SLOVENSKI STANDARD
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Geografske informacije - Geoprostorski API za informacije v obliki ploščic - 1. del: Osrednji profil (ISO/DIS 19177-1:2024)

Geographic information - Geospatial API for tiles - Part 1: Core (ISO/DIS 19177-1:2024)

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Geographic information — Geospatial API for tiles —

Part 1: Core

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Foreword

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This document was prepared by Technical Committee ISO/TC 211, *Geographic information/Geomatics*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 287, *Geographic Information*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement) and in collaboration with the Open Geospatial Consortium Inc. (OGC).

This document defines the *OGC API — Tiles — Part 1: Core* Standard. A Web API conforming to this document can serve tiles of spatially referenced data or maps with predefined content, extent, and resolution. Suggested additions, changes and comments on this document are welcome and encouraged. Such suggestions may be submitted using the issues log on the GitHub repository: https://github.com/opengeospatial/ogcapi-tiles.

A list of all parts in the ISO 19177 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

The *OGC API — Tiles* Standard defines building blocks for implementing Web APIs that support the retrieval of tiled geospatial information. A Web API is an application programming interface for either a web server or a web browser [Wikipedia, 2022].

The OGC suite of Web API standards is an extensible framework for building HTTP based services that can be accessed in different applications on different platforms such as the Web, desktop, mobile, etc. The *OGC API — Tiles* Standard specifies how different forms/types of geospatial resources are supported, such as tiles of vector features ("vector tiles"), coverages, and maps (or imagery). Although OGC API — Tiles can be used independently, the building blocks can be combined with other OGC API Standards for additional capabilities or increased interoperability for specific types of data. The *OGC API — Tiles* Standard references the *OGC Two-Dimensional Tile Matrix Set (TMS) and Tile Set Metadata* Standard [OGC 17-083r4]. That Standard defines logical models and encodings for specifying tile matrix sets and describing tile sets. A tile matrix set is a tiling scheme that enables an application to partition and index space based on a set of regular grids defined for multiple scales in a Coordinate Reference System (CRS).

The *OGC API — Tiles* Standard is an alternative to the OGC's Web Map Tile Service (WMTS) Standard. Instead of a fixed Web interface, OGC API — Tiles focuses on simple reusable REST API building blocks which can be described using the OpenAPI specification. Whereas WMTS focused on map tiles, the *OGC API — Tiles* Standard is designed to support any form of tiled data.

Geographic information — Geospatial API for tiles —

Part 1: Core

1 Scope

The *OGC API — Tiles* Standard specifies the behavior of Web APIs that provide access to tiles of one or more geospatial data resources (collections) that the Web API offers. This document defines how to discover which resources offered by the Web API can be retrieved as tiles, get metadata about the available tile sets (including according to which tile matrix set each tile set is partitioned and the limits of that tile set within a common potentially global tile matrix set) and how to request a tile. This document is sometimes referred to as the *Tiles API*.

The core conformance class is defined in a way that could be easily included in a web API, even if that API does not conform to the *OGC API — Common* Standard. A web API can combine some requirements classes of this OGC API Standard with those of other OGC API Standards (including *OGC API — Common*) to extend the scope of the Web API by adding functionality..

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Reed C. OGC 19-014r3, *Topic 22 — Core Tiling Conceptual and Logical Models for 2D Euclidean Space*. Open Geospatial Consortium (2020). https://docs.ogc.org/as/19-014r3/19-014r3.html.

Masó J., Jacovella-St-Louis J. OGC 17-083r4, *OGC Two Dimensional Tile Matrix Set and Tile Set Metadata*. Open Geospatial Consortium (2022). https://docs.ogc.org/is/17-083r4/17-083r4.html.

Heazel C., OGC API — Common — Part 1: Core (Draft). OGC 19-072, Open Geospatial Consortium, https://docs.ogc.org/DRAFTS/19-072.html

Heazel C., OGC API — Common — Part 2: Geospatial Data (Draft). OGC 20-024, Open Geospatial Consortium, https://docs.ogc.org/DRAFTS/20-024.html

Domenico B. OGC 10-090r3, *OGC Network Common Data Form (NetCDF) Core Encoding Standard version 1.0*. Open Geospatial Consortium (2011). https://portal.ogc.org/files/?artifact id=43732.

