not a descendant of kml:Update.

12.13.3 Content

12.13.3.1 kml:listItemType

12.13.3.1.1 Description

Specifies how a kml:Folder and its contents shall be displayed as items in the list view.

12.13.3.1.2 Content

Type:	kml:listItemTypeEnumType
Default Value:	**check**

12.13.3.2 kml:bgColor

See 12.6.3.1 kml:bgColor.

12.13.3.3 kml:ItemIcon

12.13.3.3.1 Description

Icons used in the list view to reflects the state of a `kml:Folder` or `kml:NetworkLink` fetch. Multiple `kml:ItemIcon` elements may be encoded to associate each state with a unique icon.

See 12.14 kml:ItemIcon.

12.13.3.4 kml:maxSnippetLines

12.13.3.4.1 Description

Specifies the maximum number of lines to display for the *kml:AbstractFeatureGroup* `kml:snippet` value in the list view.

12.13.3.4.2 Content

> Type: xsd:int
> Default Value: 2

12.13.3.5 kml:ListStyleSimpleExtensionGroup

See 6.6.3.1 Simple Element Substitution.

12.13.3.6 kml:ListStyleObjectExtensionGroup

See 6.6.3.2 Complex Element Substitution.

12.13.4 Example

```
<kml xmlns="http://www.opengis.net/kml/2.2">
<Document>
  <name>ListStyle.kml</name>
  <open>1</open>
  <Style id="bgColorExample">
    <ListStyle>
      <bgColor>ff336699</bgColor>
    </ListStyle>
  </Style>
  <Style id="checkHideChildrenExample">
    <ListStyle>
      <listItemType>checkHideChildren</listItemType>
    </ListStyle>
  </Style>
  <Style id="radioFolderExample">
    <ListStyle>
      <listItemType>radioFolder</listItemType>
    </ListStyle>
  </Style>
  <Folder>
    <name>ListStyle Examples</name>
    <open>1</open>
    <Folder>
      <name>bgColor example</name>
      <open>1</open>
       <styleUrl>#bgColorExample</styleUrl>
      <Placemark>
        <name>pl1</name>
        <Point>
          <coordinates>-122.362815,37.822931,0</coordinates>
        </Point>
      </Placemark>
      <Placemark>
        <name>pl2</name>
        <Point>
          <coordinates>-122.362825,37.822931,0</coordinates>
        </Point>
      </Placemark>
      <Placemark>
        <name>pl3</name>
        <Point>
          <coordinates>-122.362835,37.822931,0</coordinates>
        </Point>
      </Placemark>
    </Folder>
    <Folder>
      <name>checkHideChildren example</name>
      <open>1</open>
      <styleUrl>#checkHideChildrenExample</styleUrl>
      <Placemark>
        <name>pl4</name>
        <Point>
          <coordinates>-122.362845,37.822941,0</coordinates>
        </Point>
      </Placemark>
      <Placemark>
```

```
          <name>pl5</name>
          <Point>
            <coordinates>-122.362855,37.822941,0</coordinates>
          </Point>
        </Placemark>
        <Placemark>
          <name>pl6</name>
          <Point>
            <coordinates>-122.362865,37.822941,0</coordinates>
          </Point>
        </Placemark>
      </Folder>
      <Folder>
        <name>radioFolder example</name>
        <open>1</open>
        <styleUrl>#radioFolderExample</styleUrl>
        <Placemark>
          <name>pl7</name>
          <Point>
            <coordinates>-122.362875,37.822951,0</coordinates>
          </Point>
        </Placemark>
        <Placemark>
          <name>pl8</name>
          <Point>
            <coordinates>-122.362885,37.822951,0</coordinates>
          </Point>
        </Placemark>
        <Placemark>
          <name>pl9</name>
          <Point>
            <coordinates>-122.362895,37.822951,0</coordinates>
          </Point>
        </Placemark>
      </Folder>
    </Folder>
</Document>
</kml>
```

12.14 kml:ItemIcon

12.14.1 Structure

```
<kml:ItemIcon
 id="ID [0..1]"
 targetId="NCName [0..1]">
    <kml:ObjectSimpleExtensionGroup> ... </kml:ObjectSimpleExtensionGroup> [0..*]
    <kml:state> ... </kml:state> [0..1]
    <kml:href> ... </kml:href> [0..1]
    <kml:ItemIconSimpleExtensionGroup> ... </kml:ItemIconSimpleExtensionGroup>
[0..*]
```

```
    <kml:ItemIconObjectExtensionGroup> ... </kml:ItemIconObjectExtensionGroup>
[0..*]
</kml:ItemIcon>
```

12.14.2 Description

This element can be used wherever the following element is referenced:

- *kml:AbstractObjectGroup*

Specifies the location (kml:href) for an icon used in the list view to reflect the state (kml:state) of the kml:Folder or kml:NetworkLink to which it is associated.

kml:ItemIcon shall contain the kml:href element outside of an update context, that is when not a descendant of kml:Update.

12.14.3 Content

12.14.3.1 kml:state

12.14.3.1.1 Description

Specifies the current state of the kml:NetworkLink or kml:Folder. Icons associated with the **open** and **closed** modes are used for kml:Folders. Icons associated with the **error** and **fetching0**, **fetching1**, and **fetching2** modes are used for kml:NetworkLinks. Sample icons for each state are shown in the following diagram.
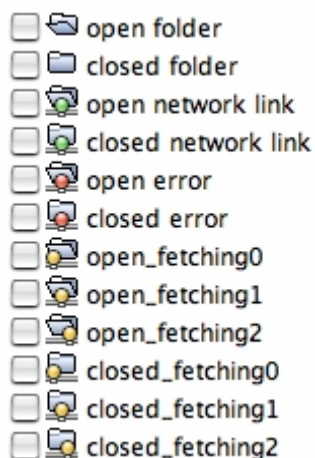
12.14.3.1.2 Content

Type: kml:itemIconStateType
Default Value: none

12.14.3.2 kml:href

See 12.9.3.1 kml:href.

12.14.3.3 kml:ItemIconSimpleExtensionGroup

See 6.6.3.1 Simple Element Substitution.

12.14.3.4 kml:ItemIconObjectExtensionGroup

See 6.6.3.2 Complex Element Substitution.

13 Links

13.1 kml:Link, kml:Icon (kml:LinkType)

13.1.1 Structure

```
<kml:Link
 id="ID [0..1]"
 targetId="NCName [0..1]">
    <kml:ObjectSimpleExtensionGroup> ... </kml:ObjectSimpleExtensionGroup> [0..*]
    <kml:href> ... </kml:href> [0..1]
    <kml:BasicLinkSimpleExtensionGroup> ... </kml:BasicLinkSimpleExtensionGroup>
[0..*]
    <kml:BasicLinkObjectExtensionGroup> ... </kml:BasicLinkObjectExtensionGroup>
[0..*]
    <kml:refreshMode> ... </kml:refreshMode> [0..1]
    <kml:refreshInterval> ... </kml:refreshInterval> [0..1]
    <kml:viewRefreshMode> ... </kml:viewRefreshMode> [0..1]
    <kml:viewRefreshTime> ... </kml:viewRefreshTime> [0..1]
    <kml:viewBoundScale> ... </kml:viewBoundScale> [0..1]
    <kml:viewFormat> ... </kml:viewFormat> [0..1]
    <kml:httpQuery> ... </kml:httpQuery> [0..1]
    <kml:LinkSimpleExtensionGroup> ... </kml:LinkSimpleExtensionGroup> [0..*]
    <kml:LinkObjectExtensionGroup> ... </kml:LinkObjectExtensionGroup> [0..*]
</kml:Link>
```

```
<kml:Icon
 id="ID [0..1]"
 targetId="NCName [0..1]">
    <kml:ObjectSimpleExtensionGroup> ... </kml:ObjectSimpleExtensionGroup> [0..*]
    <kml:href> ... </kml:href> [0..1]
    <kml:BasicLinkSimpleExtensionGroup> ... </kml:BasicLinkSimpleExtensionGroup>
[0..*]
    <kml:BasicLinkObjectExtensionGroup> ... </kml:BasicLinkObjectExtensionGroup>
[0..*]
    <kml:refreshMode> ... </kml:refreshMode> [0..1]
    <kml:refreshInterval> ... </kml:refreshInterval> [0..1]
    <kml:viewRefreshMode> ... </kml:viewRefreshMode> [0..1]
    <kml:viewRefreshTime> ... </kml:viewRefreshTime> [0..1]
    <kml:viewBoundScale> ... </kml:viewBoundScale> [0..1]
    <kml:viewFormat> ... </kml:viewFormat> [0..1]
    <kml:httpQuery> ... </kml:httpQuery> [0..1]
    <kml:LinkSimpleExtensionGroup> ... </kml:LinkSimpleExtensionGroup> [0..*]
    <kml:LinkObjectExtensionGroup> ... </kml:LinkObjectExtensionGroup> [0..*]
</kml:Icon>
```

13.1.2 Description

This element can be used wherever the following element is referenced:

- *kml:AbstractObjectGroup*

NOTE: The schema type for kml:Link and kml:Icon derives by extension from
          kml:BasicLinkType, whose content model is described in 12.9 kml:Icon
          (kml:BasicLinkType).

kml:Link and kml:Icon have the same content model. They both specify the location
(kml:href) and handling of a resource. For both elements kml:href shall be specified when
not being used feature update context, that is when not a descendant of kml:Update.

The resource should be loaded and refreshed according to the refresh parameters supplied.
Two different sets of refresh parameters can be specified: one based on time
(kml:refreshMode and kml:refreshInterval) and one based on the current view
(kml:viewRefreshMode and kml:viewRefreshTime).

In addition, kml:Link and kml:Icon specifies whether to scale any bounding box parameters
(kml:viewBoundScale), and provides a set of optional viewing parameters
(kml:viewFormat) as well as a set of optional parameters containing version and language
information (kml:httpQuery).

The valid URL request shall be the concatenation of three pieces of information:

- the kml:href (URL) that specifies the resource location;

- the `kml:viewFormat` string value used to specify any view parameters;

- the `kml:httpQuery` string value used to specify any other query parameters.

An earth browser shall substitute relevant values for query parameters within the URL request.

If `kml:viewFormat` or `kml:httpQuery` are specified, they should contain at least one parameter.

If the resource specified in `kml:href` is a local resource, the `kml:viewFormat` and `kml:httpQuery` elements shall be ignored.

`kml:Link` and `kml:Icon` shall contain the `kml:href` child element outside of an update context, that is when not a descendant of `kml:Update`.

13.1.3   Content

13.1.3.1   kml:href

See 12.9.3.1 kml:href.

13.1.3.2   kml:refreshMode

13.1.3.2.1   Description

Specifies a time-based refresh mode.

If a fetched resource has a `kml:NetworkLinkControl`, the `expires` time takes precedence over expiration times specified in HTTP headers.

If no `expires` time is specified, the HTTP *max-age* header is used (if present). If *max-age* is not present, the *Expires* HTTP header is used (if present). See RFC 2616.

If `kml:refreshInterval` is specified then `kml:refreshMode` should be set to **onInterval**. If `kml:viewRefreshTime` is specified then `kml:refreshMode` should be set to **onStop**.

13.1.3.2.2   Content

Type:	kml:refreshModeEnumType
Default Value:	**onChange**

13.1.3.3   kml:refreshInterval

13.1.3.3.1   Description

Indicates to refresh the resource every *n* seconds. The value shall be positive.

Content

Type:	xsd:double
Default Value:	4.0

13.1.3.4   kml:viewRefreshMode

13.1.3.4.1   Description

Specifies how the link is refreshed when the geographic view changes.

13.1.3.4.2   Content

Type:	kml:viewRefreshModeEnumType
Default Value:	**never**

13.1.3.5   kml:viewRefreshTime

13.1.3.5.1   Description

Specifies the number of seconds to wait before refreshing the geographic view after camera movement stops. This applies when `kml:viewRefreshMode` is set to **onStop**. The value shall be positive.

13.1.3.5.2   Content

Type:	xsd:double
Default Value:	4.0

13.1.3.6　kml:viewBoundScale

13.1.3.6.1　Description

Scales any bounding box parameters. A value less than 1 specifies to use a geographic area less than the current geographic view. A value greater than 1 specifies to use a geographic area greater than the current geographic view. . The value shall be positive.

13.1.3.6.2　Content

Type:　　　　　　　xsd:double
Default Value:　　　1.0

13.1.3.7　kml:viewFormat

13.1.3.7.1　Description

Specifies the format of a query string related to view parameters that is appended to the `kml:href` before the resource is fetched. The following query parameters may be used:

- **[lookatLon]**, **[lookatLat]** – longitude and latitude of the point that `kml:LookAt` is viewing

- **[lookatRange]**, **[lookatTilt]**, **[lookatHeading]** – values used by the `kml:LookAt` element (see descriptions of `kml:range`, `kml:tilt`, and `kml:heading` in `kml:LookAt`)

- **[lookatTerrainLon]**, **[lookatTerrainLat]**, **[lookatTerrainAlt]** – point on the terrain in decimal degrees/meters that `kml:LookAt` is viewing

- **[cameraLon]**, **[cameraLat]**, **[cameraAlt]** – decimal degrees/meters of the eyepoint for the camera

- **[horizFov]**, **[vertFov] –** horizontal, vertical field of view for the camera

- **[horizPixels]**, **[vertPixels]** – size in pixels of the geographic view

- **[terrainEnabled]** – indicates whether the geographic view is showing terrain

- **[bboxWest], [bboxSouth], [bboxEast], [bboxNorth]** – bounding box limits matching the OGC Web Map Service (WMS) bounding box specification.

13.1.3.7.2 Content

Type: xsd:string
Default Value: none

13.1.3.8 kml:httpQuery

13.1.3.8.1 Description

String value used to specify any additional query parameters not related to the geographic view.

13.1.3.8.2 Content

Type: xsd:string
Default Value: none

The following query parameters may be used:

- **[clientVersion]** – version of earth browser client

- **[kmlVersion]** – version of requested kml

- **[clientName]** – name of earth browser client

- **[language]** – language preference of the earth browser client

13.1.3.9 kml:LinkSimpleExtensionGroup

See 6.6.3.1 Simple Element Substitution.

13.1.3.10 kml:LinkObjectExtensionGroup

See 6.6.3.2 Complex Element Substitution.

13.1.4   Example

```
<NetworkLink>
  <name>NE US Radar</name>
  <flyToView>1</flyToView>
  <Link>
    <href>http://www.example.com/geotiff/NE/MergedReflectivityQComposite.kml</href>
    <refreshMode>onInterval</refreshMode>
    <refreshInterval>30</refreshInterval>
    <viewRefreshMode>onStop</viewRefreshMode>
    <viewRefreshTime>7</viewRefreshTime>
    <viewFormat>BBOX=[bboxWest],[bboxSouth],[bboxEast],[bboxNorth];CAMERA=\
      [lookatLon],[lookatLat],[lookatRange],[lookatTilt],[lookatHeading];VIEW=\
      [horizFov],[vertFov],[horizPixels],[vertPixels],[terrainEnabled]</viewFormat>
  </Link>
</NetworkLink>
```

13.2   kml:NetworkLinkControl

13.2.1   Structure

```
<kml:NetworkLinkControl>
    <kml:minRefreshPeriod> ... </kml:minRefreshPeriod> [0..1]
    <kml:maxSessionLength> ... </kml:maxSessionLength> [0..1]
    <kml:cookie> ... </kml:cookie> [0..1]
    <kml:message> ... </kml:message> [0..1]
    <kml:linkName> ... </kml:linkName> [0..1]
    <kml:linkDescription> ... </kml:linkDescription> [0..1]
    <kml:linkSnippet> ... </kml:linkSnippet> [0..1]
    <kml:expires> ... </kml:expires> [0..1]
    <kml:Update> ... </kml:Update> [0..1]
    <kml:AbstractViewGroup> ... </kml:AbstractViewGroup> [0..1]
    <kml:NetworkLinkControlSimpleExtensionGroup> ...
</kml:NetworkLinkControlSimpleExtensionGroup> [0..*]
    <kml:NetworkLinkControlObjectExtensionGroup> ...
</kml:NetworkLinkControlObjectExtensionGroup> [0..*]
</kml:NetworkLinkControl>
```

13.2.2   Description

Controls the behaviour of a kml:NetworkLink that references the KML resource to which the *kml:NetworkLinkControl* belongs.

See also 9.12 kml:NetworkLink.

13.2.3 Content

13.2.3.1 kml:minRefreshPeriod

13.2.3.1.1 Description

Specifies in seconds the minimum allowed time between refreshes of the referenced KML resource. The value shall take precedence over the `kml:refreshInterval` element value specified by the `kml:NetworkLink`.

13.2.3.1.2 Content

Type: xsd:double
Default Value: 0.0

13.2.3.2 kml:maxSessionLength

13.2.3.2.1 Description

Specifies in seconds the maximum time that an earth browser shall remain connected to the referenced KML resource. The default value of -1 indicates not to terminate the session explicitly.

