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T. Clarke
BATC
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Concise Binary Object Representation (CBOR) Tag for Coordinate Reference
System (CRS) Specification
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Abstract

The Concise Binary Object Representation (CBOR, [RFC 7049](#)) is a data format whose design goals include the possibility of extremely small code size, fairly small message size, and extensibility without the need for version negotiation.

In CBOR, one point of extensibility is the definition of CBOR tags. An existing CBOR tag, 103, allows for the representation of geographic coordinates. Proper exploitation of geographic coordinates requires an associated reference frame. The present document defines a CBOR tag for referencing the coordinate reference system (CRS) for a geographic coordinate. It is intended as the reference document for the IANA registration of the CBOR tag defined.

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1. Introduction

Specifying geographic coordinates for a location on Earth requires the definition of a coordinate reference system (CRS). A CRS is made up of several components: [[EDS1](#)]

- o Coordinate system: The X, Y grid upon which your data is overlaid and how you define where a point is located in space.
- o Horizontal and vertical units: The units used to define the grid along the x, y (and z) axis.
- o Datum: A modeled version of the shape of the Earth which defines the origin used to place the coordinate system in space. You will learn this further below.
- o Projection Information: The mathematical equation used to flatten objects that are on a round surface (e.g. the Earth) so you can view them on a flat surface (e.g. your computer screens or a paper map).

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2. Objectives

This document aims to address the specification of coordinate reference systems in CBOR [RFC7049] encoded data. This is accomplished using complete CRS specification or through a well-known spatial reference identifier.

3. Applicability

This tag is designed for use with the Geographic Coordinates CBOR Tag 103 [CBOR-GC]. A CRS may be attached to a Geographic Coordinate or it may specify a default CRS for an entire scope. This is the expected application but this tag may be used in any relevant context.

4. Semantics

The CBOR CRS tag shall be associated with one of multiple CBOR data types. Each allowed type is associated with a different method of specifying a CRS.

4.1. Well-known Text

OGC [OGC] Well-known Text (WKT) [WKT] is a standardized format for CRS specification. When the CRS tag is associated with a Text String (CBOR Major type 3), the data shall be interpreted as OGC WKT. This allows for complete CRS specification of and subtype of CRS.

4.2. EPSG Spatial Reference Identifier

A spatial reference identifier (SRID) is a unique value which unambiguously identifies a CRS. Many vendors and registries provide SRIDs. This association is not intended to allow specification of an arbitrary SRID, but provides a way to reference an SRID in the European Petroleum Survey Group's (EPSG) SRID database. EPSG numbers are a de-facto standard for CRS reference and are very commonly used. EPSG numbers can be searched and referenced in a number of places including [EPSG.io] and [SpatialReference.org]. When the CRS tag is associated with a basic numeric type (CBOR Major type 0), the data shall be interpreted as an EPSG SRID.

5. IANA Considerations

IANA is requested to allocate a tag from the Specification Required space, with the present document as the specification reference.

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Tag	Data	Semantics
TBD	multiple	Geographic Coordinate Reference System WKT or EPSG number

RFC editor note: Please replace TBD by the tag number allocated by IANA throughout the document and delete this note.

6. Security Considerations

The security considerations of [RFC7049] apply; the tag introduced here are not expected to raise security considerations beyond those.

7. References

7.1. Normative References

- [CBOR-GC] "CBOR Geographic Coordinates", n.d., <<https://github.com/allthingstalk/cbor/blob/master/CBOR-Tag103-Geographic-Coordinates.md>>.
- [RFC7049] Bormann, C. and P. Hoffman, "Concise Binary Object Representation (CBOR)", RFC 7049, DOI 10.17487/RFC7049, October 2013, <<https://www.rfc-editor.org/info/rfc7049>>.
- [WKT] Open Geospatial Consortium, "Geographic information - Well-known text representation of coordinate reference systems", May 2015, <<http://www.opengis.net/doc/IS/wkt-crs/1.0>>.

7.2. Informative References

- [EDS1] Wasser, L., "Earthlab/Earth-Analytics-R-Course: Earth Analytics Course In The R Programming Language", Zenodo article, DOI 10.5281/zenodo.1326873, August 2018.
- [EPSG.io] "MapTiler EPSG Reference Website", n.d., <<https://epsg.io>>.
- [OGC] "The Open Geospatial Consortium", n.d., <<http://www.opengeospatial.org/>>.
- [SpatialReference.org] "Spatial Reference Website", n.d., <<http://spatialreference.org>>.

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[SR-ORG-7428]

"SR-ORG:7428 WGS 84 (3D EGM96 geoid height)", n.d.,
<<http://spatialreference.org/ref/sr-org/7428/>>.

Appendix A. Examples

CRS for EPSG:4326, the World Geodetic System 1984 horizontal coordinate system used by GPS satellites, specified using an EPSG SRID.

```
D8 68      # Geographic Coordinate System - tag(104)
19 10E6 # EPSG:4326                        - unsigned(4326)
```

```
# Diagnostic notation: 104(4326)
```

CRS for WGS 84 3D EGM96 geoid height [[SR-ORG-7428](#)] specified using WKT


```

D8 68          # Geographic Coordinate System - tag(104)
79 0191       # OGC WKT - text(401)
47454F4743535B225747532038342028
33442045474D39362067656F69642068
656967687429222C444154554D5B2257
6F726C642047656F6465746963205379
7374656D2031393834222C5350484552
4F49445B22574753203834222C363337
383133372E302C3239382E3235373232
333536332C415554484F524954595B22
45505347222C2237303330225D5D2C41
5554484F524954595B2245505347222C
2236333236225D5D2C5052494D454D5B
22477265656E77696368222C302E302C
415554484F524954595B224550534722
2C2238393031225D5D2C554E49545B22
444D53222C302E303030303034383438
31333638313130393533365D2C415849
535B2247656F6465746963206C617469
74756465222C4E4F5254485D2C415849
535B2247656F6465746963206C6F6E67
6974756465222C454153545D2C415849
535B22477261766974792D72656C6174
656420686569676874222C55502C4155
54484F524954595B2245505347222C22
35373733225D5D2C415554484F524954
595B2245505347222C2234333239225D5D

```

```

# Diagnostic notation:
104("GEOGCS[\"WGS 84 (3D EGM96 geoid height)\",
  DATUM[\"World Geodetic System 1984\",
  SPHEROID[\"WGS 84\",6378137.0,298.257223563,
  AUTHORITY[\"EPSG\",\"7030\"]],
  AUTHORITY[\"EPSG\",\"6326\"]],
  PRIMEM[\"Greenwich\",0.0,AUTHORITY[\"EPSG\",\"8901\"]],
  UNIT[\"DMS\",0.00000484813681109536],
  AXIS[\"Geodetic latitude\",NORTH],
  AXIS[\"Geodetic longitude\",EAST],
  AXIS[\"Gravity-related height\",UP,
  AUTHORITY[\"EPSG\",\"5773\"]],
  AUTHORITY[\"EPSG\",\"4329\"]])

```

Author's Address

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Trevor R.H. Clarke
Ball Aerospace and Technologies Corp.
2862 Presidential Dr.
Fairborn, OH 45324
United States

Phone: +1-937-320-4000
Email: tclarke@ball.com