Butler H., Daly M., Doyle A., Gillies S., Hagen S., Schaub T. IETF RFC 7946, *The GeoJSON Format*. (2016). https://www.rfc-editor.org/info/rfc7946.

Adobe Developers Association, TIFF Specification Revision 6.0. (1992)

Devys E., Habermann T., Heazel C., Lott R., Rouault E. OGC 19-008r4, *OGC GeoTIFF Standard*. Open Geospatial Consortium (2019). https://docs.ogc.org/is/19-008r4/19-008r4.html.

ISO/IEC ISO/IEC 10918-1, *Information technology — Digital compression and coding of continuous-tone still images: Requirements and guidelines*. International Organization for Standardization, International Electrotechnical Commission, Geneva https://www.iso.org/standard/18902.html.

ISO/IEC ISO/IEC 15948, *Information technology — Computer graphics and image processing — Portable Network Graphics (PNG): Functional specification*. International Organization for Standardization, International Electrotechnical Commission, Geneva https://www.iso.org/standard/29581.html.

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
coverage tile
tile that contains information, often in a gridded form, where the values represent observations or measurements as a count, or quantity using some unit of measure

Note 1 to entry: Coverage tiles are generated in combination with *OGC API — Coverages*, and can also be generated by combining a subset (trim) and resampling operation. Usually, visualizing a coverage tile on a rendering device implies mapping those values to colors.

3.2
dataset
a set of data, published or curated by a single agent, and available for access or download in one or more representations (modified from DCAT: https://www.w3.org/TR/vocab-dcat-2/#dcat-scope)

Note 1 to entry: A Web API implementing OGC API — Common often gives access to a single dataset which may be comprised of one or more *geospatial data resources*.

3.3
geospatial data resource
web accessible resource that consists of a set of geospatial data

Note 1 to entry: In Web APIs implementing *OGC API — Common — Part 2: Geospatial Data*, geospatial data resources are referred to as collections and are defined in the *collections* conformance class.

Note 2 to entry: *geodata* is sometimes used in this document as an abbreviation of *geospatial data*

3.4
geospatial resource aspect
web accessible resource that represents a component of geospatial information (metadata, schemas…) or geospatial data accessed using a particular mechanism and data model (e.g., feature items, tiles, maps, coverages,…) of a more generic geospatial data resource (e.g., a collection)

Note 1 to entry: Not to be confused with a web accessible resource representation. While resource representations share the same path and are selected by format negotiation, geospatial aspects use different paths. Commonly a geospatial aspect is a subpath of a geospatial data resource.

3.5
landing page
any page whose primary purpose is to contain a description of something else. Landing pages often provide summaries or additional information about the thing that they describe. (W3C, URLs in Data Primer) In the context of the OGC API Standards, a landing page serves as the root node of the API Resource tree and provides the information needed to navigate all the resources exposed through the API. The landing page provides access to the root of a dataset.

3.6
map tile
tile that contains information in a raster form where the values of cells are colors which can be readily displayed on rendering devices

Note 1 to entry: Map tiles are generated in combination with *OGC API — Maps*.

3.7
tile
geometric shape with known properties that may or may not be the result of a tiling (tessellation) process. A tile consists of a single connected “piece” without “holes” or “lines” (topological disc) In the context of a 2D *tile matrix*, a *tile* is one of the rectangular regions of space, which can be uniquely identified by row and column integer indices, making up the tile matrix. In the context of a geospatial data *tile set*, a *tile* contains data for such a partition of space as part of an overall set of tiles for that tiled geospatial data.

Note 1 to entry: From OGC 19-014r1: Core Tiling Conceptual and Logical Models for 2D Euclidean Space

Note 2 to entry: From OGC 17-083r4: OGC Two Dimensional Tile Matrix Set and Tile Set Metadata standard

Note 3 to entry: Tiles are useful to efficiently request, transfer, cache, display, store and process geospatial data for a specific resolution and area of interest, providing deterministic performance and scalability for arbitrarily large datasets.