13.2.3.2.2 Content

Type: xsd: double
Default Value: -1.0

13.2.3.3 kml:cookie

13.2.3.3.1 Description

Use this element to append a string to the `kml:NetworkLink` URL query.

13.2.3.3.2 Content

Type: xsd:string
Default Value: none

13.2.3.4   kml:message

13.2.3.4.1   Description

Text that should be displayed when a `kml:NetworkLink` is first activated or the `kml:message` value is updated.

13.2.3.4.2   Content

    Type: xsd:string
    Default Value: none

13.2.3.5   kml:linkName

13.2.3.5.1   Description

Specifies valid content for the `kml:NetworkLink kml:name` element. The `kml:linkName` value shall take precedence over the value of `kml:name` value.

13.2.3.5.2   Content

    Type: xsd:string
    Default Value: none

13.2.3.6   kml:linkDescription

13.2.3.6.1   Description

Specifies text for the `kml:NetworkLink kml:description` element. The `kml:linkDescription` value shall take precedence over the `kml:NetworkLink kml:description` value.

The text may include HTML content that is encoded as well-formed XML using HTML entity references or by enclosing the HTML within a CDATA section.

13.2.3.6.2   Content

    Type: xsd:string
    Default Value: none

13.2.3.7   kml:linkSnippet

13.2.3.7.1   Description

Specifies text for the `kml:NetworkLink kml:Snippet` element. The `kml:linkSnippet` content shall take precedence over the `kml:NetworkLink kml:Snippet` value.

The text may include HTML content that is encoded as well-formed XML using HTML entity references or by enclosing the HTML within a CDATA section.

See also 9.1.3.9 kml:snippet.

13.2.3.7.2   Content

    Type: xsd:string
    Default Value: none

13.2.3.8   kml:expires

13.2.3.8.1   Description

Specifies a point in time at which the `kml:NetworkLink` shall be refreshed. It applies only if an associated `kml:Link` refreshMode *value* is **onExpire**.

13.2.3.8.2   Content

    Type: kml:dateTimeType
    Default Value: none

13.2.3.9   kml:Update

See 13.3 kml:Update.

13.2.3.10   kml:AbstractViewGroup

See 14.1 AbstractViewGroup.

13.2.3.11   kml:NetworkLinkControlSimpleExtensionGroup

See 6.6.3.1 Simple Element Substitution.

13.2.3.12 kml:NetworkLinkControlObjectExtensionGroup

See 6.6.3.2 Complex Element Substitution.

13.2.4 Example

```
<kml xmlns="http://www.opengis.net/kml/2.2">
  <NetworkLinkControl>
     <message>This is a pop-up message. You will only see this once</message>
     <cookie>cookie=sometext</cookie>
     <linkName>New KML features</linkName>
     <linkDescription><![CDATA[KML now has new features
                      available!]]></linkDescription>
  </NetworkLinkControl>
</kml>
```

13.3 kml:Update

13.3.1 Structure

```
<kml:Update>
    <kml:targetHref> anyURI </kml:targetHref> [1]
    Start Choice [1..*]
        <kml:Create> ... </kml:Create> [1]
        <kml:Delete> ... </kml:Delete> [1]
        <kml:Change> ... </kml:Change> [1]
        <kml:UpdateOpExtensionGroup> ... </kml:UpdateOpExtensionGroup> [1]
    End Choice
    <kml:UpdateExtensionGroup> ... </kml:UpdateExtensionGroup> [0..*]
</kml:Update>
```

13.3.2 Description

Specifies an addition, change, or deletion to a KML resource that has previously been retrieved via kml:NetworkLink.

NOTE: Update does not affect the KML resource itself; rather it updates its representation within the earth browser only.

All KML objects within an update context, that is a grandchild of the kml:Update element shall include a targetId attribute that identifies the object to be updated, and shall not have an id attribute.

kml:Update shall have at least one child element.

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13.3.3   Content

13.3.3.1   kml:targetHref

13.3.3.1.1   Description

Specifies the URL for the target KML resource that has been previously retrieved via `kml:NetworkLink.`

13.3.3.1.2   Content

    Type: xsd:anyURI
    Default Value: none

13.3.3.2   kml:Create

See 13.4 kml:Create.

13.3.3.3   kml:Delete

See 13.5 kml:Delete.

13.3.3.4   kml:Change

See 13.6 kml:Change.

13.3.3.5   kml:UpdateOpExtensionGroup

See 6.6.3.2 Complex Element Substitution.

13.3.3.6   kml:UpdateExtensionGroup

See 6.6.3.2 Complex Element Substitution.

13.4   kml:Create

13.4.1   Structure

```
<kml:Create>
    <kml:AbstractContainerGroup> ... </kml:AbstractContainerGroup> [0..*]
</kml:Create>
```

13.4.2   Description

Specifies the addition of zero or more *kml:AbstractFeatureGroup* elements to an identified kml:Folder or kml:Document in the target resource.

The kml:Folder or kml:Document shall be identified as a child of the kml:Create element and shall include the kml:targetId attribute, and omit the id attribute.New *kml:AbstractFeatureGroup* elements to be added to the identified kml:Folder or kml:Document are specified as the content of this child.

The kml:targetHref for a created *kml:AbstractFeatureGroup* is the same as that of the target KML resource.

13.4.3   Content

13.4.3.1   kml:AbstractContainerGroup

See 9.6 kml:AbstractContainerGroup.

13.4.4   Example

This example creates a new kml:Placemark in a previously created kml:Document that has an id of region24. Note that to make subsequent updates to placemark891, http://myserver.com/Point.kml is used as the kml:targetHref value.

```
<Update>
  <targetHref>http://myserver.com/Point.kml</targetHref>
  <Create>
    <Document targetId="region24">
      <Placemark id="placemark891">
        <Point>
          <coordinates>-95.48,40.43,0</coordinates>
        </Point>
      </Placemark>
    </Document>
  </Create>
</Update>
```

13.5   kml:Delete

13.5.1   Structure

```
<kml:Delete>
    <kml:AbstractFeatureGroup> ... </kml:AbstractFeatureGroup> [0..*]
</kml:Delete>
```

13.5.2   Description

Specifies the deletion of zero or more *kml:AbstractFeatureGroup* elements in the target resource.

Features shall be identified as children of the kml:Create element and shall include the kml:targetId attribute and omit the id attribute.

13.5.3   Content

13.5.3.1   kml:AbstractFeatureGroup

See 9.1 kml:AbstractFeatureGroup.

13.5.4   Example

This example deletes a kml:Placemark previously loaded into an earth browser. This kml:Placemark may have been loaded directly by a kml:NetworkLink with the specified URL, or it may have been loaded by a subsequent kml:Update to the original kml:Document.

```
<Update>
  <targetHref>http://www.foo.com/Point.kml</targetHref>
  <Delete>
    <Placemark targetId="pa3556"></>
  </Delete>
</Update>
```

13.6   kml:Change

13.6.1   Structure

```
<kml:Change>
    <kml:AbstractObjectGroup> ... </kml:AbstractObjectGroup> [0..*]
</kml:Change>
```

13.6.2   Description

Specifies modifications to zero or more identified *kml:AbstractObjectGroup* elements in the target resource.

Target elements to be modified are identified as children of the kml:Change element and shall include the kml:targetId attribute and omit the id attribute. Modifications to the identified *kml:AbstractObjectGroup* are specified by the content of these children.

The content of identified target elements not subject to modification shall remain unchanged.

13.6.3   Content

13.6.3.1   kml:AbstractObjectGroup

See 8.1 kml:AbstractObjectGroup.

13.6.3.2   kml:NetworkLinkControlSimpleExtensionGroup

See 6.6.3.1 Simple Element Substitution.

13.6.3.3   kml:NetworkLinkControlObjectExtensionGroup

See 6.6.3.2 Complex Element Substitution.

13.6.4 Example

```
<NetworkLinkControl>
  <Update>
    <targetHref>http://www/~sam/January14Data/Point.kml</targetHref>
    <Change>
      <Point targetId="point123">
        <coordinates>-95.48,40.43,0</coordinates>
      </Point>
    </Change>
  </Update>
</NetworkLinkControl>
```

14 Views

14.1   kml:AbstractViewGroup

14.1.1   Structure

```
<kml:AbstractViewGroup
 id="ID [0..1]"
 targetId="NCName [0..1]">
    <kml:AbstractObjectGroupSimpleExtensionGroup> ...
</kml:AbstractObjectGroupSimpleExtensionGroup> [0..*]
    <kml:AbstractViewSimpleExtensionGroup> ...
</kml:AbstractViewSimpleExtensionGroup> [0..*]
    <kml:AbstractViewObjectExtensionGroup> ...
</kml:AbstractViewObjectExtensionGroup> [0..*]
</kml:AbstractViewGroup>
```

14.1.2   Description

Abstract: yes

This element can be used wherever the following element is referenced:

- *kml:AbstractObjectGroup*

The following elements can be used wherever this element is referenced:

- kml:LookAt
- kml:Camera

An earth browser displays KML graphics overlaid on a backdrop image which is typically that of the earth. In addition to describing the overlaid graphic elements, KML can define a geographic view of the overlaid graphics and the backdrop image.

14.1.3   Content

14.1.3.1   kml:AbstractViewSimpleExtensionGroup

See 6.6.3.1 Simple Element Substitution.

14.1.3.2   kml:AbstractViewObjectExtensionGroup

See 6.6.3.2 Complex Element Substitution.

14.2   kml:Camera

14.2.1   Structure

```
<kml:Camera
 id="ID [0..1]"
 targetId="NCName [0..1]">
    <kml:ObjectSimpleExtensionGroup> ... </kml:ObjectSimpleExtensionGroup> [0..*]
    <kml:AbstractViewSimpleExtensionGroup> ...
</kml:AbstractViewSimpleExtensionGroup> [0..*]
    <kml:AbstractViewObjectExtensionGroup> ...
</kml:AbstractViewObjectExtensionGroup> [0..*]
    <kml:longitude> ... </kml:longitude> [0..1]
    <kml:latitude> ... </kml:latitude> [0..1]
    <kml:altitude> ... </kml:altitude> [0..1]
    <kml:heading> ... </kml:heading> [0..1]
    <kml:tilt> ... </kml:tilt> [0..1]
    <kml:roll> ... </kml:roll> [0..1]
    <kml:altitudeModeGroup> ... </kml:altitudeModeGroup> [0..1]
    <kml:CameraSimpleExtensionGroup> ... </kml:CameraSimpleExtensionGroup> [0..*]
    <kml:CameraObjectExtensionGroup> ... </kml:CameraObjectExtensionGroup> [0..*]
</kml:Camera>
```

14.2.2   Description

This element can be used wherever the following element is referenced:

- *kml:AbstractViewGroup*

The kml:Camera element specifies the position and orientation of a virtual camera. This can be used to specify views of the earth or of objects in space.

A kml:Camera element should contain the kml:longitude, kml:latitude, and kml:altitude child elements outside of an update context, that is when not a descendant of kml:Update.

14.2.3   Defining a View

The kml:Camera element specifies the position of the view point of the camera using the child elements kml:longitude, kml:latitude, kml:altitude and kml:altitudeMode. The orientation of the camera is specified using the additional child elements kml:heading, kml:tilt and kml:roll.

The initial or zero position of the camera is defined by an earth-fixed frame lying in a meridian plane (plane containing the view point, the poles, and the earth's center of mass),

with the Z'-axis normal to the earth's surface, the Y'-axis directed away from the equator, and the X'-axis such as to form a right handed orthogonal frame.

A body-fixed reference frame is assumed attached to the virtual camera, with the Z-axis along the optical axis of the camera, the Y-axis through the top of the camera, and the X-axis such as to form a right handed orthogonal frame. In the zero position of the camera, the camera body Z-axis is aligned with the –Z' axis and the body Y axis with the Y' axis. The orientation of the camera is then defined by the following sequence of rotations (Euler angles) which must be performed in the stated order:

- `kml:altitude` – translate along the Z' axis to the specified altitude.

- `kml:heading` – clockwise rotation around the Z axis. The range of the heading is from 0 to 360 degrees.

- `kml:tilt` – counter clockwise rotation around the X axis. The range of the tilt is from -180 to + 180 degrees.

- `kml:roll` – clockwise around the Z axis (again). The range of the roll is from -180 to +180 degrees

The camera body axes are shown as follows:
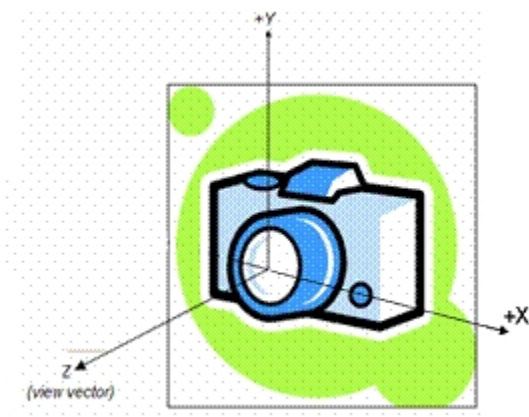
The earth-fixed frame specifying the initial (zero) orientation of the camera is illustrated below:

14.2.4   Order of Rotation

The order of rotation is important. By default, the camera shall look straight down the Z axis towards the Earth. The order of rotation is:

1. `kml:heading` – rotate around the Z axis.

5. `kml:tilt` – rotate around the X axis.

6. `kml:roll` – rotate around the Z axis (again).

The camera's view direction is a vector that is computed from these three rotations. Note that each time a rotation is applied, two of the camera axes shall change their orientation.

Heading (Rotation about Z):
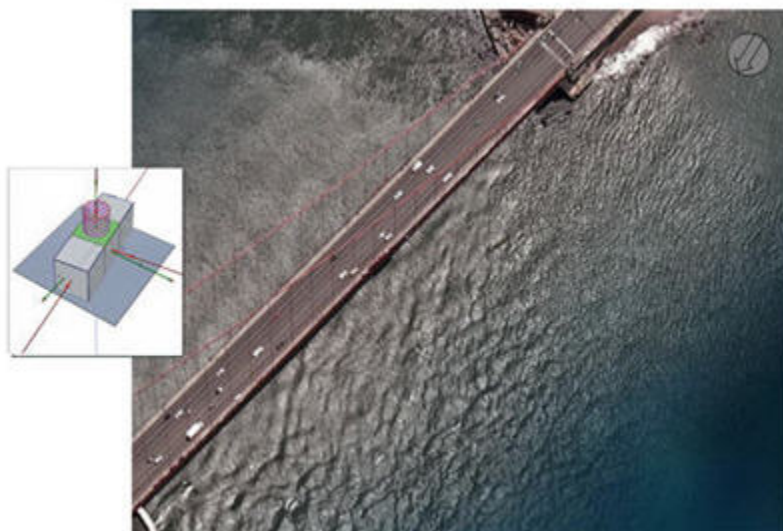
Tilt (Rotation about X):
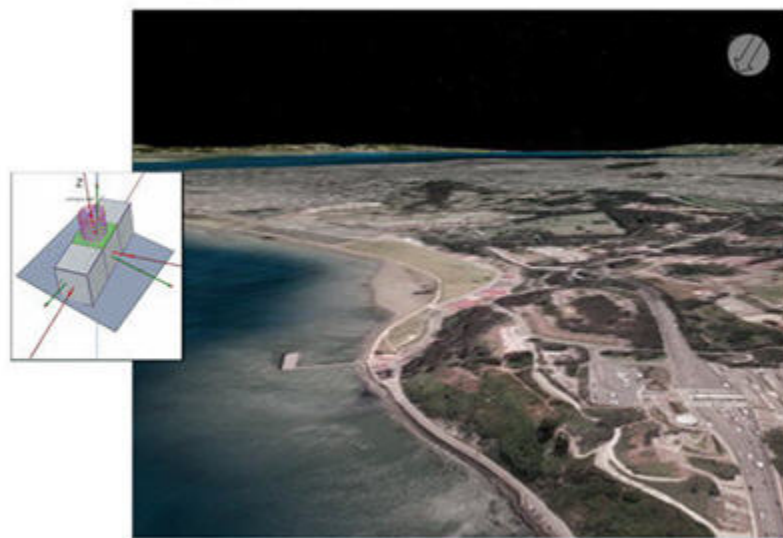
Roll (Rotation about Z again)
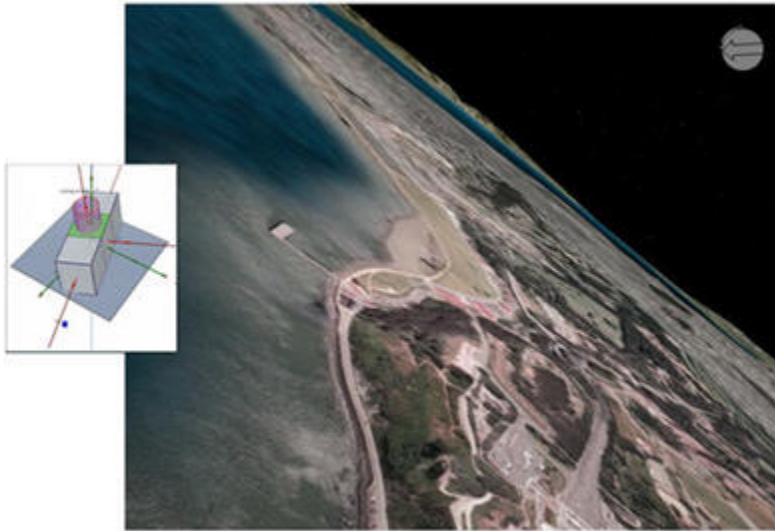
14.2.5   Content

14.2.5.1   kml:longitude

14.2.5.1.1   Description

Geodetic longitude of the virtual camera (eye point). Angular distance in decimal degrees, relative to the Prime Meridian. Values west of the Meridian range from −180 to 0 degrees. Values east of the Meridian range from 0 to 180 degrees.

