DigitalGlobe™

Partition Integration Developer Guide

Cloud Services | August 2013

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1   Introduction

1.1   About This Document

This document explains the interface through which tiles are delivered from DigitalGlobe's tile delivery system.

1.2   Targeted Audience

This document is targeted to help developers who are integrating partitions.

1.3   What Are Partitions?

Partitions are the delivery unit for DigitalGlobe-created tiles and are based on the tile zoom level grid of the used projection. All tiles and associated metadata for a partition are tar-compressed into a single file for delivery.

1.4   References

- http://www.opengeospatial.org/standards
- http://en.wikipedia.org/wiki/GIS#OGC_standards
- http://www.wikipedia.org/
- http://en.wikipedia.org/wiki/Geography_Markup_Language

2 Tile Delivery Structure

Tiles are delivered via a partition; two types of partition deliveries are available as described in Ingested Content on page 15. Both partition types will use the same directory structure. Refer to Appendix A for an example of the partition layout structure.

2.1 Partition Layout

Image tiles are created in a pre-defined directory structure. Prior to delivery, the entire directory is compressed into a single tar file. A directory structure is created for each delivery partition. You will be directed to the top-level directory for download. The directory will have the following naming convention:

`3857_<partition>_<xxx>_<yyy>_<yyyymmdd>_<wo>`

where:

- 3857 indicates the projection in which the tiles are created; this will be a constant.
- <partition> is the tile level of the partition and can have one of two values:
    - **worldwide** for the worldwide, low resolution partition
    - **9** for all other partitions
- **<xxx>** is a three-digit number representing the "x" position of the level 9 grid for this tile set; the range is 000-999, always using the full three digits. For the worldwide partition, this value is 000.
- <yyy> is a three-digit number representing the "y" position of the level 9 grid for this tile set; the range is 000-999, always using the full three digits. For the worldwide partition, this value is 000.
- <yyyymmdd> is the date that the directory was created. The format is four-digit year, two-digit month, and two-digit day.
- <wo> signifies "work order". This format is a case-sensitive alphanumeric string (0-9, a-z, A-Z only) used to uniquely identify the delivery of this partition. The string can be up to 15 characters. This parameter allows for identification of multiple deliveries of the same partition.

This top-level directory will contain each partition bundled into an individual tar file with the following format:

3857_<partition>_<xxx>_<yyy>_<yyyymmdd>_<wo>.tar: The tar file of all the data in the directory structure.

The tile path that will be created after tar extraction will follow the following format:

3857_ <partition>_<xxx>_<yyy>/jpg/<scale>/<x>/<y>.jpg

where:

- **3857_<partition>_<xxx>_<yyy>** is the directory as defined above.
- **jpg** is the directory path to the tiles. This is a constant.
- **<scale>** represents the tile zoom level of the tiles contained in this directory. The values for <scale> are integers 1 – 20, inclusive.
- **<x>** is the "x" location of the tiles in this directory based on the EPSG:3857 grid of the world. <x> will be an integer from 1 – 999999, inclusive.
- **<y>** is the "y" location of the specific jpg tile, based on the EPSG:3857 grid of the world. <y> will be an integer from 1 – 999999, inclusive.

