Open Geospatial Consortium

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GeoTIFF Standards Working Group Charter

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To: OGC members & interested parties

The OGC members listed below have proposed the OGC GeoTIFF SWG be re-chartered with an expanded scope as described below. The SWG proposal provided in this document meets the requirements of the OGC Technical Committee (TC) Policies and Procedures.

The SWG name, statement of purpose, scope, list of deliverables, audience, and language specified in the proposal will constitute the SWG's official charter.

This SWG will operate under the OGC IPR Policy. The eligibility requirements for becoming a participant in the SWG are that:

- You must be an employee of an OGC member organization or an individual member of OGC;

- The OGC member must have signed the OGC Membership agreement;

- You must notify the SWG chair of your intent to participate. Members may do so by logging onto the OGC Portal and navigating to the Observer page and clicking on the link for the SWG they wish to join and;

- You must attend meetings of the SWG. Attendance may be by teleconference.

Of course, participants also may join the SWG at any time. The OGC and the SWG welcomes all interested parties.

Non-OGC members who wish to participate may contact us about joining the OGC. In addition, the public may access some of the resources maintained for each SWG: the SWG public description, the SWG Charter, Change Requests, and public comments, which will be linked from the SWG's page.

Please feel free to forward this announcement to any other appropriate lists. The OGC is an open standards organization; we encourage your feedback.

Chapter 1. Purpose of the Standards Working Group

The GeoTIFF specification as an extension to the TIFF format has been used for sharing coverage data successfully for years across many platforms and software environments. It is an important de facto standard used primarily for geolocated images. The legacy GeoTIFF specification (Version 1.8.2) was developed during the 1990's by a group of interested individuals and has served the community very well since then.

The initial scope of this SWG was to incorporate the GeoTIFF specification into the OGC standards suite by updating the specification to bring it into conformance with current OGC practices. The resulting Standard was approved by the OGC Technical Committee in September 2019.

The original scope also specified that the SWG would:

- "provide a forum for evolving the standard in the future"
- "maintain compatibility with existing geoTIFF community implementations and practices" and that
- "future evolution would be done in close cooperation with the existing geoTIFF community."

A number of additional work items have been identified for this SWG since completion of OGC GeoTIFF 1.1. This updated charter brings those work items into the scope of the GeoTIFF Standards Working Group.

Chapter 2. Business Value Proposition

The GeoTIFF format is ubiquitous in the geospatial community and is currently used and supported in its ad hoc form by many OCG members. The format forms the basis for sharing a large existing collection of geospatial images and coverage data, it clearly benefits those members to have the standard managed by the OGC membership.

Chapter 3. Scope of Work

This updated charter brings additional work items into the scope of the GeoTIFF Standards Working Group. The starting point for those work items is the OGC GeoTIFF 1.1 Standard. This standard is available from https://www.ogc.org/standards/geotiff. The additional work items are described in the Additional SWG Tasks section.

3.1. Statement of relationship of planned work to the current OGC Standards baseline

The GeoTIFF / TIFF format is currently included in extensions the OGC GML Coverages (GMLCOV) 1.0 Standard to the OGC Web Coverage Service (WCS) 2.0 Standard. Standardization of the format will solidify these existing standards.

3.2. What is Out of Scope?

The SWG will not work on any tasks not explicitly listed in this charter or an ammended version thereof.

3.3. Specific Existing Work Used as Starting Point

The OGC GeoTIFF 1.1 Standard is available from https://www.ogc.org/standards/geotiff. It will serve as the starting point for any additional work by this SWG.

3.4. Is This a Persistent SWG

[x] YES

[ ] NO

3.5. When can the SWG be Inactivated

The GeoTIFF SWG charter includes the charge to "provide a forum for evolving the standard in the future". Therefore, the SWG cannot be inactivated while GeoTIFF is an approved OGC standard.

Chapter 4. Description of deliverables

4.1. Initial Deliverables

The OGC GeoTIFF 1.1 Standard was approved by the OGC Technical Committee in September 2019. Since then, additional work items have been identified which build on that baseline. The deliveries and schedules for these work items are described by task in the Additional SWG Tasks section.

4.2. Additional SWG Tasks

4.2.1. Task 1: GeoTIFF 1.2

This task will address open issues which were out of scope for version 1.1 but not significant enough for a major revision.

4.2.2. Task 2: BigTiff support

The TIFF file format uses 32 bit offsets. This limits TIFF files to four gigabytes. The BigTIFF format resembles TIFF but uses 64 bit offsets instead.

4.2.3. Task 3: Standardize Cloud-Optimized GeoTIFF (COG)

The COG community is willing to turn-over management of the COG specification to OGC. OGC shall develop a GeoTIFF extension that fully documents the COG specification in the manner of an OGC Standard.

4.2.4. Task 4: GeoTIFF / LAS harmonization

This task will examine the overlap between GeoTIFF and LAS. The deliverable will be recommendations on how to keep these two standards synchronized.

4.2.5. Task 5: Data Cubes

This task will explore potential support for data cubes. Standards resulting from this task may, but are not required to, be based on TIFF.

4.2.6. Task 6: GeoTIFF 2.0

This task will align the geodetic sections of GeoTIFF with AS Topic 2 and potentially other encodings of Geodetic parameters (such as WKT). Other emerging requirements may also be addressed under this task.