14.2.5.1.2   Content

    Type: kml:angle180Type
    Default Value: 0.0

14.2.5.2 kml:latitude

14.2.5.2.1 Description

Geodetic latitude of the virtual camera. Decimal degrees north or south of the Equator (0 degrees). Values range from −90 degrees to 90 degrees.

14.2.5.2.2 Content

Type: kml:angle90Type
Default Value: 0.0

14.2.5.3 kml:altitude

14.2.5.3.1 Description

Distance of the camera from the Earth's surface, in meters, interpreted according to the `kml:altitudeMode` specification.

14.2.5.3.2 Content

Type: xsd:double
Default Value: 0.0

14.2.5.4 kml:heading

14.2.5.4.1 Description

Direction (azimuth) of the camera, in decimal degrees. Values range from 0 (North) to 360 degrees.

14.2.5.4.2 Content

Type: kml:angle360Type
Default Value: 0.0

14.2.5.5   kml:tilt

14.2.5.5.1   Description

Rotation, in decimal degrees, of the camera around the X axis. A value of 0 indicates that the view is aimed straight down toward the earth (the most common case). A value of 90 for `kml:tilt` indicates that the view is aimed toward the horizon. Values greater than 90 indicate that the view is pointed up into the sky. Values for `kml:tilt` are clamped at +180 degrees.

14.2.5.5.2   Content

Type:	kml:angle180Type
Default Value:	0.0

14.2.5.6   kml:roll

14.2.5.6.1   Description

Rotation, in decimal degrees, of the camera around the Z axis. Values range from −180 to +180 degrees.

14.2.5.6.2   Content

Type:	kml:angle180Type
Default Value:	0.0

14.2.5.7   kml:altitudeModeGroup

See 9.16 kml:altitudeModeGroup and 9.17 kml:altitudeMode.

14.2.5.8   kml:CameraSimpleExtensionGroup

See 6.6.3.1 Simple Element Substitution.

14.2.5.9   kml:CameraObjectExtensionGroup

See 6.6.3.2 Complex Element Substitution.

14.3   kml:LookAt

14.3.1   Structure

```
<kml:LookAt
 id="ID [0..1]"
 targetId="NCName [0..1]">
    <kml:ObjectSimpleExtensionGroup> ... </kml:ObjectSimpleExtensionGroup> [0..*]
    <kml:AbstractViewSimpleExtensionGroup> ...
</kml:AbstractViewSimpleExtensionGroup> [0..*]
    <kml:AbstractViewObjectExtensionGroup> ...
</kml:AbstractViewObjectExtensionGroup> [0..*]
    <kml:longitude> ... </kml:longitude> [0..1]
    <kml:latitude> ... </kml:latitude> [0..1]
    <kml:altitude> ... </kml:altitude> [0..1]
    <kml:heading> ... </kml:heading> [0..1]
    <kml:tilt> ... </kml:tilt> [0..1]
    <kml:range> ... </kml:range> [0..1]
    <kml:altitudeModeGroup> ... </kml:altitudeModeGroup> [0..1]
    <kml:LookAtSimpleExtensionGroup> ... </kml:LookAtSimpleExtensionGroup> [0..*]
    <kml:LookAtObjectExtensionGroup> ... </kml:LookAtObjectExtensionGroup> [0..*]
</kml:LookAt>
```

14.3.2   Description

This element can be used wherever the following element is referenced:

- *kml:AbstractViewGroup*

Specifies the geographic view in terms of a point of interest viewed from a virtual camera. The kml:LookAt object is more limited in scope than kml:Camera and should establish a view direction that intersects the Earth's surface.

A kml:LookAt element shall contain the kml:longitude, kml:latitude, and kml:range child elements outside of an update context, that is when not a descendant of kml:Update.

14.3.3 Defining How to Look

This diagram illustrates the kml:range, kml:tilt, and kml:altitude elements:

This diagram illustrates the kml:heading element:
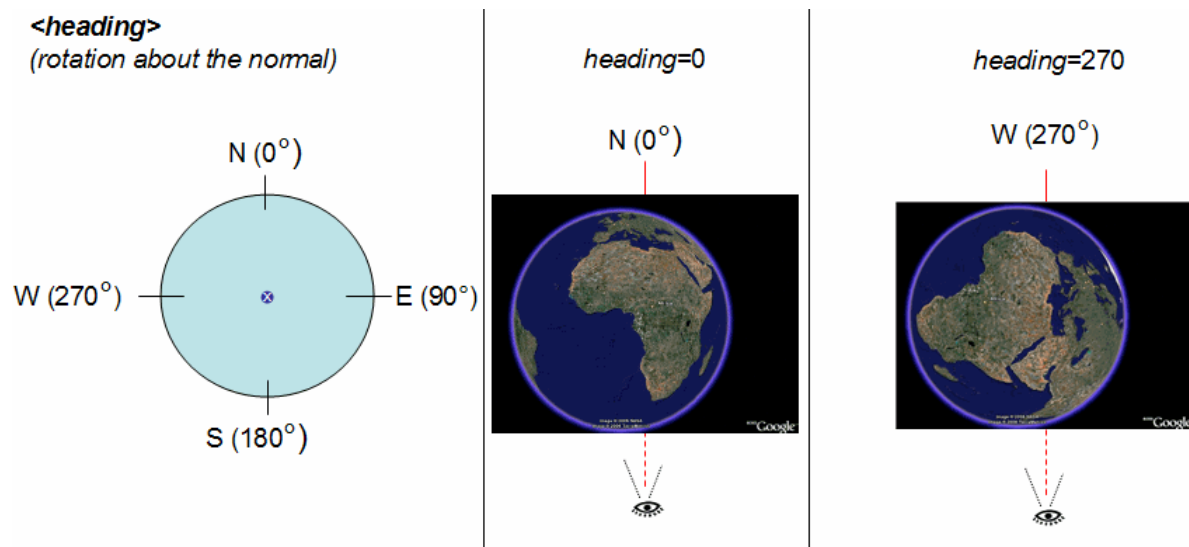
14.3.4 Content

14.3.4.1 kml:longitude

14.3.4.1.1 Description

Geodetic longitude of the point the camera is looking at. Angular distance in decimal degrees, relative to the Prime Meridian. Values west of the Meridian range from −180 to 0 degrees. Values east of the Meridian range from 0 to 180 degrees.

14.3.4.1.2 Content

 Type: kml:angle180Type
 Default Value: 0.0

14.3.4.2 kml:latitude

14.3.4.2.1 Description

Geodetic latitude of the point the camera is looking at. Decimal degrees north or south of the Equator (0 degrees). Values range from −90 degrees to 90 degrees.

14.3.4.2.2 Content

 Type: kml:angle90Type
 Default Value: 0.0

14.3.4.3 kml:altitude

14.3.4.3.1 Description

Altitude in meters, interpreted according to the `kml:altitudeMode` specification.

14.3.4.3.2 Content

 Type: xsd:double
 Default Value: 0.0

14.3.4.4 kml:heading

14.3.4.4.1 Description

Direction (North, South, East, West), in decimal degrees. Values range from 0 (North) to 360 degrees.

14.3.4.4.2 Content

Type:	kml:angle360Type
Default Value:	0.0

14.3.4.5 kml:tilt

14.3.4.5.1 Description

Angle, in decimal degrees, between the direction of the `LookAt` position and the normal to the surface of the Earth. Values range from 0 to 90 degrees. Values for `kml:tilt` cannot be negative. A `kml:tilt` value of 0 degrees indicates viewing from directly above. A `kml:tilt` value of 90 degrees indicates viewing along the horizon.

14.3.4.5.2 Content

See 16.5 kml:anglepos180Type.

14.3.4.6 kml:range

14.3.4.6.1 Description

Distance in meters from the point specified by `kml:longitude`, `kml:latitude`, and `kml:altitude` to the `kml:LookAt` position.

14.3.4.6.2 Content

Type:	xsd:double
Default Value:	0.0

14.3.4.7   kml:altitudeModeGroup

14.3.4.7.1   Description

The default value **clampToGround** indicates to place the kml:LookAt position on the terrain.

See 9.16 kml:altitudeModeGroup and 9.17 kml:altitudeMode.

14.3.4.8   kml:LookAtSimpleExtensionGroup

See 6.6.3.1 Simple Element Substitution.

14.3.4.9   kml:LookAtObjectExtensionGroup

See 6.6.3.2 Complex Element Substitution.

14.3.5   Example

```
<kml xmlns="http://www.opengis.net/kml/2.2">
<Placemark>
  <name>LookAt.kml</name>
  <LookAt>
    <longitude>-122.363</longitude>
    <latitude>37.81</latitude>
    <altitude>2000</altitude>
    <range>500</range>
    <tilt>45</tilt>
    <heading>0</heading>
    <altitudeMode>relativeToGround</altitudeMode>
  </LookAt>
  <Point>
    <coordinates>-122.363,37.82,0</coordinates>
  </Point>
</Placemark>
</kml>
```

15 Time

15.1 kml:AbstractTimePrimitiveGroup

15.1.1 Structure

```
<kml:AbstractTimePrimitiveGroup
 id="ID [0..1]"
 targetId="NCName [0..1]">
    <kml:ObjectSimpleExtensionGroup> ... </kml:ObjectSimpleExtensionGroup> [0..*]
    <kml:AbstractTimePrimitiveSimpleExtensionGroup> ...
</kml:AbstractTimePrimitiveSimpleExtensionGroup> [0..*]
    <kml:AbstractTimePrimitiveObjectExtensionGroup> ...
</kml:AbstractTimePrimitiveObjectExtensionGroup> [0..*]
</kml:AbstractTimePrimitiveGroup>
```
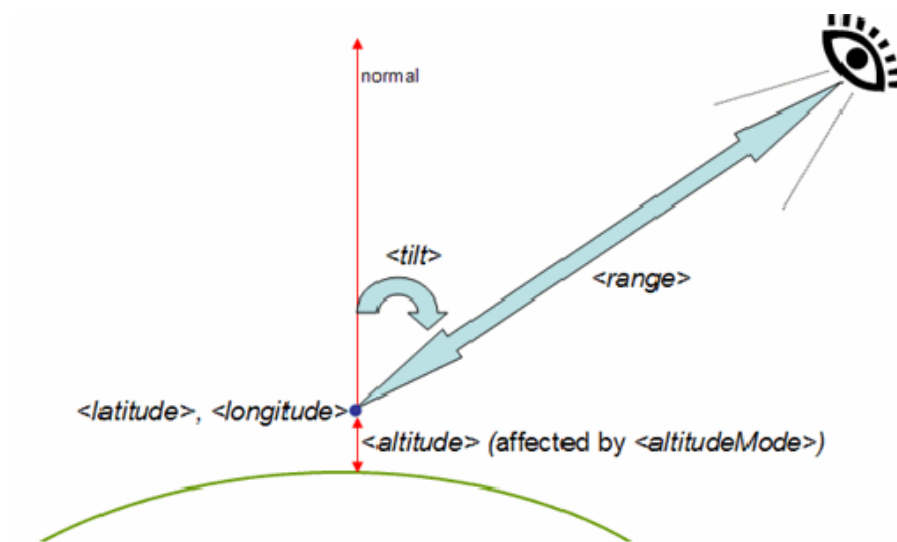
15.1.2 Description

This element can be used wherever the following element is referenced:

- *kml:AbstractObjectGroup*

The following elements can be used wherever this element is referenced:

- kml:TimeStamp
- kml:TimeSpan

Time values encoded within elements that extend *kml:AbstractTimePrimitiveGroup* shall be in the context of the temporal reference system specified by ISO 8601, which uses the Gregorian Calendar and 24 hour local or Coordinated Universal Time (UTC).

See also 9.6 kml:AbstractContainerGroup regarding the inheritance of the *kml:AbstractTimePrimitiveGroup* within KML feature hierarchies.

15.1.3 Content

15.1.3.1 kml:AbstractTimePrimitiveSimpleExtensionGroup

See 6.6.3.1 Simple Element Substitution.

15.1.3.2   kml:AbstractTimePrimitiveObjectExtensionGroup

See 6.6.3.2 Complex Element Substitution.

15.2   kml:TimeSpan

15.2.1   Structure

```
<kml:TimeSpan
 id="ID [0..1]"
 targetId="NCName [0..1]">
    <kml:ObjectSimpleExtensionGroup> ... </kml:ObjectSimpleExtensionGroup> [0..*]
    <kml:AbstractTimePrimitiveSimpleExtensionGroup> ...
</kml:AbstractTimePrimitiveSimpleExtensionGroup> [0..*]
    <kml:AbstractTimePrimitiveObjectExtensionGroup> ...
</kml:AbstractTimePrimitiveObjectExtensionGroup> [0..*]
    <kml:begin> ... </kml:begin> [0..1]
    <kml:end> ... </kml:end> [0..1]
    <kml:TimeSpanSimpleExtensionGroup> ... </kml:TimeSpanSimpleExtensionGroup>
[0..*]
    <kml:TimeSpanObjectExtensionGroup> ... </kml:TimeSpanObjectExtensionGroup>
[0..*]
</kml:TimeSpan>
```

15.2.2   Description

This element can be used wherever the following element is referenced:

* *kml:AbstractTimePrimitiveGroup*

Specifies an extent in time bounded by begin and end temporal values. At least one of the child elements kml:begin and kml:end shall be encoded.

15.2.3   Content

15.2.3.1   kml:begin

15.2.3.1.1   Description

Describes the beginning instant of a time period. If absent, the beginning of the period is unbounded. The value shall be encoding according to the kml:dateTimeType field type.

15.2.3.1.2   Content

    Type: kml:dateTimeType

Default Value: none

15.2.3.2   kml:end

15.2.3.2.1   Description

Describes the ending instant of a time period. If absent, the end of the period is unbounded. The value shall be later than the `kml:begin` value. The value shall be encoding according to the `kml:dateTimeType` field type.

15.2.3.2.2   Content

Type: kml:dateTimeType
Default Value: none

15.2.3.3   kml:TimeSpanSimpleExtensionGroup

See 6.6.3.1 Simple Element Substitution.

15.2.3.4   kml:TimeSpanObjectExtensionGroup

See 6.6.3.2 Complex Element Substitution.

15.2.4   Example

The following example shows the time period representing Colorado's statehood. It contains only a `kml:begin` element because Colorado became a state on August 1, 1876, and continues to be a state:

```
<Placemark>
  <name>Colorado</name>
  ...
  <TimeSpan>
    <begin>1876-08-01</begin>
  </TimeSpan>
</Placemark>
```

15.3   kml:TimeStamp

15.3.1   Structure

```
<kml:TimeStamp
 id="ID [0..1]"
 targetId="NCName [0..1]">
    <kml:ObjectSimpleExtensionGroup> ... </kml:ObjectSimpleExtensionGroup> [0..*]
    <kml:AbstractTimePrimitiveSimpleExtensionGroup> ...
</kml:AbstractTimePrimitiveSimpleExtensionGroup> [0..*]
    <kml:AbstractTimePrimitiveObjectExtensionGroup> ...
</kml:AbstractTimePrimitiveObjectExtensionGroup> [0..*]
    <kml:when> ... </kml:when> [0..1]
    <kml:TimeStampSimpleExtensionGroup> ... </kml:TimeStampSimpleExtensionGroup>
[0..*]
    <kml:TimeStampObjectExtensionGroup> ... </kml:TimeStampObjectExtensionGroup>
[0..*]
</kml:TimeStamp>
```

15.3.2   Description

This element can be used wherever the following element is referenced:

- *kml:AbstractTimePrimitiveGroup*

Specifies a single moment in time within the required kml:when child element.

15.3.3   Content

15.3.3.1   kml:when

15.3.3.1.1   Description

Specifies a single moment in time.