The content and format of each of these directories is described in the following sections.
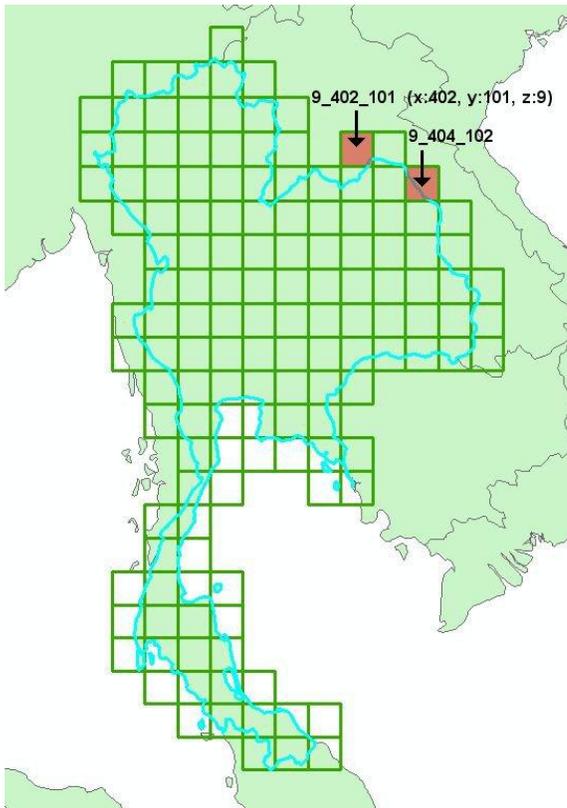
FIGURE 2.1 EXAMPLE PARTITIONS AT ZOOM LEVEL 9 GRID
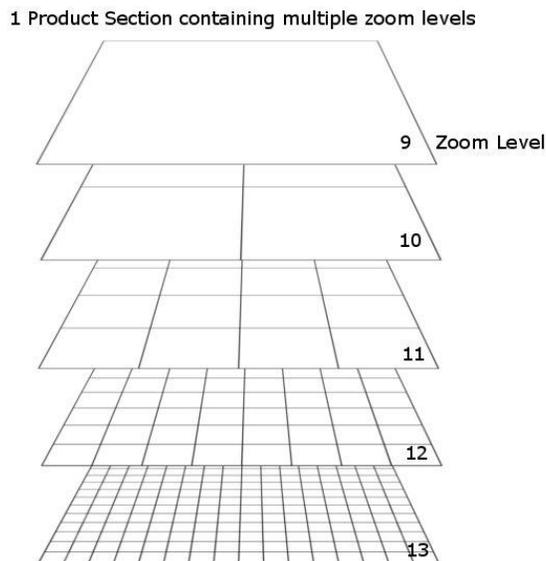
FIGURE 2.2 VISUAL EXAMPLE OF TILES CONTAINED IN A PARTITION

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2.1.1 THE PARTITION DIRECTORY

The **3857_<partition>**_<xxx>_<yyy> directory contains three files: a metadata file, a browse image file, and a shapefile as defined in the following sections.

2.1.1.1 Metadata File

The metadata file is named tile_master.lst. It provides additional metadata for all tiles within this partition. The tile_master.lst is a pipe-delimited list of all tiles containing the metadata noted in Table 2.1 in the order listed. An example is shown in Figure 2.3.

TABLE 2.1 DESCRIPTION OF METADATA IN TILE_MASTER.LST

ATTRIBUTE	DATA TYPE	EXAMPLE VALUE	DESCRIPTION
tilePath	String	**3857_9_176_146_20111001_D1/ jpg/12/1408/1169.jpg**	Path to the tile after tarfile is uncompressed
tileIdentifier	String	**3857_17_23375_51223_50000039**	A unique identifier for this tile. This matches the tileIdentifier field in the embedded metadata.
featureInTileIdentifier	String	**7160fa0ef2ce3f2638fe bd5f3be3b8ee: 2011-01-21, 3fcecedf8d7ee48a478535a 506152777:2010-03-19**	Comma-separated list of featureIds and latest (newest) acquisition dates of each feature used to create the tile.
earliestAcquisitionDate	String	**2010-07-13 01:20:43.635**	The earliest (oldest) acquisition date of all images that were used to create this tile.
latestAquisitionDate	String	**2011-01-21 16:12:08.953**	The latest (newest) acquisition date of all images that were used to create this tile.
fileSize	Integer	**25781**	Size of .jpg file in bytes.

```
|<tile path>|<tile identifier>|<featureInTileIdentifier>|<earliest date>|<latest
date>|<file size bytes>|
|3857_9_454_178_20120404_33022004041555009454178/jpg/17/116232/45592.jpg|3857_17_1
16232_45592_33022004041555009454178|73536766e6b99f70faab81331b9b1e77:2008-02-
29,0c23cc1e11d3df0c0de209e6da6e1cde:2010-01-01|2008-02-29 01:44:00.169|2010-01-01
00:00:00.0|6327|
|3857_9_454_178_20120404_33022004041555009454178/jpg/17/116224/45592.jpg|3857_17_1
16224_45592_33022004041555009454178|73536766e6b99f70faab81331b9b1e77:2008-02-
29,0c23cc1e11d3df0c0de209e6da6e1cde:2010-01-01|2008-02-29 01:44:00.169|2010-01-01
00:00:00.0|6495|
```

FIGURE 2.3 EXAMPLE CONTENT OF TILE_MASTER.LST

2.1.1.2 Shapefiles

The shapefile metadata are defined in Table 2.2.