Note 4 to entry: Tiles can contain a variety of data types, such as grid-based pictorial representations (map tiles), coverage subsets (coverage tiles), or feature-based representations (vector tiles).

3.8
tile matrix
tiling grid in a given 2D coordinate reference system, associated to a specific scale and partitioning space into regular conterminous *tiles*, each of which being assigned a unique identifier

Note 1 to entry: From OGC 17-083r4: OGC Two Dimensional Tile Matrix Set and Tile Set Metadata standard.

Note 2 to entry: Each tile of a tile matrix is uniquely identifiable by integer indices for the row and the column. The number of rows is referred to as the *matrix height*, while the maximum number of columns is referred to as the *matrix width* (the number of columns can vary for different rows in *variable width tile matrices*).

3.9
tile matrix set
tiling scheme consisting of a set of *tile matrices* defined at different scales covering approximately the same area and having a common coordinate reference system

Note 1 to entry: From OGC 17-083r4: OGC Two Dimensional Tile Matrix Set and Tile Set Metadata standard

3.10
tile indexing scheme
scheme to uniquely reference a *tile* in a *tiling scheme* by the use of a unique identifier (or set of identifiers), and reversely, which unique identifier (or unique set of identifiers) corresponds to a space satisfying the geometric properties of a specific tile

Note 1 to entry: From OGC 17-083r4: OGC Two Dimensional Tile Matrix Set and Tile Set Metadata standard.

3.11
tile set
a set of *tiles* resulting from tiling data according to a particular *tiling scheme*

Note 1 to entry: From OGC 19-014r1: Core Tiling Conceptual and Logical Models for 2D Euclidean Space, but adapted to clarify that in the context of this document, a tile set refers specifically to a set of tiles containing data and following a common tiling scheme.

3.12
tiling scheme
scheme that defines how space is partitioned into individual *tiles*, potentially featuring multiple levels of detail (each tiling at a different granularity to reflect a different resolution or scale) A tiling scheme defines the spatial reference system and the geometric properties of each tile defined by the scheme. Those properties include which space each tile occupies (the tile's spatial extent), as well as a tile coordinate origin if a particular corner of origin convention is established.

Note 1 to entry: A tiling scheme can be defined on top of a CRS as well as other spatial reference systems such as DGGS and other organizations including irregular ones. In this document, only tiling schemes based on CRSs are supported.

Note 2 to entry: From OGC 17-083r4: OGC Two Dimensional Tile Matrix Set and Tile Set Metadata standard.

3.13
tile set metadata
additional metadata beyond the common properties defining the *tile set*. Such metadata could be an abstract, the owner, the author, or other common metadata. [OGC 19-014r3] metadata describing common properties defining a *tile set*, layers and styles used to produce the tile set, the limits of the tile matrix with actual data and common metadata such as abstract, owner, author, etc.

Note 1 to entry: From OGC 17-083r4: OGC Two Dimensional Tile Matrix Set and Tile Set Metadata standard.

3.14
vector tile
tiled vector feature data
tile that contains vector data that has been generalized (simplified) at the tile scale resolution and clipped by the tile boundaries

Note 1 to entry: From OGC 17-083r4: OGC Two Dimensional Tile Matrix Set and Tile Set Metadata standard.

3.15
Web API
API using an architectural style that is founded on the technologies of the Web.

[SOURCE: OGC API — Features — Part 1: Core]

Note 1 to entry: See Best Practice 24: Use Web Standards as the foundation of APIs (W3C Data on the Web Best Practices) for more detail.

3.16
Web API based implementation
a server software that implements a Web API.

Note 1 to entry: The Web API based implementations mentioned in the context of this document declare conformity to at least one Conformance Class defined by this document.

4 Conformance

4.1 General

The *OGC API — Tiles* Standard defines multiple requirements classes and their associated conformance classes.

The standardization targets of all conformance classes are "Web APIs".

The Tiles API requirements classes are summarized below and in more detail in subsequent clauses.

4.2 Requirements classes defining resources

Requirements Class "Core" (http://www.opengis.net/spec/ogcapi-tiles-1/1.0/req/core)