15.3.3.1.2   Content

> Type: kml:dateTimeType

Default Value: none

15.3.3.1.3   Examples

The following examples show different temporal resolutions for the `kml:when` value:

- xsd:gYear *(YYYY)*

```
<TimeStamp>
  <when>1997</when>
</TimeStamp>
```

- xsd:gYearMonth *(YYYY-MM)*

```
<TimeStamp>
  <when>1997-07</when>
</TimeStamp>
```

- xsd:date *(YYYY-MM-DD)*

```
<TimeStamp>
  <when>1997-07-16</when>
</TimeStamp>
```

- xsd:dateTime *(YYYY-MM-DD*T*hh:mm:ss*Z*)*
  Here, T is the separator between the calendar and the hourly notation of time, and Z indicates UTC. (Seconds are required.)

```
<TimeStamp>
  <when>1997-07-16T07:30:15Z</when>
</TimeStamp>
```

- xsd:dateTime *(YYYY-MM-DD*T*hh:mm:sszzzzzzz)*
  This example gives the local time and then the ± conversion to UTC.

```
<TimeStamp>
  <when>1997-07-16T10:30:15+03:00</when>
</TimeStamp>
```

15.3.3.2   kml:TimeStampSimpleExtensionGroup

See 6.6.3.1 Simple Element Substitution.

15.3.3.3 kml: TimeStampObjectExtensionGroup

See 6.6.3.2 Complex Element Substitution.

16 Field Types

16.1 kml:altitudeModeEnumType

16.1.1 Content

Base XSD Type: xsd:string
value comes from list: {'clampToGround'|'relativeToGround'|'absolute'}

clampToGround	Ignore the altitude specification.
relativeToGround	Interpret the altitude in meters relative to the terrain elevation.
absolute	Interpret the altitude as a value in meters relative to the vertical datum.

16.2 kml:angle180Type

16.2.1 Content

Base XSD Type: xsd:double
-180.0 <= value <= 180.0

16.3 kml:angle360Type

16.3.1 Content

Base XSD Type: xsd:double
-360.0 <= value <= 360.0

16.4 kml:angle90Type

16.4.1 Content

Base XSD Type: xsd:double
-90.0 <= value <= 90.0

16.5   kml:anglepos180Type

16.5.1   Content

Base XSD Type: xsd:double
0.0 <= value <= 180.0

16.6   kml:anglepos90Type

16.6.1   Content

Base XSD Type: xsd:double
0.0 <= value <= 90.0

16.7   kml:colorModeEnumType

16.7.1   Description

Specifies the color mode for a graphic element.

Values for <colorMode> are normal (no effect) and random. A value of random applies a random linear scale to the base <color> as follows:

To achieve a truly random selection of colors, specify a base <color> of transparent white (00ffffff).

If a single color component is specified (for example, a value of ff0000ff for red), random color values for that one component (red) will be selected. In this case, the values would range from 00 (black) to ff (full red).

If values for two or for all three color components are specified, a random linear scale is applied to each color component, with results ranging from black to the maximum values specified for each component.

The opacity of a color comes from the alpha component of `color` and is never randomized.

16.7.2   Content

Base XSD Type: xsd:string
value comes from list: {'normal'|'random'}

| **normal** | Specifies a single colour value. |
| **random** | Specifies to use a random colour value. |

16.8   kml:colorType

16.8.1   Description

Species the color of a graphic or text element.

Color and opacity (alpha) values are expressed in hexadecimal notation. The range of values for any one color is 0 to 255 (00 to ff); opaque white is ffffffff; opaque black is ff000000.

The order of expression is *aabbggrr*, where *aa=alpha* (00 to ff); *bb=blue* (00 to ff); *gg=green* (00 to ff); *rr=red* (00 to ff).

For alpha, 00 is fully transparent and ff is fully opaque. For example, to apply a blue color with 50 percent opacity to an overlay, specify the following: <bgColor>7fff0000</bgColor>, where *alpha*=0x7f, *blue*=0xff, *green*=0x00, and *red*=0x00.

16.8.2   Content

Base XSD Type: xsd:hexBinary
length = 4

16.9   kml:coordinatesType

16.9.1   Description

String representing one or more coordinate tuples, with each tuple consisting of decimal values for geodetic longitude, geodetic latitude, and altitude. The altitude component is optional. The coordinate separator is a comma and the tuple separator is a whitespace. Longitude and latitude coordinates are expressed in decimal degrees only.

16.9.2   Content

List of: xsd:string

16.10   kml:dateTimeType

16.10.1   Content

Union of: xsd:dateTime, xsd:date, xsd:gYearMonth, xsd:gYear

16.11   kml:displayModeEnumType

16.11.1   Content

Base XSD Type: xsd:string
value comes from list: {'default'|'hide'}

default   Specifies to display the balloon.

hide   Specifies to hide the balloon.

16.12   kml:gridOriginEnumType

16.12.1   Content

Base XSD Type: string
value comes from list: {'lowerLeft'|'upperLeft'}

lowerLeft   Specifies to begin numbering the tiles in a layer of a
                                `kml:ImagePyramid` from the lower left corner.

upperLeft   Specifies to begin numbering the tiles in a layer of
                                `kml:ImagePyramid` from the upper left corner.

16.13   kml:itemIconStateEnumType

16.13.1   Description

Specifies the current state of a `kml:NetworkLink` or `kml:Folder`.

16.13.2   Content

Base XSD Type: xsd:string
value comes from list: {'open'|'closed'|'error'|'fetching0'|'fetching1'|'fetching2'}

open   open folder

closed   closed folder

error	error in fetch
fetching0	fetch state 0
fetching1	fetch state 1
fetching2	fetch state 0

16.14 kml:itemIconStateType

16.14.1 Content

List of: kml:itemIconStateEnumType

16.15 kml:listItemTypeEnumType

16.15.1 Description

Specifies how a *kml:AbstractFeatureGroup* and its contents shall be displayed as items in a list view.

16.15.2 Content

Base XSD Type: string
value comes from list: {'radioFolder'|'check'|'checkHideChildren'|'checkOffOnly'}

radioFolder	Only one of the *kml:AbstractContainerGroup*'s items shall be visible at a time.
check	The *kml:AbstractFeatureGroup's* visibility is tied to its item's checkbox.
checkHideChildren	Use a normal checkbox for visibility but do not display the *kml:AbstractContainerGroup*'s children in the list view. A checkbox allows the user to toggle visibility of the child objects in the viewer.
checkOffOnly	Prevents all items from being made visible at once—that is, the user can turn everything in the *kml:AbstractContainerGroup* off but cannot turn everything on at the same time. This setting is useful for *kml:AbstractContainerGroup*'s containing large amounts of data.

16.16   kml:refreshModeEnumType

16.16.1   Content

Base XSD Type: xsd:string
value comes from list: {'onChange'|'onInterval'|'onExpire'}

onChange	Refresh when the resource is first loaded and whenever the `kml:Link` parameters change.
onInterval	Refresh the resource every *n* seconds as specified in `kml:refreshInterval`.
onExpire	Refresh the resource when the expiration time is reached.

16.17   kml:shapeEnumType

16.17.1   Content

Base XSD Type: string
value comes from list: {'rectangle'|'cylinder'|'sphere'}

rectangle	Used for an ordinary photo.
cylinder	Used for panoramas, which can be either partial or full cylinders.
sphere	Used for spherical panoramas.

16.18   kml:styleStateEnumType

16.18.1   Content

Base XSD Type: xsd:string
value comes from list: {'normal'|'highlight'}

normal	Specifies a normal style for a kml:Placemark.
highlight	Specifies a highlighted style for a kml:Placemark.

16.19   kml:SnippetType

16.19.1   Content

Type: xsd:string

16.19.2 Attributes

16.19.2.1 maxLines

16.19.2.1.1 Description

Specifies the maximum number of lines to display for the *kml:AbstractFeatureGroup* `kml:snippet` value in the list view.

16.19.2.1.2 Content

    Type: xsd:int
    Default Value: 2

16.20 kml:unitsEnumType

16.20.1 Description

16.20.2 Content

    Base XSD Type: xsd:string
    value comes from list: {'fraction'|'pixels'|'insetPixels'}

fraction	Value is a fraction of the icon.
pixels	Value is a specific pixel size.
insetPixels	Value is an offset in pixels from the upper right corner of the icon.

16.21 kml:vec2Type

16.21.1 Structure

```
<...
 x="double [0..1]"
 y="double [0..1]"
 xunits=" kml:unitsEnumType [0..1]"
 yunits=" kml:unitsEnumType [0..1]"/>
```

16.21.2 Description

Specifies an image coordinate system.

The *x* and *y* values may each be specified in three different ways: as *pixels* (**pixels**), as fractions of the icon (**fraction**), or as inset pixels (**insetPixels**), which is an offset in pixels from the upper right corner of the icon. They may or may not be specified in a consistent manner - for example, x can be specified in pixels and y as a fraction.

16.21.3 Attributes

16.21.3.1 x

16.21.3.1.1 Description

The *x* component of a point.

16.21.3.1.2 Content

Type:	xsd:double
Default Value:	1.0

16.21.3.2 y

16.21.3.2.1 Description

The *y* component of a point.

16.21.3.2.2 Content

Type:	xsd:double
Default Value:	1.0

16.21.3.3 xunits

16.21.3.3.1 Description

Units in which the *x* value is specified.

16.21.3.3.2 Content

Type: kml:unitsEnumType
Default Value: fraction

16.21.3.4 yunits

16.21.3.4.1 Description

Units in which the *y* value is specified.

16.21.3.4.2 Content

FieldType: kml:unitsEnumType
Default Value: fraction

16.22 kml:viewRefreshModeEnumType

16.22.1 Content

Base XSD Type: string
value comes from list: {'never'|'onRequest'|'onStop'|'onRegion'}

never	Ignore changes in the geographic view. Also ignore `kml:viewFormat` parameters, if any.
onRequest	Refresh the resource only when the user explicitly requests it.
onStop	Refresh the resource *n* seconds after movement stops, where *n* is specified in `kml:viewRefreshTime`.
onRegion	Refresh the resource if a `kml:Region` becomes active.

Annex A
(normative)

KML Schemas

KML schema (ogckml22.xsd)

```xml
<?xml version="1.0" encoding="UTF-8"?>
<schema xmlns="http://www.w3.org/2001/XMLSchema"
        xmlns:kml="http://www.opengis.net/kml/2.2"
        xmlns:atom="http://www.w3.org/2005/Atom"
        xmlns:xal="urn:oasis:names:tc:ciq:xsdschema:xAL:2.0"
        targetNamespace="http://www.opengis.net/kml/2.2"
        elementFormDefault="qualified"
        version="0.1.0">

  <!-- import atom:author and atom:link -->
  <import namespace="http://www.w3.org/2005/Atom"
    schemaLocation="atom-author-link.xsd"/>

  <!-- import xAL:Address -->
  <import namespace="urn:oasis:names:tc:ciq:xsdschema:xAL:2.0"
    schemaLocation="http://docs.oasis-
open.org/election/external/xAL.xsd"/>

  <!-- KML field types (simple content) -->

  <simpleType name="anglepos90Type">
    <restriction base="double">
      <minInclusive value="0.0"/>
      <maxInclusive value="90.0"/>
    </restriction>
  </simpleType>

  <simpleType name="angle90Type">
    <restriction base="double">
      <minInclusive value="-90"/>
      <maxInclusive value="90.0"/>
    </restriction>
  </simpleType>

  <simpleType name="anglepos180Type">
    <restriction base="double">
      <minInclusive value="0.0"/>
```

```xml
      <maxInclusive value="180.0"/>
    </restriction>
</simpleType>

<simpleType name="angle180Type">
  <restriction base="double">
    <minInclusive value="-180.0"/>
    <maxInclusive value="180.0"/>
  </restriction>
</simpleType>

<simpleType name="angle360Type">
  <restriction base="double">
    <minInclusive value="-360.0"/>
    <maxInclusive value="360.0"/>
  </restriction>
</simpleType>

<simpleType name="altitudeModeEnumType">
  <restriction base="string">
    <enumeration value="clampToGround"/>
    <enumeration value="relativeToGround"/>
    <enumeration value="absolute"/>
  </restriction>
</simpleType>

<simpleType name="colorType">
  <annotation>
    <documentation><![CDATA[

      aabbggrr

      ffffffff: opaque white
      ff000000: opaque black

      ]]></documentation>
  </annotation>
  <restriction base="hexBinary">
    <length value="4"/>
  </restriction>
</simpleType>

<simpleType name="coordinatesType">
  <list itemType="string"/>
</simpleType>

<simpleType name="colorModeEnumType">
  <restriction base="string">
    <enumeration value="normal"/>
    <enumeration value="random"/>
  </restriction>
</simpleType>
```

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```
<simpleType name="dateTimeType">
  <union memberTypes="dateTime date gYearMonth gYear"/>
</simpleType>

<simpleType name="displayModeEnumType">
  <restriction base="string">
    <enumeration value="default"/>
    <enumeration value="hide"/>
  </restriction>
</simpleType>

<simpleType name="gridOriginEnumType">
  <restriction base="string">
    <enumeration value="lowerLeft"/>
    <enumeration value="upperLeft"/>
  </restriction>
</simpleType>
<simpleType name="itemIconStateType">
  <list itemType="kml:itemIconStateEnumType"/>
</simpleType>

<simpleType name="itemIconStateEnumType">
  <restriction base="string">
    <enumeration value="open"/>
    <enumeration value="closed"/>
    <enumeration value="error"/>
    <enumeration value="fetching0"/>
    <enumeration value="fetching1"/>
    <enumeration value="fetching2"/>
  </restriction>
</simpleType>

<simpleType name="listItemTypeEnumType">
  <restriction base="string">
    <enumeration value="radioFolder"/>
    <enumeration value="check"/>
    <enumeration value="checkHideChildren"/>
    <enumeration value="checkOffOnly"/>
  </restriction>
</simpleType>

<simpleType name="refreshModeEnumType">
  <restriction base="string">
    <enumeration value="onChange"/>
    <enumeration value="onInterval"/>
    <enumeration value="onExpire"/>
  </restriction>
</simpleType>