TABLE 2.2 DESCRIPTION OF METADATA IN ALL_PRE-AUTOMATION_WORKORDERS SHAPEFILE

ATTRIBUTE	EXAMPLE VALUE	DESCRIPTION
work_order	59307	Work order. A unique production version identifier of the partition delivered.

ATTRIBUTE	EXAMPLE VALUE	DESCRIPTION
stackindex	1	Stacking Order. 1 being the feature stacked on top, 2 beneath 1, 3 beneath 2, etc.
zoom	9	Zoom Level. All feature metadata is provided at zoom level 9.
row	180	The row number of this partition in the zoom level 9 grid.
column	159	The column of this partition in the zoom level 9 grid.
tar_name	3857_9_159_180_20120417_59307.tar	Tar file name. The name of the .tar file associated with the delivery being described by the metadata.
file_count	3883991	Number of files in the tar file.
status	Success	Delivery Status. For a delivered file, this will always be "success".
precisegeo	T	Precision Geometry. "t" (true) if precise geometry has been computed for this feature. "f" (false) if precise geometry was not computed for this feature.
feature_id	d803fb3816803ff70c2a474e28426323	Feature Identification. The DGCS 3.0 string that uniquely identifies the particular feature.
acquired	2011-06-10 12:01:17.587+00	Acquired. The date and time the image was acquired.
data_layer	aerial_cells	Data Layer. The DGCS Data Layer by which the imagery is grouped.
source	UC-G	Source. Indicates the sensor (camera) that collected the imagery. For example: WV-02.
prod_level	1:6,350	Product Level. The special accuracy of the product level as stated in the National Mapping Accuracy Standard (NMAS).
prod_type	Natural Color	Product Type. The type of spectral product described by the feature.
gsd	0.3	Ground Sampling Distance. The distance on the ground that is represented by each pixel in the image.
wkt	POLYGON((-67.78549966 46.59686384,-67.78557982 46.59993713,-67.7856069 46.601354	The geometry of the feature in Well Known Text format.

The automated shapefile file is compressed into a .zip file named <3857>_<partition>_<xxx>_<yyy>_<yyyymmdd>_<workorder>.zip. Unpacking the zip file will result in an output of four files that make up the shapefile.

For example for a zip file named: 3857_9_449_168_20120405_123454322.zip, the files contained in the zip file will be named:
- 3857_9_449_168_20120405_123454322_SEAMLINES_SHAPE.shp
- 3857_9_449_168_20120405_123454322_SEAMLINES_SHAPE.shx
- 3857_9_449_168_20120405_123454322_SEAMLINES_SHAPE.prj
- 3857_9_449_168_20120405_123454322_SEAMLINES_SHAPE.dbf

The metadata contained in the shapefile (specifically the .dbf) is shown in the following table. Some fields may or may not contain information depending upon the data source.

TABLE 2.3 DESCRIPTION OF METADATA IN AUTOMATED SEAMLINE SHAPEFILE

ATTRIBUTE	EXAMPLE VALUE	DESCRIPTION
featureId	0c23cc1e11d3df0c0de209e6da6e1cde	Feature Identification. The DGCS 3.0 string that uniquely identifies the particular feature.