Chapter 5. IPR Policy for this SWG

[x] RAND-Royalty Free

[ ] RAND for fee

Chapter 6. Anticipated Audience / Participants

The NASA, NOAA, USGS, DGIWG, IGN, NGA, TBD after discussion

Chapter 7. Domain Working Group Endorsement

No applicable at time of chartering.

Chapter 8. Other informative information about the work of this SWG

8.1. Collaboration

The GeoTIFF SWG is using and will continue to use GitHub for management of Standard document and related content.

8.2. Similar or Applicable Standards Work (OGC and Elsewhere)

The GeoTIFF Specification has been developed and maintained on the http://trac.osgeo.org website. This SWG will stay in touch with that group and as this work progresses.

8.3. Details of first meeting

Not Applicable

8.4. Projected on-going meeting schedule

TBD

8.5. Supporters of this Charter

The following people support this proposal and are committed to the Charter and projected meeting schedule. These members are known as SWG Founding or Charter members. The charter members agree to the SoW and IPR terms as defined in this charter. The charter members have voting rights beginning the day the SWG is officially formed. Charter Members are shown on the public SWG page. Extend the table as necessary.

Name	Organization
Emmanuel Devys	IGN, France
Steve Olding	NASA
Chuck Heazel	Heazeltech
Pedro Gonçalves	Terradue

8.6. Conveners

Emmanuel Devys - IGN, Chuck Heazel - HeazelTech, Even Rouault - Spatialys

Annex A: Refining GeoTIFF

<table>
<tr><td>NOTE</td><td>This annex will be deleted from the final draft of the Charter. It has been ratained in this draft to support refinement of section 4.2.</td></tr>
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Notes on suggested refinements to the GeoTIFF 1.0 specification as part of a GeoTIFF standards refinement and publication process at NASA.

A.1. Projection Parameters

While the original specification offers some example coordinate systems with projection parameters (ie. 3.1.3 Lamber Conformal Conic Aeronautical Chart), and provides a list of general projection parameters (6.2.3) it does not generally indicate what projection parameters are used for which projection methods, nor does it attempt to relate them to any other well known definitions such as EPSG.

I feel it is important to collect a list of projection parameters for each support projection method, and where possible to relate them back to EPSG method and parameter codes for clarity.

To some extent I have attempted to do so at http://www.remotesensing.org/geotiff/proj_list/ in a way relate connects GeoTIFF, PROJ.4, EPSG and OGC Well Known Text. For the purposes of the GeoTIFF specification I would suggest we stick to offering the GeoTIFF codes, and relating them back to EPSG while enumerating some projection methods and parameters support in GeoTIFF and not in EPSG and clarifying some situations that match poorly between GeoTIFF and EPSG.

A.2. New Projection Methods and Projection Parameters

Since the original GeoTIFF specification a number of GeoTIFF projection methods and parameters have been added. These should also be reviewed, and if they seem reasonable and in somewhat well understood and common use they should be captured in the specification.

A.3. Relationship to Newer EPSG Releases

The original GeoTIFF specification was based on the EPSG database in release at the time. Since then the EPSG database has grown and to a limited extent been refactored. While it was not exactly clear how this related to GeoTIFF the accepted industry practice has been to accept newer EPSG PCS and GCS codes even though they are not explicitly listed in the GeoTIFF specification (ie. sections 6.3.2, 6.3.3 and 6.3.4). It is suggested that this be codified into the GeoTIFF specification. We should also likely update sections 6.3.x to reflect a current set of codes or alternatively remove them in favor of a reference to EPSG with a few examples for clarification.

A.4. PixelAsPoint vs. PixelAsArea

The original GeoTIFF specification was somewhat vague on the implications of using PixelIsPoint?

and PixelIsArea? in 2.5.2.2. Some users fell into the trap of thinking that these were only a sampling technique clue and did not affect the real coordinate system. This is not the evolved industry consensus, and the specification needs to make this very clear. Some detail on this issue is captured in: http://trac.osgeo.org/gdal/wiki/rfc33_gtiff_pixelispoint

A.5. Vertical Coordinate Systems

The information on vertical coordinate systems in the GeoTIFF specification was pretty slim (see 2.5.3.4 and 6.3.4) and and it has taken a long time to establish industry practice on this topic. An effort has been made to suggest best practice at VerticalCS and after review I suggest this make it's way into the specification in some form.

A.6. TOWGS84GeoKey

One area the original specification left undefined (perhaps deliberately to reflect handling within EPSG) was how transformation between datums should be accomplished. For the most part this is currently accomplished by applications corresponding GCS/Datum codes with the corresponding EPSG definitions and then selecting among the EPSG provided transformations between datums. However, in the area of projected coordinate systems GeoTIFF took the positions that users could either use an existing EPSG PCS/GCS code **or** define details of the coordinate system themselves in the GeoTIFF file. This ability is not available for datums.

As one step towards improved self-defining capability in GeoTIFF that captures much existing industry practice it has been suggested a TOWGS84GeoKey be added essentially corresponding to the OGC WKT TOWGS84 keyword. A proposal in this regard is written up at TOWGS84GeoKey and is in use in at least GDAL based applications: http://trac.osgeo.org/geotiff/wiki/VerticalCS

A.7. Axis Order

The GeoTIFF spec is vague on axis order issues. Some suggestions on this are made in the FAQ and some conclusion should likely be codified in the specification - hopefully not in a way that flies in the face of actual industry practice.