<simpleType name="viewRefreshModeEnumType">
  <restriction base="string">
```

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```
        <enumeration value="never"/>
        <enumeration value="onRequest"/>
        <enumeration value="onStop"/>
        <enumeration value="onRegion"/>
    </restriction>
  </simpleType>

  <simpleType name="shapeEnumType">
    <restriction base="string">
        <enumeration value="rectangle"/>
        <enumeration value="cylinder"/>
        <enumeration value="sphere"/>
    </restriction>
  </simpleType>

  <simpleType name="styleStateEnumType">
    <restriction base="string">
        <enumeration value="normal"/>
        <enumeration value="highlight"/>
    </restriction>
  </simpleType>

  <simpleType name="unitsEnumType">
    <restriction base="string">
        <enumeration value="fraction"/>
        <enumeration value="pixels"/>
        <enumeration value="insetPixels"/>
    </restriction>
  </simpleType>

  <complexType name="vec2Type" abstract="false">
    <attribute name="x" type="double" default="1.0"/>
    <attribute name="y" type="double" default="1.0"/>
    <attribute name="xunits" type="kml:unitsEnumType" use="optional"
      default="fraction"/>
    <attribute name="yunits" type="kml:unitsEnumType" use="optional"
      default="fraction"/>
  </complexType>

  <annotation>
    <documentation>Simple elements</documentation>
  </annotation>
  <element name="address" type="string"/>
  <element name="altitude" type="double" default="0.0"/>
  <element name="altitudeModeGroup" abstract="true"/>
  <element name="altitudeMode" type="kml:altitudeModeEnumType"
    default="clampToGround" substitutionGroup="kml:altitudeModeGroup"/>
  <element name="begin" type="kml:dateTimeType"/>
  <element name="bgColor" type="kml:colorType" default="ffffffff"/>
  <element name="bottomFov" type="kml:angle90Type" default="0.0"/>
  <element name="color" type="kml:colorType" default="ffffffff"/>
  <element name="colorMode" type="kml:colorModeEnumType"
default="normal"/>
```

```xml
  <element name="cookie" type="string"/>
  <element name="coordinates" type="kml:coordinatesType"/>
  <element name="description" type="string"/>
  <element name="displayName" type="string"/>
  <element name="displayMode" type="kml:displayModeEnumType"
default="default"/>
  <element name="drawOrder" type="int" default="0"/>
  <element name="east" type="kml:angle180Type" default="180.0"/>
  <element name="end" type="kml:dateTimeType"/>
  <element name="expires" type="kml:dateTimeType"/>
  <element name="extrude" type="boolean" default="0"/>
  <element name="fill" type="boolean" default="1"/>
  <element name="flyToView" type="boolean" default="0"/>
  <element name="gridOrigin" type="kml:gridOriginEnumType"
default="lowerLeft"/>
  <element name="heading" type="kml:angle360Type" default="0.0"/>
  <!-- not anyURI due to $[x] substitution in PhotoOverlay -->
  <element name="href" type="string"/>
  <element name="httpQuery" type="string"/>
  <element name="hotSpot" type="kml:vec2Type"/>
  <element name="key" type="kml:styleStateEnumType" default="normal"/>
  <element name="latitude" type="kml:angle90Type" default="0.0"/>
  <element name="leftFov" type="kml:angle180Type" default="0.0"/>
  <element name="linkDescription" type="string"/>
  <element name="linkName" type="string"/>
  <element name="linkSnippet" type="kml:SnippetType"/>
  <element name="listItemType" type="kml:listItemTypeEnumType"
default="check"/>
  <element name="longitude" type="kml:angle180Type" default="0.0"/>
  <element name="maxSnippetLines" type="int" default="2"/>
  <element name="maxSessionLength" type="double" default="-1.0"/>
  <element name="message" type="string"/>
  <element name="minAltitude" type="double" default="0.0"/>
  <element name="minFadeExtent" type="double" default="0.0"/>
  <element name="minLodPixels" type="double" default="0.0"/>
  <element name="minRefreshPeriod" type="double" default="0.0"/>
  <element name="maxAltitude" type="double" default="0.0"/>
  <element name="maxFadeExtent" type="double" default="0.0"/>
  <element name="maxLodPixels" type="double" default="-1.0"/>
  <element name="maxHeight" type="int" default="0"/>
  <element name="maxWidth" type="int" default="0"/>
  <element name="name" type="string"/>
  <element name="near" type="double" default="0.0"/>
  <element name="north" type="kml:angle180Type" default="180.0"/>
  <element name="open" type="boolean" default="0"/>
  <element name="outline" type="boolean" default="1"/>
  <element name="phoneNumber" type="string"/>
  <element name="range" type="double" default="0.0"/>
  <element name="refreshMode" type="kml:refreshModeEnumType"
    default="onChange"/>
  <element name="refreshInterval" type="double" default="4.0"/>
```

```
<element name="refreshVisibility" type="boolean" default="0"/>
<element name="rightFov" type="kml:angle180Type" default="0.0"/>
<element name="roll" type="kml:angle180Type" default="0.0"/>
<element name="rotation" type="kml:angle180Type" default="0.0"/>
<element name="scale" type="double" default="1.0"/>
<element name="shape" type="kml:shapeEnumType" default="rectangle"/>
<element name="south" type="kml:angle180Type" default="-180.0"/>
<element name="sourceHref" type="anyURI"/>
<element name="snippet" type="string"/>
<element name="state" type="kml:itemIconStateType"/>
<element name="styleUrl" type="anyURI"/>
<element name="targetHref" type="anyURI"/>
<element name="tessellate" type="boolean" default="0"/>
<element name="text" type="string"/>
<element name="textColor" type="kml:colorType" default="ff000000"/>
<element name="tileSize" type="int" default="256"/>
<element name="tilt" type="kml:anglepos180Type" default="0.0"/>
<element name="topFov" type="kml:angle90Type" default="0.0"/>
<element name="viewBoundScale" type="double" default="1.0"/>
<element name="viewFormat" type="string"/>
<element name="viewRefreshMode" type="kml:viewRefreshModeEnumType"
  default="never"/>
<element name="viewRefreshTime" type="double" default="4.0"/>
<element name="visibility" type="boolean" default="1"/>
<element name="west" type="kml:angle180Type" default="-180.0"/>
<element name="when" type="kml:dateTimeType"/>
<element name="width" type="double" default="1.0"/>
<element name="x" type="double" default="1.0"/>
<element name="y" type="double" default="1.0"/>
<element name="z" type="double" default="1.0"/>

<element name="AbstractObjectGroup" type="kml:AbstractObjectType"
  abstract="true"/>
<complexType name="AbstractObjectType" abstract="true">
  <sequence>
    <element ref="kml:ObjectSimpleExtensionGroup" minOccurs="0"
      maxOccurs="unbounded"/>
  </sequence>
  <attributeGroup ref="kml:idAttributes"/>
</complexType>
<element name="ObjectSimpleExtensionGroup" abstract="true"
  type="anySimpleType"/>

<attributeGroup name="idAttributes">
  <attribute name="id" type="ID" use="optional"/>
  <attribute name="targetId" type="NCName" use="optional"/>
</attributeGroup>

<element name="AbstractFeatureGroup" type="kml:AbstractFeatureType"
  abstract="true" substitutionGroup="kml:AbstractObjectGroup"/>
<complexType name="AbstractFeatureType" abstract="true">
  <complexContent>
    <extension base="kml:AbstractObjectType">
```

```
      <sequence>
        <element ref="kml:name" minOccurs="0"/>
        <element ref="kml:visibility" minOccurs="0"/>
        <element ref="kml:open" minOccurs="0"/>
        <element ref="atom:author" minOccurs="0"/>
        <element ref="atom:link" minOccurs="0"/>
        <element ref="kml:address" minOccurs="0"/>
        <element ref="xal:AddressDetails" minOccurs="0"/>
        <element ref="kml:phoneNumber" minOccurs="0"/>
        <choice>
          <element ref="kml:snippet" minOccurs="0"/>
          <!-- Deprecate in OGC KML -->
          <element ref="kml:Snippet" minOccurs="0"/>
        </choice>
        <element ref="kml:description" minOccurs="0"/>
        <element ref="kml:AbstractViewGroup" minOccurs="0"/>
        <element ref="kml:AbstractTimePrimitiveGroup" minOccurs="0"/>
        <element ref="kml:styleUrl" minOccurs="0"/>
        <element ref="kml:AbstractStyleSelectorGroup" minOccurs="0"
          maxOccurs="unbounded"/>
        <element ref="kml:Region" minOccurs="0"/>
        <element ref="kml:ExtendedData" minOccurs="0"/>
        <element ref="kml:AbstractFeatureSimpleExtensionGroup"
minOccurs="0"
          maxOccurs="unbounded"/>
        <element ref="kml:AbstractFeatureObjectExtensionGroup"
minOccurs="0"
          maxOccurs="unbounded"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>
<element name="AbstractFeatureObjectExtensionGroup" abstract="true"
  substitutionGroup="kml:AbstractObjectGroup"/>
<element name="AbstractFeatureSimpleExtensionGroup" abstract="true"
  type="anySimpleType"/>

<element name="Snippet" type="kml:SnippetType"/>
<complexType name="SnippetType" final="#all">
  <simpleContent>
    <extension base="string">
      <attribute name="maxLines" type="int" use="optional" default="2"/>
    </extension>
  </simpleContent>
</complexType>

<element name="AbstractViewGroup" type="kml:AbstractViewType"
abstract="true"
  substitutionGroup="kml:AbstractObjectGroup"/>
<complexType name="AbstractViewType" abstract="true">
  <complexContent>
```

```xml
        <extension base="kml:AbstractObjectType">
          <sequence>
            <element ref="kml:AbstractViewSimpleExtensionGroup"
minOccurs="0"
              maxOccurs="unbounded"/>
            <element ref="kml:AbstractViewObjectExtensionGroup"
minOccurs="0"
              maxOccurs="unbounded"/>
          </sequence>
        </extension>
      </complexContent>
  </complexType>
  <element name="AbstractViewSimpleExtensionGroup" abstract="true"
    type="anySimpleType"/>
  <element name="AbstractViewObjectExtensionGroup" abstract="true"
    substitutionGroup="kml:AbstractObjectGroup"/>

  <element name="LookAt" type="kml:LookAtType"
    substitutionGroup="kml:AbstractViewGroup"/>
  <complexType name="LookAtType" final="#all">
    <complexContent>
      <extension base="kml:AbstractViewType">
        <sequence>
          <element ref="kml:longitude" minOccurs="0"/>
          <element ref="kml:latitude" minOccurs="0"/>
          <element ref="kml:altitude" minOccurs="0"/>
          <element ref="kml:heading" minOccurs="0"/>
          <element ref="kml:tilt" minOccurs="0"/>
          <element ref="kml:range" minOccurs="0"/>
          <element ref="kml:altitudeModeGroup" minOccurs="0"/>
          <element ref="kml:LookAtSimpleExtensionGroup" minOccurs="0"
            maxOccurs="unbounded"/>
          <element ref="kml:LookAtObjectExtensionGroup" minOccurs="0"
            maxOccurs="unbounded"/>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
  <element name="LookAtSimpleExtensionGroup" abstract="true"
    type="anySimpleType"/>
  <element name="LookAtObjectExtensionGroup" abstract="true"
    substitutionGroup="kml:AbstractObjectGroup"/>

  <element name="Camera" type="kml:CameraType"
    substitutionGroup="kml:AbstractViewGroup"/>
  <complexType name="CameraType" final="#all">
    <complexContent>
      <extension base="kml:AbstractViewType">
        <sequence>
          <element ref="kml:longitude" minOccurs="0"/>
          <element ref="kml:latitude" minOccurs="0"/>
          <element ref="kml:altitude" minOccurs="0"/>
          <element ref="kml:heading" minOccurs="0"/>
```

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```
            <element ref="kml:tilt" minOccurs="0"/>
            <element ref="kml:roll" minOccurs="0"/>
            <element ref="kml:altitudeModeGroup" minOccurs="0"/>
            <element ref="kml:CameraSimpleExtensionGroup" minOccurs="0"
              maxOccurs="unbounded"/>
            <element ref="kml:CameraObjectExtensionGroup" minOccurs="0"
              maxOccurs="unbounded"/>
          </sequence>
        </extension>
      </complexContent>
    </complexType>
    <element name="CameraSimpleExtensionGroup" abstract="true"
      type="anySimpleType"/>
    <element name="CameraObjectExtensionGroup" abstract="true"
      substitutionGroup="kml:AbstractObjectGroup"/>

    <element name="ExtendedData" type="kml:ExtendedDataType"/>
    <complexType name="ExtendedDataType" final="#all">
      <sequence>
        <element ref="kml:Data" minOccurs="0" maxOccurs="unbounded"/>
        <element ref="kml:SchemaData" minOccurs="0" maxOccurs="unbounded"/>
        <any namespace="##other" processContents="lax" minOccurs="0"
          maxOccurs="unbounded"/>
      </sequence>
    </complexType>

    <element name="SchemaData" type="kml:SchemaDataType"
      substitutionGroup="kml:AbstractObjectGroup"/>
    <complexType name="SchemaDataType" final="#all">
      <complexContent>
        <extension base="kml:AbstractObjectType">
          <sequence>
            <element ref="kml:SimpleData" minOccurs="0"
maxOccurs="unbounded"/>
            <element ref="kml:SchemaDataExtension" minOccurs="0"
              maxOccurs="unbounded"/>
          </sequence>
          <attribute name="schemaUrl" type="anyURI"/>
        </extension>
      </complexContent>
    </complexType>
    <element name="SchemaDataExtension" abstract="true"/>

    <element name="SimpleData" type="kml:SimpleDataType"/>
    <complexType name="SimpleDataType" final="#all">
      <simpleContent>
        <extension base="string">
          <attribute name="name" type="string" use="required"/>
        </extension>
      </simpleContent>
    </complexType>
```

```xml
<element name="Data" type="kml:DataType"
  substitutionGroup="kml:AbstractObjectGroup"/>
<complexType name="DataType" final="#all">
  <complexContent>
    <extension base="kml:AbstractObjectType">
      <sequence>
        <element ref="kml:displayName" minOccurs="0"/>
        <element name="value" type="string"/>
        <element ref="kml:DataExtension" minOccurs="0"
maxOccurs="unbounded"/>
      </sequence>
      <attribute name="name" type="string"/>
    </extension>
  </complexContent>
</complexType>
<element name="DataExtension" abstract="true"/>

<element name="AbstractContainerGroup" type="kml:AbstractContainerType"
  abstract="true" substitutionGroup="kml:AbstractFeatureGroup"/>
<complexType name="AbstractContainerType" abstract="true">
  <complexContent>
    <extension base="kml:AbstractFeatureType">
      <sequence>
        <element ref="kml:AbstractContainerSimpleExtensionGroup"
          minOccurs="0" maxOccurs="unbounded"/>
        <element ref="kml:AbstractContainerObjectExtensionGroup"
          minOccurs="0" maxOccurs="unbounded"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>
<element name="AbstractContainerSimpleExtensionGroup" abstract="true"
  type="anySimpleType"/>
<element name="AbstractContainerObjectExtensionGroup" abstract="true"
  substitutionGroup="kml:AbstractObjectGroup"/>

<element name="AbstractGeometryGroup" type="kml:AbstractGeometryType"
  abstract="true" substitutionGroup="kml:AbstractObjectGroup"/>
<complexType name="AbstractGeometryType" abstract="true">
  <complexContent>
    <extension base="kml:AbstractObjectType">
      <sequence>
        <element ref="kml:AbstractGeometrySimpleExtensionGroup"
minOccurs="0"
          maxOccurs="unbounded"/>
        <element ref="kml:AbstractGeometryObjectExtensionGroup"
minOccurs="0"
          maxOccurs="unbounded"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>
```

```xml
<element name="AbstractGeometrySimpleExtensionGroup" abstract="true"
  type="anySimpleType"/>
<element name="AbstractGeometryObjectExtensionGroup" abstract="true"
  substitutionGroup="kml:AbstractObjectGroup"/>

<element name="AbstractOverlayGroup" type="kml:AbstractOverlayType"
  abstract="true" substitutionGroup="kml:AbstractFeatureGroup"/>
<complexType name="AbstractOverlayType" abstract="true">
  <complexContent>
    <extension base="kml:AbstractFeatureType">
      <sequence>
        <element ref="kml:color" minOccurs="0"/>
        <element ref="kml:drawOrder" minOccurs="0"/>
        <element ref="kml:Icon" minOccurs="0"/>
        <element ref="kml:AbstractOverlaySimpleExtensionGroup"
minOccurs="0"
          maxOccurs="unbounded"/>
        <element ref="kml:AbstractOverlayObjectExtensionGroup"
minOccurs="0"
          maxOccurs="unbounded"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>
<element name="AbstractOverlaySimpleExtensionGroup" abstract="true"
  type="anySimpleType"/>
<element name="AbstractOverlayObjectExtensionGroup" abstract="true"
  substitutionGroup="kml:AbstractObjectGroup"/>

<element name="AbstractStyleSelectorGroup"
  type="kml:AbstractStyleSelectorType" abstract="true"
  substitutionGroup="kml:AbstractObjectGroup"/>
<complexType name="AbstractStyleSelectorType" abstract="true">
  <complexContent>
    <extension base="kml:AbstractObjectType">
      <sequence>
        <element ref="kml:AbstractStyleSelectorSimpleExtensionGroup"
          minOccurs="0" maxOccurs="unbounded"/>
        <element ref="kml:AbstractStyleSelectorObjectExtensionGroup"
          minOccurs="0" maxOccurs="unbounded"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>
<element name="AbstractStyleSelectorSimpleExtensionGroup"
abstract="true"
  type="anySimpleType"/>
<element name="AbstractStyleSelectorObjectExtensionGroup"
abstract="true"
  substitutionGroup="kml:AbstractObjectGroup"/>
```

```xml
<element name="AbstractTimePrimitiveGroup"
  type="kml:AbstractTimePrimitiveType" abstract="true"
  substitutionGroup="kml:AbstractObjectGroup"/>
<complexType name="AbstractTimePrimitiveType" abstract="true">
  <complexContent>
    <extension base="kml:AbstractObjectType">
      <sequence>
        <element ref="kml:AbstractTimePrimitiveSimpleExtensionGroup"
          minOccurs="0" maxOccurs="unbounded"/>
        <element ref="kml:AbstractTimePrimitiveObjectExtensionGroup"
          minOccurs="0" maxOccurs="unbounded"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>
<element name="AbstractTimePrimitiveSimpleExtensionGroup"
abstract="true"
  type="anySimpleType"/>
<element name="AbstractTimePrimitiveObjectExtensionGroup"
abstract="true"
  substitutionGroup="kml:AbstractObjectGroup"/>

<element name="kml" type="kml:KmlType">
  <annotation>
    <documentation><![CDATA[

    <kml> is the root element.