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ATTRIBUTE	EXAMPLE VALUE	DESCRIPTION
offNadirAn		Off Nadir Angle. The average degrees off nadir for the entire strip at which the image was collected.
sunElevati		Sun Elevation. The average degree of solar elevation angle for the entire strip at the time the image was collected.
cloudCover	0	Cloud Cover. The percentage of area within the entire strip covered by clouds. The value will be "0" for products made from more than one image.
sunAzimuth		Sun Azimuth. The degree of solar azimuth angle at the time the image was collected.
source	Landsat 15m TerraColor - 2010	Source. Indicates the sensor (camera) that collected the imagery. For example: WV-02.
sourceUnit	Mosaic Product	Source Unit. The type of product unit described by the feature. For example, "Strip" or "Mosaic".
productTyp	Natural Color	Product Type. The type of spectral product described by the feature. Possible values: **Panchromatic:** A black and white rendition of the cell. **Natural Color:** An RGB rendition of the cell. **Pan Sharpened Natural Color:** RGB image overlaid on the panchromatic image. Provides color at a higher visual resolution.
groundSamp	15.42	Ground Sampling Distance. The distance on the ground that is represented by each pixel in the image.
groundSam0	Meter	Ground Sampling Distance Units. The units of measure defining the Ground Sampling Distance. For example, "Meters".
dataLayer	base_mosaic	Data Layer. The source Data Layer name as described in the GBM spec *. Possible values: **base_mosaic:** Global Basemap **country_coverage:** Global Basemap Countries **metro:** Global Basemap Cities **aerial_cells:** Global Basemap Aerial Cells. U.S. and Western Europe Coverage, only. **aerial_markets:** GBM Aerial Markets/urban areas. US and Western EU. **global_color:** Global Basemap RGB natural color. **global_pan:** Global Basemap panchromatic.
legacyDesc	Maracaibo	Legacy Description. The DigitalGlobe market name describing the product such as Metro and Aerial.
outputMosa	TRUE	Output Mosaic. "TRUE" indicating if the product described by the Feature consists of multiple images (a mosaic). "FALSE" if the product is a strip.
colorBandO	RGB	Color Band Order. The order in which the spectral bands occur in the product.
assetName	FINISHED	Asset Name. The Name of the DigitalGlobe catalog that contains the Product.
assetType	PRODUCT_GEOMETRY	Asset Type. The Type of the catalog that contains the Product described by the feature.

ATTRIBUTE	EXAMPLE VALUE	DESCRIPTION
legacyId		Legacy ID. If source_unit is "Strip", this is the DigitalGlobe internal identifier of the image used to make the product described by the feature; for other source_units, this field is null.
factoryOrd	052187237-10	Factory Order Number. The DigitalGlobe internal systems identifier of the product described by the feature. Contains a dash, therefore is not all numeric.
acquisitio	2009-05-27 01:20:43.63599	Acquisition Date. For source_unit="Strip", the GMT of acquisition of the image used to make the product; for other source_unit values, the GMT of acquisition of the oldest image contained in the product described by the Feature.
perPixelX	0.000138	Per Pixel X. The ground sampling distance of the pixels in the X direction, in the units in which the image is projected.
perPixelY	-0.00014	Per Pixel Y. The ground sampling distance of the pixels in the Y direction, in the units in which the image is projected.
crsFromPix	EPSG:4326	Coordinate Reference System from Pixels. The EPSG code projection, read from the GeoTIFF header of the image.
url		A URL that points to a browse image of the product described by the feature.
ageDays	825	Age in Days. The number of days between the features acquisition date and the date the product was loaded into DGCS.
formattedD	1/1/2010	Formatted Date. The feature acquisition date formatted for display without time value.
CE90Accura	0	Circular Error 90 Accuracy(CE90). The accuracy of the image stated in the CE90 standard CE90. Circular Error of 90%, is commonly used for quoting and validating geodetic image registration accuracy. A CE90 value is the minimum diameter of the horizontal circle that can be centered on all photo-identifiable Ground Control Points (GCPs) and also contain 90% of their respective twin counterparts acquired in an independent geodetic survey.
RMSEAccura	0	Root Mean Square Accuracy (RMSE). The accuracy of the image as stated in the RMSE standard. The geographic accuracy of the product described by the feature, in Meters, as a 2d RMS Error value. Commonly used for quoting and validating geodetic image registration accuracy. An RMSE value is a single summary statistic that describes the square-root of the mean horizontal distance between all photo-identifiable GCPs and their respective twin counterparts acquired in an independent geodetic survey.
ingestDate	20:34.3	Ingest Date. The date the image was loaded into DGCS.
spatialAcc	1:50,000	Spatial Accuracy. The accuracy of the image as stated in the National Mapping Accuracy Standard

ATTRIBUTE	EXAMPLE VALUE	DESCRIPTION
		(NMAS).
earliestAc	2009-05-27 01:20:43.63599	Earliest Acquisition Date. The earliest acquisition date of the image.
latestAcqu	2009-05-27 01:20:43.63599	Latest Acquisition Date. The latest acquisition date of the image.
pixelsInge	1	Pixels Ingested. A number "1" value indicates that pixels have been loaded into the DGCS system.
precisegeo	TRUE	Precision Geometry. "TRUE" indicates that precise geometry has been computed for this feature. "FALSE" indicates precise geometry was not computed for this feature.
vendorName		Vendor Name. The source company name (non-DigitalGlobe) of the data. This will be blank.
vendorRefe		Vendor Reference. The source company's identifier (non-DigitalGlobe) for the product described by the feature.
companyNam	DigitalGlobe	The name of the company that owns the imagery defined by the feature.
copyright	Image Copyright 2012 DigitalGlobe, Inc.	Copyright owner of the imagery used in the product. Comma-delimited list for multiple copyrights.
parentId		The featureId of the mosaic product with which the feature is associated.