    ]]></documentation>
  </annotation>
</element>
<complexType name="KmlType" final="#all">
  <sequence>
    <element ref="kml:NetworkLinkControl" minOccurs="0"/>
    <element ref="kml:AbstractFeatureGroup" minOccurs="0"/>
    <element ref="kml:KmlSimpleExtensionGroup" minOccurs="0"
      maxOccurs="unbounded"/>
    <element ref="kml:KmlObjectExtensionGroup" minOccurs="0"
      maxOccurs="unbounded"/>
  </sequence>
  <attribute name="hint" type="string"/>
</complexType>
<element name="KmlSimpleExtensionGroup" abstract="true"
type="anySimpleType"/>
<element name="KmlObjectExtensionGroup" abstract="true"
  substitutionGroup="kml:AbstractObjectGroup"/>

<element name="NetworkLinkControl" type="kml:NetworkLinkControlType"/>
<complexType name="NetworkLinkControlType" final="#all">
  <sequence>
    <element ref="kml:minRefreshPeriod" minOccurs="0"/>
    <element ref="kml:maxSessionLength" minOccurs="0"/>
    <element ref="kml:cookie" minOccurs="0"/>
```

```
      <element ref="kml:message" minOccurs="0"/>
      <element ref="kml:linkName" minOccurs="0"/>
      <element ref="kml:linkDescription" minOccurs="0"/>
      <element ref="kml:linkSnippet" minOccurs="0"/>
      <element ref="kml:expires" minOccurs="0"/>
      <element ref="kml:Update" minOccurs="0"/>
      <element ref="kml:AbstractViewGroup" minOccurs="0"/>
      <element ref="kml:NetworkLinkControlSimpleExtensionGroup"
minOccurs="0"
        maxOccurs="unbounded"/>
      <element ref="kml:NetworkLinkControlObjectExtensionGroup"
minOccurs="0"
        maxOccurs="unbounded"/>
    </sequence>
  </complexType>
  <element name="NetworkLinkControlSimpleExtensionGroup" abstract="true"
    type="anySimpleType"/>
  <element name="NetworkLinkControlObjectExtensionGroup" abstract="true"
    substitutionGroup="kml:AbstractObjectGroup"/>

  <element name="Document" type="kml:DocumentType"
    substitutionGroup="kml:AbstractContainerGroup"/>
  <complexType name="DocumentType" final="#all">
    <complexContent>
      <extension base="kml:AbstractContainerType">
        <sequence>
          <element ref="kml:Schema" minOccurs="0" maxOccurs="unbounded"/>
          <element ref="kml:AbstractFeatureGroup" minOccurs="0"
            maxOccurs="unbounded"/>
          <element ref="kml:DocumentSimpleExtensionGroup" minOccurs="0"
            maxOccurs="unbounded"/>
          <element ref="kml:DocumentObjectExtensionGroup" minOccurs="0"
            maxOccurs="unbounded"/>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
  <element name="DocumentSimpleExtensionGroup" abstract="true"
    type="anySimpleType"/>
  <element name="DocumentObjectExtensionGroup" abstract="true"
    substitutionGroup="kml:AbstractObjectGroup"/>

  <element name="Schema" type="kml:SchemaType"/>
  <complexType name="SchemaType" final="#all">
    <sequence>
      <element ref="kml:SimpleField" minOccurs="0" maxOccurs="unbounded"/>
      <element ref="kml:SchemaExtension" minOccurs="0"
maxOccurs="unbounded"/>
    </sequence>
    <attribute name="name" type="string"/>
    <attribute name="id" type="ID"/>
```

```
</complexType>
<element name="SchemaExtension" abstract="true"/>

<element name="SimpleField" type="kml:SimpleFieldType"/>
<complexType name="SimpleFieldType" final="#all">
  <sequence>
    <element ref="kml:displayName" minOccurs="0"/>
    <element ref="kml:SimpleFieldExtension" minOccurs="0"
      maxOccurs="unbounded"/>
  </sequence>
  <attribute name="type" type="string"/>
  <attribute name="name" type="string"/>
</complexType>
<element name="SimpleFieldExtension" abstract="true"/>

<element name="Folder" type="kml:FolderType"
  substitutionGroup="kml:AbstractContainerGroup"/>
<complexType name="FolderType" final="#all">
  <complexContent>
    <extension base="kml:AbstractContainerType">
      <sequence>
        <element ref="kml:AbstractFeatureGroup" minOccurs="0"
          maxOccurs="unbounded"/>
        <element ref="kml:FolderSimpleExtensionGroup" minOccurs="0"
          maxOccurs="unbounded"/>
        <element ref="kml:FolderObjectExtensionGroup" minOccurs="0"
          maxOccurs="unbounded"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>
<element name="FolderSimpleExtensionGroup" abstract="true"
  type="anySimpleType"/>
<element name="FolderObjectExtensionGroup" abstract="true"
  substitutionGroup="kml:AbstractObjectGroup"/>

<element name="Placemark" type="kml:PlacemarkType"
  substitutionGroup="kml:AbstractFeatureGroup"/>
<complexType name="PlacemarkType" final="#all">
  <complexContent>
    <extension base="kml:AbstractFeatureType">
      <sequence>
        <element ref="kml:AbstractGeometryGroup" minOccurs="0"/>
        <element ref="kml:PlacemarkSimpleExtensionGroup" minOccurs="0"
          maxOccurs="unbounded"/>
        <element ref="kml:PlacemarkObjectExtensionGroup" minOccurs="0"
          maxOccurs="unbounded"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>
<element name="PlacemarkSimpleExtensionGroup" abstract="true"
  type="anySimpleType"/>
```

```xml
<element name="PlacemarkObjectExtensionGroup" abstract="true"
  substitutionGroup="kml:AbstractObjectGroup"/>

<element name="NetworkLink" type="kml:NetworkLinkType"
  substitutionGroup="kml:AbstractFeatureGroup"/>
<complexType name="NetworkLinkType" final="#all">
  <complexContent>
    <extension base="kml:AbstractFeatureType">
      <sequence>
        <element ref="kml:refreshVisibility" minOccurs="0"/>
        <element ref="kml:flyToView" minOccurs="0"/>
        <element ref="kml:Link" minOccurs="0"/>
        <element ref="kml:NetworkLinkSimpleExtensionGroup" minOccurs="0"
          maxOccurs="unbounded"/>
        <element ref="kml:NetworkLinkObjectExtensionGroup" minOccurs="0"
          maxOccurs="unbounded"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>
<element name="NetworkLinkSimpleExtensionGroup" abstract="true"
  type="anySimpleType"/>
<element name="NetworkLinkObjectExtensionGroup" abstract="true"
  substitutionGroup="kml:AbstractObjectGroup"/>

<element name="Region" type="kml:RegionType"
  substitutionGroup="kml:AbstractObjectGroup"/>
<complexType name="RegionType" final="#all">
  <complexContent>
    <extension base="kml:AbstractObjectType">
      <sequence>
        <element ref="kml:LatLonAltBox" minOccurs="0"/>
        <element ref="kml:Lod" minOccurs="0"/>
        <element ref="kml:RegionSimpleExtensionGroup" minOccurs="0"
          maxOccurs="unbounded"/>
        <element ref="kml:RegionObjectExtensionGroup" minOccurs="0"
          maxOccurs="unbounded"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>
<element name="RegionSimpleExtensionGroup" abstract="true"
  type="anySimpleType"/>
<element name="RegionObjectExtensionGroup" abstract="true"
  substitutionGroup="kml:AbstractObjectGroup"/>

<element name="LatLonAltBox" type="kml:LatLonAltBoxType"
  substitutionGroup="kml:AbstractObjectGroup"/>
<complexType name="LatLonAltBoxType" final="#all">
  <complexContent>
    <extension base="kml:AbstractLatLonBoxType">
```

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```
        <sequence>
          <element ref="kml:minAltitude" minOccurs="0"/>
          <element ref="kml:maxAltitude" minOccurs="0"/>
          <element ref="kml:altitudeModeGroup" minOccurs="0"/>
          <element ref="kml:LatLonAltBoxSimpleExtensionGroup"
minOccurs="0"
            maxOccurs="unbounded"/>
          <element ref="kml:LatLonAltBoxObjectExtensionGroup"
minOccurs="0"
            maxOccurs="unbounded"/>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
  <element name="LatLonAltBoxSimpleExtensionGroup" abstract="true"
    type="anySimpleType"/>
  <element name="LatLonAltBoxObjectExtensionGroup" abstract="true"
    substitutionGroup="kml:AbstractObjectGroup"/>

  <element name="Lod" type="kml:LodType"
    substitutionGroup="kml:AbstractObjectGroup"/>
  <complexType name="LodType" final="#all">
    <complexContent>
      <extension base="kml:AbstractObjectType">
        <sequence>
          <element ref="kml:minLodPixels" minOccurs="0"/>
          <element ref="kml:maxLodPixels" minOccurs="0"/>
          <element ref="kml:minFadeExtent" minOccurs="0"/>
          <element ref="kml:maxFadeExtent" minOccurs="0"/>
          <element ref="kml:LodSimpleExtensionGroup" minOccurs="0"
            maxOccurs="unbounded"/>
          <element ref="kml:LodObjectExtensionGroup" minOccurs="0"
            maxOccurs="unbounded"/>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
  <element name="LodSimpleExtensionGroup" abstract="true"
type="anySimpleType"/>
  <element name="LodObjectExtensionGroup" abstract="true"
    substitutionGroup="kml:AbstractObjectGroup"/>

  <element name="Icon" type="kml:LinkType"
    substitutionGroup="kml:AbstractObjectGroup"/>
  <element name="Link" type="kml:LinkType"
    substitutionGroup="kml:AbstractObjectGroup"/>
  <complexType name="LinkType" final="#all">
    <complexContent>
      <extension base="kml:BasicLinkType">
        <sequence>
          <element ref="kml:refreshMode" minOccurs="0"/>
          <element ref="kml:refreshInterval" minOccurs="0"/>
          <element ref="kml:viewRefreshMode" minOccurs="0"/>
```

```
            <element ref="kml:viewRefreshTime" minOccurs="0"/>
            <element ref="kml:viewBoundScale" minOccurs="0"/>
            <element ref="kml:viewFormat" minOccurs="0"/>
            <element ref="kml:httpQuery" minOccurs="0"/>
            <element ref="kml:LinkSimpleExtensionGroup" minOccurs="0"
              maxOccurs="unbounded"/>
            <element ref="kml:LinkObjectExtensionGroup" minOccurs="0"
              maxOccurs="unbounded"/>
          </sequence>
        </extension>
      </complexContent>
    </complexType>
    <element name="LinkSimpleExtensionGroup" abstract="true"
      type="anySimpleType"/>
    <element name="LinkObjectExtensionGroup" abstract="true"
      substitutionGroup="kml:AbstractObjectGroup"/>

    <element name="MultiGeometry" type="kml:MultiGeometryType"
      substitutionGroup="kml:AbstractGeometryGroup"/>
    <complexType name="MultiGeometryType" final="#all">
      <complexContent>
        <extension base="kml:AbstractGeometryType">
          <sequence>
            <element ref="kml:AbstractGeometryGroup" minOccurs="0"
              maxOccurs="unbounded"/>
            <element ref="kml:MultiGeometrySimpleExtensionGroup"
minOccurs="0"
              maxOccurs="unbounded"/>
            <element ref="kml:MultiGeometryObjectExtensionGroup"
minOccurs="0"
              maxOccurs="unbounded"/>
          </sequence>
        </extension>
      </complexContent>
    </complexType>
    <element name="MultiGeometrySimpleExtensionGroup" abstract="true"
      type="anySimpleType"/>
    <element name="MultiGeometryObjectExtensionGroup" abstract="true"
      substitutionGroup="kml:AbstractObjectGroup"/>

    <element name="Point" type="kml:PointType"
      substitutionGroup="kml:AbstractGeometryGroup"/>
    <complexType name="PointType" final="#all">
      <complexContent>
        <extension base="kml:AbstractGeometryType">
          <sequence>
            <element ref="kml:extrude" minOccurs="0"/>
            <element ref="kml:altitudeModeGroup" minOccurs="0"/>
            <element ref="kml:coordinates" minOccurs="0"/>
            <element ref="kml:PointSimpleExtensionGroup" minOccurs="0"
              maxOccurs="unbounded"/>
```

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```xml
            <element ref="kml:PointObjectExtensionGroup" minOccurs="0"
              maxOccurs="unbounded"/>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
  <element name="PointSimpleExtensionGroup" abstract="true"
    type="anySimpleType"/>
  <element name="PointObjectExtensionGroup" abstract="true"
    substitutionGroup="kml:AbstractObjectGroup"/>

  <element name="LineString" type="kml:LineStringType"
    substitutionGroup="kml:AbstractGeometryGroup"/>
  <complexType name="LineStringType" final="#all">
    <complexContent>
      <extension base="kml:AbstractGeometryType">
        <sequence>
          <element ref="kml:extrude" minOccurs="0"/>
          <element ref="kml:tessellate" minOccurs="0"/>
          <element ref="kml:altitudeModeGroup" minOccurs="0"/>
          <element ref="kml:coordinates" minOccurs="0"/>
          <element ref="kml:LineStringSimpleExtensionGroup" minOccurs="0"
            maxOccurs="unbounded"/>
          <element ref="kml:LineStringObjectExtensionGroup" minOccurs="0"
            maxOccurs="unbounded"/>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
  <element name="LineStringSimpleExtensionGroup" abstract="true"
    type="anySimpleType"/>
  <element name="LineStringObjectExtensionGroup" abstract="true"
    substitutionGroup="kml:AbstractObjectGroup"/>

  <element name="LinearRing" type="kml:LinearRingType"
    substitutionGroup="kml:AbstractGeometryGroup"/>
  <complexType name="LinearRingType" final="#all">
    <complexContent>
      <extension base="kml:AbstractGeometryType">
        <sequence>
          <element ref="kml:extrude" minOccurs="0"/>
          <element ref="kml:tessellate" minOccurs="0"/>
          <element ref="kml:altitudeModeGroup" minOccurs="0"/>
          <element ref="kml:coordinates" minOccurs="0"/>
          <element ref="kml:LinearRingSimpleExtensionGroup" minOccurs="0"
            maxOccurs="unbounded"/>
          <element ref="kml:LinearRingObjectExtensionGroup" minOccurs="0"
            maxOccurs="unbounded"/>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
  <element name="LinearRingSimpleExtensionGroup" abstract="true"
```

```
    type="anySimpleType"/>
<element name="LinearRingObjectExtensionGroup" abstract="true"
  substitutionGroup="kml:AbstractObjectGroup"/>

<element name="Polygon" type="kml:PolygonType"
  substitutionGroup="kml:AbstractGeometryGroup"/>
<complexType name="PolygonType" final="#all">
  <complexContent>
    <extension base="kml:AbstractGeometryType">
      <sequence>
        <element ref="kml:extrude" minOccurs="0"/>
        <element ref="kml:tessellate" minOccurs="0"/>
        <element ref="kml:altitudeModeGroup" minOccurs="0"/>
        <element ref="kml:outerBoundaryIs" minOccurs="0"/>
        <element ref="kml:innerBoundaryIs" minOccurs="0"
          maxOccurs="unbounded"/>
        <element ref="kml:PolygonSimpleExtensionGroup" minOccurs="0"
          maxOccurs="unbounded"/>
        <element ref="kml:PolygonObjectExtensionGroup" minOccurs="0"
          maxOccurs="unbounded"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>
<element name="PolygonSimpleExtensionGroup" abstract="true"
  type="anySimpleType"/>
<element name="PolygonObjectExtensionGroup" abstract="true"
  substitutionGroup="kml:AbstractObjectGroup"/>

<element name="outerBoundaryIs" type="kml:BoundaryType"/>
<element name="innerBoundaryIs" type="kml:BoundaryType"/>
<complexType name="BoundaryType" final="#all">
  <sequence>
    <element ref="kml:LinearRing" minOccurs="0"/>
    <element ref="kml:BoundarySimpleExtensionGroup" minOccurs="0"
      maxOccurs="unbounded"/>
    <element ref="kml:BoundaryObjectExtensionGroup" minOccurs="0"
      maxOccurs="unbounded"/>
  </sequence>
</complexType>
<element name="BoundarySimpleExtensionGroup" abstract="true"
  type="anySimpleType"/>
<element name="BoundaryObjectExtensionGroup" abstract="true"
  substitutionGroup="kml:AbstractObjectGroup"/>

<element name="Model" type="kml:ModelType"
  substitutionGroup="kml:AbstractGeometryGroup"/>
<complexType name="ModelType" final="#all">
  <complexContent>
    <extension base="kml:AbstractGeometryType">
      <sequence>
```

```
            <element ref="kml:altitudeModeGroup" minOccurs="0"/>
            <element ref="kml:Location" minOccurs="0"/>
            <element ref="kml:Orientation" minOccurs="0"/>
            <element ref="kml:Scale" minOccurs="0"/>
            <element ref="kml:Link" minOccurs="0"/>
            <element ref="kml:ResourceMap" minOccurs="0"/>
            <element ref="kml:ModelSimpleExtensionGroup" minOccurs="0"
              maxOccurs="unbounded"/>
            <element ref="kml:ModelObjectExtensionGroup" minOccurs="0"
              maxOccurs="unbounded"/>
          </sequence>
        </extension>
      </complexContent>
    </complexType>
    <element name="ModelSimpleExtensionGroup" abstract="true"
      type="anySimpleType"/>
    <element name="ModelObjectExtensionGroup" abstract="true"
      substitutionGroup="kml:AbstractObjectGroup"/>

    <element name="Location" type="kml:LocationType"
      substitutionGroup="kml:AbstractObjectGroup"/>
    <complexType name="LocationType" final="#all">
      <complexContent>
        <extension base="kml:AbstractObjectType">
          <sequence>
            <element ref="kml:longitude" minOccurs="0"/>
            <element ref="kml:latitude" minOccurs="0"/>
            <element ref="kml:altitude" minOccurs="0"/>
            <element ref="kml:LocationSimpleExtensionGroup" minOccurs="0"
              maxOccurs="unbounded"/>
            <element ref="kml:LocationObjectExtensionGroup" minOccurs="0"
              maxOccurs="unbounded"/>
          </sequence>
        </extension>
      </complexContent>
    </complexType>
    <element name="LocationSimpleExtensionGroup" abstract="true"
      type="anySimpleType"/>
    <element name="LocationObjectExtensionGroup" abstract="true"
      substitutionGroup="kml:AbstractObjectGroup"/>

    <element name="Orientation" type="kml:OrientationType"
      substitutionGroup="kml:AbstractObjectGroup"/>
    <complexType name="OrientationType" final="#all">
      <complexContent>
        <extension base="kml:AbstractObjectType">
          <sequence>
            <element ref="kml:heading" minOccurs="0"/>
            <element ref="kml:tilt" minOccurs="0"/>
            <element ref="kml:roll" minOccurs="0"/>
            <element ref="kml:OrientationSimpleExtensionGroup" minOccurs="0"
              maxOccurs="unbounded"/>
            <element ref="kml:OrientationObjectExtensionGroup" minOccurs="0"
```

```
              maxOccurs="unbounded"/>
        </sequence>
      </extension>
   </complexContent>
</complexType>
<element name="OrientationSimpleExtensionGroup" abstract="true"
   type="anySimpleType"/>
<element name="OrientationObjectExtensionGroup" abstract="true"
   substitutionGroup="kml:AbstractObjectGroup"/>

<element name="Scale" type="kml:ScaleType"
   substitutionGroup="kml:AbstractObjectGroup"/>
<complexType name="ScaleType" final="#all">
   <complexContent>
      <extension base="kml:AbstractObjectType">
        <sequence>
          <element ref="kml:x" minOccurs="0"/>
          <element ref="kml:y" minOccurs="0"/>
          <element ref="kml:z" minOccurs="0"/>
          <element ref="kml:ScaleSimpleExtensionGroup" minOccurs="0"
            maxOccurs="unbounded"/>
          <element ref="kml:ScaleObjectExtensionGroup" minOccurs="0"
            maxOccurs="unbounded"/>
        </sequence>
      </extension>
   </complexContent>
</complexType>
<element name="ScaleSimpleExtensionGroup" abstract="true"
   type="anySimpleType"/>
<element name="ScaleObjectExtensionGroup" abstract="true"
   substitutionGroup="kml:AbstractObjectGroup"/>

<element name="ResourceMap" type="kml:ResourceMapType"
   substitutionGroup="kml:AbstractObjectGroup"/>
<complexType name="ResourceMapType" final="#all">
   <complexContent>
      <extension base="kml:AbstractObjectType">
        <sequence>
          <element ref="kml:Alias" minOccurs="0" maxOccurs="unbounded"/>
          <element ref="kml:ResourceMapSimpleExtensionGroup" minOccurs="0"
            maxOccurs="unbounded"/>
          <element ref="kml:ResourceMapObjectExtensionGroup" minOccurs="0"
            maxOccurs="unbounded"/>
        </sequence>
      </extension>
   </complexContent>
</complexType>
<element name="ResourceMapSimpleExtensionGroup" abstract="true"
   type="anySimpleType"/>
<element name="ResourceMapObjectExtensionGroup" abstract="true"
   substitutionGroup="kml:AbstractObjectGroup"/>
```

```xml
<element name="Alias" type="kml:AliasType"
  substitutionGroup="kml:AbstractObjectGroup"/>
<complexType name="AliasType" final="#all">
  <complexContent>
    <extension base="kml:AbstractObjectType">
      <sequence>
        <element ref="kml:targetHref" minOccurs="0"/>
        <element ref="kml:sourceHref" minOccurs="0"/>
        <element ref="kml:AliasSimpleExtensionGroup" minOccurs="0"
          maxOccurs="unbounded"/>
        <element ref="kml:AliasObjectExtensionGroup" minOccurs="0"
          maxOccurs="unbounded"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>
<element name="AliasSimpleExtensionGroup" abstract="true"
  type="anySimpleType"/>
<element name="AliasObjectExtensionGroup" abstract="true"
  substitutionGroup="kml:AbstractObjectGroup"/>

<element name="GroundOverlay" type="kml:GroundOverlayType"
  substitutionGroup="kml:AbstractOverlayGroup"/>
<complexType name="GroundOverlayType" final="#all">
  <complexContent>
    <extension base="kml:AbstractOverlayType">
      <sequence>
        <element ref="kml:altitude" minOccurs="0"/>
        <element ref="kml:altitudeModeGroup" minOccurs="0"/>
        <element ref="kml:LatLonBox" minOccurs="0"/>
        <element ref="kml:GroundOverlaySimpleExtensionGroup"
minOccurs="0"
          maxOccurs="unbounded"/>
        <element ref="kml:GroundOverlayObjectExtensionGroup"
minOccurs="0"
          maxOccurs="unbounded"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>
<element name="GroundOverlaySimpleExtensionGroup" abstract="true"
  type="anySimpleType"/>
<element name="GroundOverlayObjectExtensionGroup" abstract="true"
  substitutionGroup="kml:AbstractObjectGroup"/>

<complexType name="AbstractLatLonBoxType" abstract="true">
  <complexContent>
    <extension base="kml:AbstractObjectType">
      <sequence>
        <element ref="kml:north" minOccurs="0"/>
        <element ref="kml:south" minOccurs="0"/>
        <element ref="kml:east" minOccurs="0"/>
```

```
        <element ref="kml:west" minOccurs="0"/>
        <element ref="kml:AbstractLatLonBoxSimpleExtensionGroup"
          minOccurs="0" maxOccurs="unbounded"/>
        <element ref="kml:AbstractLatLonBoxObjectExtensionGroup"
          minOccurs="0" maxOccurs="unbounded"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>
<element name="AbstractLatLonBoxSimpleExtensionGroup" abstract="true"
  type="anySimpleType"/>
<element name="AbstractLatLonBoxObjectExtensionGroup" abstract="true"
  substitutionGroup="kml:AbstractObjectGroup"/>

<element name="LatLonBox" type="kml:LatLonBoxType"
  substitutionGroup="kml:AbstractObjectGroup"/>
<complexType name="LatLonBoxType" final="#all">
  <complexContent>
    <extension base="kml:AbstractLatLonBoxType">
      <sequence>
        <element ref="kml:rotation" minOccurs="0"/>
        <element ref="kml:LatLonBoxSimpleExtensionGroup" minOccurs="0"
          maxOccurs="unbounded"/>
        <element ref="kml:LatLonBoxObjectExtensionGroup" minOccurs="0"
          maxOccurs="unbounded"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>
<element name="LatLonBoxSimpleExtensionGroup" abstract="true"
  type="anySimpleType"/>
<element name="LatLonBoxObjectExtensionGroup" abstract="true"
  substitutionGroup="kml:AbstractObjectGroup"/>

<element name="ScreenOverlay" type="kml:ScreenOverlayType"
  substitutionGroup="kml:AbstractOverlayGroup"/>
<complexType name="ScreenOverlayType" final="#all">
  <complexContent>
    <extension base="kml:AbstractOverlayType">
      <sequence>
        <element name="overlayXY" type="kml:vec2Type" minOccurs="0"/>
        <element name="screenXY" type="kml:vec2Type" minOccurs="0"/>
        <element name="rotationXY" type="kml:vec2Type" minOccurs="0"/>
        <element name="size" type="kml:vec2Type" minOccurs="0"/>
        <element ref="kml:rotation" minOccurs="0"/>
        <element ref="kml:ScreenOverlaySimpleExtensionGroup"
minOccurs="0"
          maxOccurs="unbounded"/>
        <element ref="kml:ScreenOverlayObjectExtensionGroup"
minOccurs="0"
          maxOccurs="unbounded"/>
```

```
        </sequence>
      </extension>
    </complexContent>
  </complexType>
  <element name="ScreenOverlaySimpleExtensionGroup" abstract="true"
    type="anySimpleType"/>
  <element name="ScreenOverlayObjectExtensionGroup" abstract="true"
    substitutionGroup="kml:AbstractObjectGroup"/>

  <element name="PhotoOverlay" type="kml:PhotoOverlayType"
    substitutionGroup="kml:AbstractOverlayGroup"/>
  <complexType name="PhotoOverlayType" final="#all">
    <complexContent>
      <extension base="kml:AbstractOverlayType">
        <sequence>
          <element ref="kml:rotation" minOccurs="0"/>
          <element ref="kml:ViewVolume" minOccurs="0"/>
          <element ref="kml:ImagePyramid" minOccurs="0"/>
          <element ref="kml:Point" minOccurs="0"/>
          <element ref="kml:shape" minOccurs="0"/>
          <element ref="kml:PhotoOverlaySimpleExtensionGroup"
minOccurs="0"
            maxOccurs="unbounded"/>
          <element ref="kml:PhotoOverlayObjectExtensionGroup"
minOccurs="0"
            maxOccurs="unbounded"/>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
  <element name="PhotoOverlaySimpleExtensionGroup" abstract="true"
    type="anySimpleType"/>
  <element name="PhotoOverlayObjectExtensionGroup" abstract="true"
    substitutionGroup="kml:AbstractObjectGroup"/>

  <element name="ViewVolume" type="kml:ViewVolumeType"
    substitutionGroup="kml:AbstractObjectGroup"/>
  <complexType name="ViewVolumeType" final="#all">
    <complexContent>
      <extension base="kml:AbstractObjectType">
        <sequence>
          <element ref="kml:leftFov" minOccurs="0"/>
          <element ref="kml:rightFov" minOccurs="0"/>
          <element ref="kml:bottomFov" minOccurs="0"/>
          <element ref="kml:topFov" minOccurs="0"/>
          <element ref="kml:near" minOccurs="0"/>
          <element ref="kml:ViewVolumeSimpleExtensionGroup" minOccurs="0"
            maxOccurs="unbounded"/>
          <element ref="kml:ViewVolumeObjectExtensionGroup" minOccurs="0"
            maxOccurs="unbounded"/>
        </sequence>
      </extension>
    </complexContent>
```

```
    </complexType>
    <element name="ViewVolumeSimpleExtensionGroup" abstract="true"
      type="anySimpleType"/>
    <element name="ViewVolumeObjectExtensionGroup" abstract="true"
      substitutionGroup="kml:AbstractObjectGroup"/>

    <element name="ImagePyramid" type="kml:ImagePyramidType"
      substitutionGroup="kml:AbstractObjectGroup"/>
    <complexType name="ImagePyramidType" final="#all">
      <complexContent>
        <extension base="kml:AbstractObjectType">
          <sequence>
            <element ref="kml:tileSize" minOccurs="0"/>
            <element ref="kml:maxWidth" minOccurs="0"/>
            <element ref="kml:maxHeight" minOccurs="0"/>
            <element ref="kml:gridOrigin" minOccurs="0"/>
            <element ref="kml:ImagePyramidSimpleExtensionGroup"
minOccurs="0"
              maxOccurs="unbounded"/>
            <element ref="kml:ImagePyramidObjectExtensionGroup"
minOccurs="0"
              maxOccurs="unbounded"/>
          </sequence>
        </extension>
      </complexContent>
    </complexType>
    <element name="ImagePyramidSimpleExtensionGroup" abstract="true"
      type="anySimpleType"/>
    <element name="ImagePyramidObjectExtensionGroup" abstract="true"
      substitutionGroup="kml:AbstractObjectGroup"/>

    <element name="Style" type="kml:StyleType"
      substitutionGroup="kml:AbstractStyleSelectorGroup"/>
    <complexType name="StyleType" final="#all">
      <complexContent>
        <extension base="kml:AbstractStyleSelectorType">
          <sequence>
            <element ref="kml:IconStyle" minOccurs="0"/>
            <element ref="kml:LabelStyle" minOccurs="0"/>
            <element ref="kml:LineStyle" minOccurs="0"/>
            <element ref="kml:PolyStyle" minOccurs="0"/>
            <element ref="kml:BalloonStyle" minOccurs="0"/>
            <element ref="kml:ListStyle" minOccurs="0"/>
            <element ref="kml:StyleSimpleExtensionGroup" minOccurs="0"
              maxOccurs="unbounded"/>
            <element ref="kml:StyleObjectExtensionGroup" minOccurs="0"
              maxOccurs="unbounded"/>
          </sequence>
        </extension>
      </complexContent>
    </complexType>
```

```xml
<element name="StyleSimpleExtensionGroup" abstract="true"
  type="anySimpleType"/>
<element name="StyleObjectExtensionGroup" abstract="true"
  substitutionGroup="kml:AbstractObjectGroup"/>

<element name="StyleMap" type="kml:StyleMapType"
  substitutionGroup="kml:AbstractStyleSelectorGroup"/>
<complexType name="StyleMapType" final="#all">
  <complexContent>
    <extension base="kml:AbstractStyleSelectorType">
      <sequence>
        <element ref="kml:Pair" minOccurs="0" maxOccurs="unbounded"/>
        <element ref="kml:StyleMapSimpleExtensionGroup" minOccurs="0"
          maxOccurs="unbounded"/>
        <element ref="kml:StyleMapObjectExtensionGroup" minOccurs="0"
          maxOccurs="unbounded"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>
<element name="StyleMapSimpleExtensionGroup" abstract="true"
  type="anySimpleType"/>
<element name="StyleMapObjectExtensionGroup" abstract="true"
  substitutionGroup="kml:AbstractObjectGroup"/>

<element name="Pair" type="kml:PairType"
  substitutionGroup="kml:AbstractObjectGroup"/>
<complexType name="PairType" final="#all">
  <complexContent>
    <extension base="kml:AbstractObjectType">
      <sequence>
        <element ref="kml:key" minOccurs="0"/>
        <element ref="kml:styleUrl" minOccurs="0"/>
        <element ref="kml:AbstractStyleSelectorGroup" minOccurs="0"/>
        <element ref="kml:PairSimpleExtensionGroup" minOccurs="0"
          maxOccurs="unbounded"/>
        <element ref="kml:PairObjectExtensionGroup" minOccurs="0"
          maxOccurs="unbounded"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>
<element name="PairSimpleExtensionGroup" abstract="true"
  type="anySimpleType"/>
<element name="PairObjectExtensionGroup" abstract="true"
  substitutionGroup="kml:AbstractObjectGroup"/>

<element name="AbstractSubStyleGroup" type="kml:AbstractSubStyleType"
  abstract="true" substitutionGroup="kml:AbstractObjectGroup"/>
<complexType name="AbstractSubStyleType" abstract="true">
  <complexContent>
    <extension base="kml:AbstractObjectType">
      <sequence>
```

```
            <element ref="kml:AbstractSubStyleSimpleExtensionGroup"
minOccurs="0"
              maxOccurs="unbounded"/>
            <element ref="kml:AbstractSubStyleObjectExtensionGroup"
minOccurs="0"
              maxOccurs="unbounded"/>
          </sequence>
        </extension>
      </complexContent>
    </complexType>
    <element name="AbstractSubStyleSimpleExtensionGroup" abstract="true"
      type="anySimpleType"/>
    <element name="AbstractSubStyleObjectExtensionGroup" abstract="true"
      substitutionGroup="kml:AbstractObjectGroup"/>

    <element name="AbstractColorStyleGroup"
type="kml:AbstractColorStyleType"
      abstract="true" substitutionGroup="kml:AbstractSubStyleGroup"/>
    <complexType name="AbstractColorStyleType" abstract="true">
      <complexContent>
        <extension base="kml:AbstractSubStyleType">
          <sequence>
            <element ref="kml:color" minOccurs="0"/>
            <element ref="kml:colorMode" minOccurs="0"/>
            <element ref="kml:AbstractColorStyleSimpleExtensionGroup"
              minOccurs="0" maxOccurs="unbounded"/>
            <element ref="kml:AbstractColorStyleObjectExtensionGroup"
              minOccurs="0" maxOccurs="unbounded"/>
          </sequence>
        </extension>
      </complexContent>
    </complexType>
    <element name="AbstractColorStyleObjectExtensionGroup" abstract="true"
      substitutionGroup="kml:AbstractObjectGroup"/>
    <element name="AbstractColorStyleSimpleExtensionGroup" abstract="true"
      type="anySimpleType"/>