*Detailed descriptions of the data layer names can be found in the **DigitalGlobe Advanced Ortho Series for Global Basemap** (for country_coverage and metro types), **Global Basemap Product Specification** (for global_pan and global_color) or the **DigitalGlobe AOAP Data Definition Tech Note** (for aerial_cell and aerial_markets types).

Figure 2.4shows how the partition shapefile will display the clipped features used to produce the partition with no overlap between them. Each color represents a different feature.
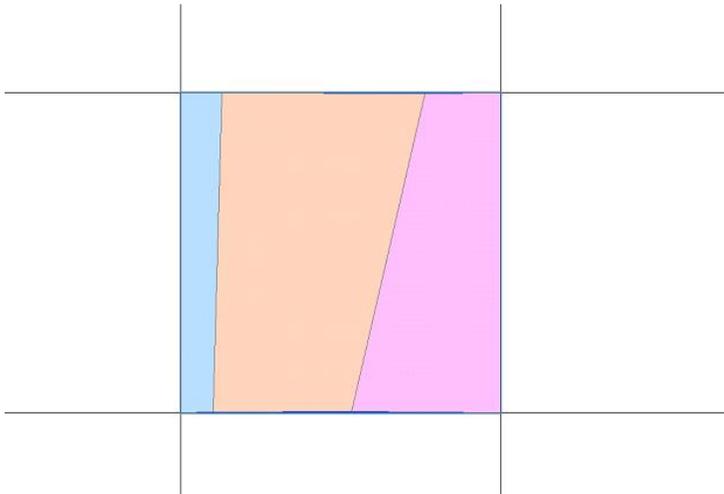
FIGURE 2.4 PARTITION SHAPEFILE FEATURES

Figure 2.5 shows that there are three individual, non-overlapping feature polygons in the shapefile.
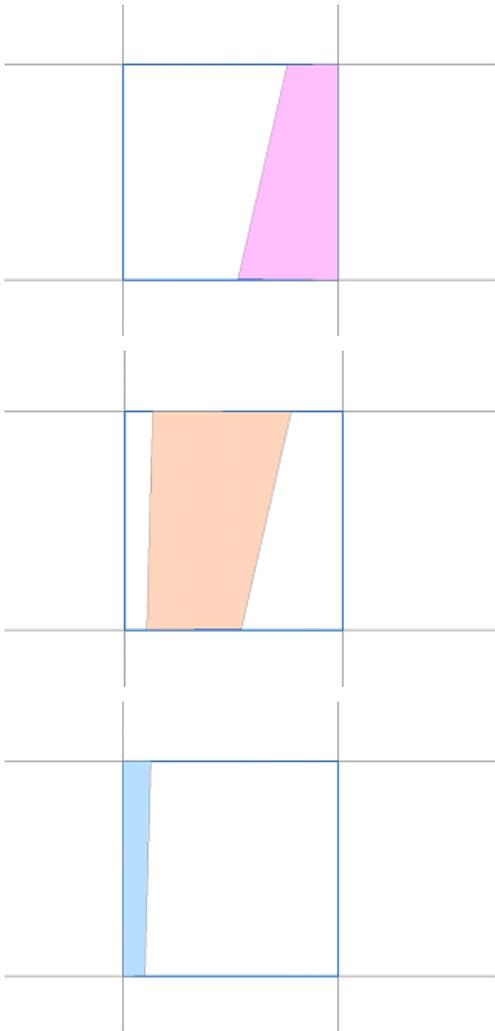
FIGURE 2.5 INDIVIDUAL FEATURES

2.1.1.3 Browse Image File

The browse image file is a resampled image covering the entire partition that is being delivered. It contains the same images that will be seen in the actual delivered tiles, resampled to approximately 16 meters per pixel. This provides an overview of the imagery in the delivered partition, and may be useful for quality assessment activities and comparisons between initial and update deliveries of the same partition. This jpg will be fairly large in size, up to approximately 10 MB.

The naming convention for the browse image file is: 3857_<partition>_<xxx>_<yyy>_<date>_<wo>.jpg.