    <element name="IconStyle" type="kml:IconStyleType"
      substitutionGroup="kml:AbstractColorStyleGroup"/>
    <complexType name="IconStyleType" final="#all">
      <complexContent>
        <extension base="kml:AbstractColorStyleType">
          <sequence>
            <element ref="kml:scale" minOccurs="0"/>
            <element ref="kml:heading" minOccurs="0"/>
            <element name="Icon" type="kml:BasicLinkType" minOccurs="0"/>
            <element ref="kml:hotSpot" minOccurs="0"/>
            <element ref="kml:IconStyleSimpleExtensionGroup" minOccurs="0"
              maxOccurs="unbounded"/>
            <element ref="kml:IconStyleObjectExtensionGroup" minOccurs="0"
              maxOccurs="unbounded"/>
```

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```xml
          </sequence>
        </extension>
      </complexContent>
    </complexType>
    <element name="IconStyleSimpleExtensionGroup" abstract="true"
      type="anySimpleType"/>
    <element name="IconStyleObjectExtensionGroup" abstract="true"
      substitutionGroup="kml:AbstractObjectGroup"/>

    <complexType name="BasicLinkType">
      <complexContent>
        <extension base="kml:AbstractObjectType">
          <sequence>
            <element ref="kml:href" minOccurs="0"/>
            <element ref="kml:BasicLinkSimpleExtensionGroup" minOccurs="0"
              maxOccurs="unbounded"/>
            <element ref="kml:BasicLinkObjectExtensionGroup" minOccurs="0"
              maxOccurs="unbounded"/>
          </sequence>
        </extension>
      </complexContent>
    </complexType>
    <element name="BasicLinkSimpleExtensionGroup" abstract="true"
      type="anySimpleType"/>
    <element name="BasicLinkObjectExtensionGroup" abstract="true"
      substitutionGroup="kml:AbstractObjectGroup"/>

    <element name="LabelStyle" type="kml:LabelStyleType"
      substitutionGroup="kml:AbstractColorStyleGroup"/>
    <complexType name="LabelStyleType" final="#all">
      <complexContent>
        <extension base="kml:AbstractColorStyleType">
          <sequence>
            <element ref="kml:scale" minOccurs="0"/>
            <element ref="kml:LabelStyleSimpleExtensionGroup" minOccurs="0"
              maxOccurs="unbounded"/>
            <element ref="kml:LabelStyleObjectExtensionGroup" minOccurs="0"
              maxOccurs="unbounded"/>
          </sequence>
        </extension>
      </complexContent>
    </complexType>
    <element name="LabelStyleSimpleExtensionGroup" abstract="true"
      type="anySimpleType"/>
    <element name="LabelStyleObjectExtensionGroup" abstract="true"
      substitutionGroup="kml:AbstractObjectGroup"/>

    <element name="LineStyle" type="kml:LineStyleType"
      substitutionGroup="kml:AbstractColorStyleGroup"/>
    <complexType name="LineStyleType" final="#all">
      <complexContent>
        <extension base="kml:AbstractColorStyleType">
          <sequence>
```

```xml
        <element ref="kml:width" minOccurs="0"/>
        <element ref="kml:LineStyleSimpleExtensionGroup" minOccurs="0"
          maxOccurs="unbounded"/>
        <element ref="kml:LineStyleObjectExtensionGroup" minOccurs="0"
          maxOccurs="unbounded"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>
<element name="LineStyleSimpleExtensionGroup" abstract="true"
  type="anySimpleType"/>
<element name="LineStyleObjectExtensionGroup" abstract="true"
  substitutionGroup="kml:AbstractObjectGroup"/>

<element name="PolyStyle" type="kml:PolyStyleType"
  substitutionGroup="kml:AbstractColorStyleGroup"/>
<complexType name="PolyStyleType" final="#all">
  <complexContent>
    <extension base="kml:AbstractColorStyleType">
      <sequence>
        <element ref="kml:fill" minOccurs="0"/>
        <element ref="kml:outline" minOccurs="0"/>
        <element ref="kml:PolyStyleSimpleExtensionGroup" minOccurs="0"
          maxOccurs="unbounded"/>
        <element ref="kml:PolyStyleObjectExtensionGroup" minOccurs="0"
          maxOccurs="unbounded"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>
<element name="PolyStyleSimpleExtensionGroup" abstract="true"
  type="anySimpleType"/>
<element name="PolyStyleObjectExtensionGroup" abstract="true"
  substitutionGroup="kml:AbstractObjectGroup"/>

<element name="BalloonStyle" type="kml:BalloonStyleType"
  substitutionGroup="kml:AbstractSubStyleGroup"/>
<complexType name="BalloonStyleType" final="#all">
  <complexContent>
    <extension base="kml:AbstractSubStyleType">
      <sequence>
        <choice>
          <annotation>
            <documentation><![CDATA[color deprecated in
2.1]]></documentation>
          </annotation>
          <element ref="kml:color" minOccurs="0"/>
          <element ref="kml:bgColor" minOccurs="0"/>
        </choice>
        <element ref="kml:textColor" minOccurs="0"/>
        <element ref="kml:text" minOccurs="0"/>
```

```
            <element ref="kml:displayMode" minOccurs="0"/>
            <element ref="kml:BalloonStyleSimpleExtensionGroup"
minOccurs="0"
               maxOccurs="unbounded"/>
            <element ref="kml:BalloonStyleObjectExtensionGroup"
minOccurs="0"
               maxOccurs="unbounded"/>
          </sequence>
        </extension>
      </complexContent>
    </complexType>
    <element name="BalloonStyleSimpleExtensionGroup" abstract="true"
      type="anySimpleType"/>
    <element name="BalloonStyleObjectExtensionGroup" abstract="true"
      substitutionGroup="kml:AbstractObjectGroup"/>

    <element name="ListStyle" type="kml:ListStyleType"
      substitutionGroup="kml:AbstractSubStyleGroup"/>
    <complexType name="ListStyleType" final="#all">
      <complexContent>
        <extension base="kml:AbstractSubStyleType">
          <sequence>
            <element ref="kml:listItemType" minOccurs="0"/>
            <element ref="kml:bgColor" minOccurs="0"/>
            <element ref="kml:ItemIcon" minOccurs="0"
maxOccurs="unbounded"/>
            <element ref="kml:maxSnippetLines" minOccurs="0"/>
            <element ref="kml:ListStyleSimpleExtensionGroup" minOccurs="0"
               maxOccurs="unbounded"/>
            <element ref="kml:ListStyleObjectExtensionGroup" minOccurs="0"
               maxOccurs="unbounded"/>
          </sequence>
        </extension>
      </complexContent>
    </complexType>
    <element name="ListStyleSimpleExtensionGroup" abstract="true"
      type="anySimpleType"/>
    <element name="ListStyleObjectExtensionGroup" abstract="true"
      substitutionGroup="kml:AbstractObjectGroup"/>

    <element name="ItemIcon" type="kml:ItemIconType"
      substitutionGroup="kml:AbstractObjectGroup"/>
    <complexType name="ItemIconType" final="#all">
      <complexContent>
        <extension base="kml:AbstractObjectType">
          <sequence>
            <element ref="kml:state" minOccurs="0"/>
            <element ref="kml:href" minOccurs="0"/>
            <element ref="kml:ItemIconSimpleExtensionGroup" minOccurs="0"
               maxOccurs="unbounded"/>
            <element ref="kml:ItemIconObjectExtensionGroup" minOccurs="0"
               maxOccurs="unbounded"/>
          </sequence>
```

```xml
        </extension>
      </complexContent>
    </complexType>
    <element name="ItemIconSimpleExtensionGroup" abstract="true"
      type="anySimpleType"/>
    <element name="ItemIconObjectExtensionGroup" abstract="true"
      substitutionGroup="kml:AbstractObjectGroup"/>

    <element name="TimeStamp" type="kml:TimeStampType"
      substitutionGroup="kml:AbstractTimePrimitiveGroup"/>
    <complexType name="TimeStampType" final="#all">
      <complexContent>
        <extension base="kml:AbstractTimePrimitiveType">
          <sequence>
            <element ref="kml:when" minOccurs="0"/>
            <element ref="kml:TimeStampSimpleExtensionGroup" minOccurs="0"
              maxOccurs="unbounded"/>
            <element ref="kml:TimeStampObjectExtensionGroup" minOccurs="0"
              maxOccurs="unbounded"/>
          </sequence>
        </extension>
      </complexContent>
    </complexType>
    <element name="TimeStampSimpleExtensionGroup" abstract="true"
      type="anySimpleType"/>
    <element name="TimeStampObjectExtensionGroup" abstract="true"
      substitutionGroup="kml:AbstractObjectGroup"/>

    <element name="TimeSpan" type="kml:TimeSpanType"
      substitutionGroup="kml:AbstractTimePrimitiveGroup"/>
    <complexType name="TimeSpanType" final="#all">
      <complexContent>
        <extension base="kml:AbstractTimePrimitiveType">
          <sequence>
            <element ref="kml:begin" minOccurs="0"/>
            <element ref="kml:end" minOccurs="0"/>
            <element ref="kml:TimeSpanSimpleExtensionGroup" minOccurs="0"
              maxOccurs="unbounded"/>
            <element ref="kml:TimeSpanObjectExtensionGroup" minOccurs="0"
              maxOccurs="unbounded"/>
          </sequence>
        </extension>
      </complexContent>
    </complexType>
    <element name="TimeSpanSimpleExtensionGroup" abstract="true"
      type="anySimpleType"/>
    <element name="TimeSpanObjectExtensionGroup" abstract="true"
      substitutionGroup="kml:AbstractObjectGroup"/>

    <element name="Update" type="kml:UpdateType"/>
    <complexType name="UpdateType" final="#all">
```

```
    <sequence>
      <element name="targetHref" type="anyURI"/>
      <choice maxOccurs="unbounded">
        <element ref="kml:Create"/>
        <element ref="kml:Delete"/>
        <element ref="kml:Change"/>
        <element ref="kml:UpdateOpExtensionGroup"></element>
      </choice>
      <element ref="kml:UpdateExtensionGroup" minOccurs="0"
        maxOccurs="unbounded"/>
    </sequence>
  </complexType>
  <element name="UpdateOpExtensionGroup" abstract="true"/>
  <element name="UpdateExtensionGroup" abstract="true"/>

  <element name="Create" type="kml:CreateType"/>
  <complexType name="CreateType">
    <sequence>
      <element ref="kml:AbstractContainerGroup" minOccurs="0"
        maxOccurs="unbounded"/>
    </sequence>
  </complexType>

  <element name="Delete" type="kml:DeleteType"/>
  <complexType name="DeleteType">
    <sequence>
      <element ref="kml:AbstractFeatureGroup" minOccurs="0"
        maxOccurs="unbounded"/>
    </sequence>
  </complexType>

  <element name="Change" type="kml:ChangeType"/>
  <complexType name="ChangeType">
    <sequence>
      <element ref="kml:AbstractObjectGroup" minOccurs="0"
        maxOccurs="unbounded"/>
    </sequence>
  </complexType>

</schema>
```

Atom schema (atom-author-link.xsd)

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

  There is no official atom XSD.

  This XSD is created based on:
  http://atompub.org/2005/08/17/atom.rnc

  A subset of Atom as used in the ogckml22.xsd
  is defined here.

-->
<xs:schema
  xmlns:xs="http://www.w3.org/2001/XMLSchema"
  elementFormDefault="qualified"
  targetNamespace="http://www.w3.org/2005/Atom"
  xmlns:atom="http://www.w3.org/2005/Atom"
  version="0.1.0">

  <!-- Person Construct -->
  <xs:complexType name="atomPersonConstruct">
    <xs:choice minOccurs="0" maxOccurs="unbounded">
      <xs:element ref="atom:name"/>
      <xs:element ref="atom:uri"/>
      <xs:element ref="atom:email"/>
    </xs:choice>
  </xs:complexType>

  <xs:element name="name" type="xs:string"/>
  <xs:element name="uri" type="xs:string"/>
  <xs:element name="email" type="atom:atomEmailAddress"/>

  <!-- atom:author -->
  <xs:element name="author" type="atom:atomPersonConstruct"/>

  <!-- atom:link -->
  <xs:element name="link">
    <xs:complexType>

          <xs:attribute name="href" use="required"/>
          <xs:attribute name="rel"/>
          <xs:attribute name="type" type="atom:atomMediaType"/>
          <xs:attribute name="hreflang" type="atom:atomLanguageTag"/>
          <xs:attribute name="title"/>
          <xs:attribute name="length"/>

    </xs:complexType>

  </xs:element>

  <!-- Whatever a media type is, it contains at least one slash -->
  <xs:simpleType name="atomMediaType">
    <xs:restriction base="xs:string">
      <xs:pattern value=".+/.+"/>
```

```
      </xs:restriction>
    </xs:simpleType>

    <!-- As defined in RFC 3066 -->
    <xs:simpleType name="atomLanguageTag">
      <xs:restriction base="xs:string">
        <xs:pattern value="[A-Za-z]{1,8}(-[A-Za-z0-9]{1,8})*"/>
      </xs:restriction>
    </xs:simpleType>

    <!--
      Unconstrained; it's not entirely clear how IRI fit into
      xsd:anyURI so let's not try to constrain it here
    -->
    <!-- Whatever an email address is, it contains at least one @ -->
    <xs:simpleType name="atomEmailAddress">
      <xs:restriction base="xs:string">
        <xs:pattern value=".+@.+"/>
      </xs:restriction>
    </xs:simpleType>

</xs:schema>
```

Annex B
(normative)

KML Coordinate Reference System Definition

```xml
<CompoundCRS gml:id="LonLat84_5773"
  xmlns="http://www.opengis.net/gml/3.2"
  xmlns:gml="http://www.opengis.net/gml/3.2"
  xmlns:xlink="http://www.w3.org/1999/xlink"
  aggregationType="sequence">

  <identifier codeSpace="http://www.opengeospatial.org/ogcna">
  urn:ogc:def:crs:OGC:LonLat84_5773
  </identifier>
  <name>Geographic 3D: Long(deg),Lat(deg),Height(m)</name>
  <scope>KML 3D coordinate reference system</scope>
  <componentReferenceSystem>
    <GeodeticCRS gml:id="LonLat84">
      <identifier codeSpace="http://www.opengeospatial.org/ogcna">
      urn:ogc:def:crs:OGC:LonLat84
      </identifier>
      <name>WGS 84 with long/lat axis order</name>
      <scope>KML geographic 2D coordinate reference system (adapted from EPSG-
4326).</scope>
      <usesEllipsoidalCS>
        <EllipsoidalCS gml:id="LonLatEllipsoidalCS">
          <identifier codeSpace="http://www.opengeospatial.org/ogcna">
          urn:ogc:def:cs:OGC:LonLatEllipsoidalCS
          </identifier>
          <name>Ellipsoidal 2D CS. Axes: longitude, latitude. Orientations: east,
north. UoM: deg</name>
          <scope>Adapted from EPSG-6422, with axis order reversed.</scope>
          <axis>
            <CoordinateSystemAxis gml:id="Long" uom="deg">
              <identifier codeSpace="http://www.opengeospatial.org/ogcna">
              urn:ogc:def:axis:OGC:Long
              </identifier>
              <axisAbbrev>Long</axisAbbrev>
              <axisDirection codeSpace="http://www.epsg.org/guides/docs/G7-
1.pdf">east</axisDirection>
            </CoordinateSystemAxis>
          </axis>
          <axis>
            <CoordinateSystemAxis gml:id="Lat" uom="deg">
              <identifier codeSpace="http://www.opengeospatial.org/ogcna">
              urn:ogc:def:axis:OGC:Lat
              </identifier>
              <axisAbbrev>Lat</axisAbbrev>
```

```
              <axisDirection codeSpace="http://www.epsg.org/guides/docs/G7-
1.pdf">north</axisDirection>
            </CoordinateSystemAxis>
          </axis>
        </EllipsoidalCS>
      </usesEllipsoidalCS>
      <usesGeodeticDatum xlink:href="urn:ogc:def:datum:EPSG:6326"
        xlink:title="World Geodetic System 1984"
        xlink:role="http://earth-
info.nga.mil/GandG/publications/tr8350.2/tr8350_2.html"/>
    </GeodeticCRS>
  </componentReferenceSystem>
  <componentReferenceSystem>
    <VerticalCRS gml:id="EPSG-5773">
      <identifier codeSpace="http://www.opengeospatial.org/ogcna">
      urn:ogc:def:crs:EPSG:5773
      </identifier>
      <name>EGM96 geoid</name>
      <remarks>Height surface resulting from the application of the EGM96 geoid
model to the WGS 84 ellipsoid.</remarks>
      <scope>Geodesy</scope>
      <verticalCS xlink:href="urn:ogc:def:cs:EPSG:6499"
        xlink:title="Gravity-related CS. Axis: height (H). Orientation: up. UoM:
m."/>
      <verticalDatum xlink:href="urn:ogc:def:datum:EPSG:5171"
        xlink:title="EGM96 geoid"
        xlink:role="http://cddis.gsfc.nasa.gov/926/egm96/egm96.html"/>
    </VerticalCRS>
  </componentReferenceSystem>
</CompoundCRS>
```

Bibliography

Google Inc., *KML 2.2 Reference Documen*t, 2007
http://code.google.com/apis/kml/documentation/kml_tags_beta1.html

IETF RFC 2616, Hypertext Transfer Protocol – HTTP/1.1. (June 1999)

IETF RFC 2806, URLs for Telephone Calls. (April 2000)

ISO 8601:2004, Data elements and interchange formats — Information interchange — Representation of dates and times.

ISO 19101:2002. Geographic information -- Reference model

ISO 19107:2003, Geographic Information — Spatial schema.

ISO 19111:—1), Geographic Information — Spatial referencing by coordinates.

ISO 19136:2007, Geographic information — Geography Markup Language (GML)

OGC document 00-014r1, Guidelines for Successful OGC Interface Specifications.