2.1.2 THE JPG DIRECTORY

The jpg directory contains a numbered sub-directory for each <scale> delivered with the partition; it does not have any file content.

2.1.3 THE <SCALE> DIRECTORY

The <scale> directories are named per the tile zoom level which they contain. Directories are created ONLY where tiles exist; i.e., if tile creation stops at zoom level 18 in a particular area, due to data content, then no 19 or 20 directories will exist in this area. In addition, a zoom level may contain less than a full set of tiles, depending on the data content.

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2.1.4 THE <X> DIRECTORY

Each of the x-level sub-directories contains the actual jpg tiles for tile column defined by <x>. Each tile is named as <y>.jpg where y is the value of the grid cell row represented by that .jpg tile.

3   Content

3.1 Ingested Content

3.1.1 AERIAL CONTENT

Aerial content is provided for the following countries:
- United States (Continental)
- United Kingdom
- Ireland
- Spain
- Portugal
- France
- Belgium
- Netherlands
- Luxembourg
- Germany
- Denmark
- Switzerland
- Austria
- Italy
- Sweden (Stockholm & Gothenburg)
- Finland (Helsinki)
- Norway (Oslo)

3.2 Content Requirements

The following three factors determine the content that is delivered in the Initial Delivery and Updates:
- stacking profile
- zoom levels
- holdback restrictions

3.2.1 STACKING PROFILE

The stacking profile determines the order in which the tile service selects imagery when creating tiles. At each tile zoom level, content is selected in the priority order shown. If full coverage is achieved with the first listed content, then no other content is selected. If the first item does not provide full coverage of the tile, the second content is selected and this process continues until full coverage is achieved. Table 3.1 shows the stacking profile for the Consumer Profile, one of DigitalGlobe's most popular profiles for consumer-based applications. Additional profiles are available that will provide different results.

TABLE 3.1 STACKING PROFILE FOR CONSUMER_PROFILE

ZOOM LEVEL	METERS PER PIXEL	STACKING ORDER (HIGHEST TO LOWEST PRIORITY)	MAP SCALE MERCATOR
1	78271.52	TERRACOLOR_1200	221,872,136
2	39135.76	TERRACOLOR_1200	110,936,068
3	19567.88	TERRACOLOR_1200	55,468,034
4	9783.94	TERRACOLOR_1200	27,734,017
5	4891.97	TERRACOLOR_150	13,867,009
6	2445.98	TERRACOLOR_150	6,933,504
7	1222.99	TERRACOLOR_150	3,466,752
8	611.5	TERRACOLOR_150	1,733,376
9	305.75	TERRACOLOR_150	866,688

ZOOM LEVEL	METERS PER PIXEL	STACKING ORDER (HIGHEST TO LOWEST PRIORITY)	MAP SCALE MERCATOR
10	152.87	TERRACOLOR_15, TERRACOLOR_150	433,344
11	76.44	TERRACOLOR_15, TERRACOLOR_150	216,672
12	38.22	TERRACOLOR_15, TERRACOLOR_150	108,336
13	19.11	TERRACOLOR_15, TERRACOLOR_150	54,168
14	9.55	TERRACOLOR_15, TERRACOLOR_150	27,084
15	4.78	AERIAL, GLOBEX_30CM_COLOR, CITY_SPHERE, GLOBAL_CELLS_COLOR, GLOBEX_NAIP, COUNTRY_COVERAGE_COLOR, GLOBEX_SUB_METER_COLOR, GLOBAL_CELLS_PAN, COUNTRY_COVERAGE_PAN, FIRSTLOOK, TERRACOLOR_15, TERRACOLOR_150	13,542
16	2.39	AERIAL, GLOBEX_30CM_COLOR, CITY_SPHERE, GLOBAL_CELLS_COLOR, GLOBEX_NAIP, COUNTRY_COVERAGE_COLOR, GLOBEX_SUB_METER_COLOR, GLOBAL_CELLS_PAN, COUNTRY_COVERAGE_PAN, FIRSTLOOK, TERRACOLOR_15, TERRACOLOR_150	6,771
17	1.19	AERIAL, GLOBEX_30CM_COLOR, CITY_SPHERE, GLOBAL_CELLS_COLOR, GLOBEX_NAIP, COUNTRY_COVERAGE_COLOR, GLOBEX_SUB_METER_COLOR, GLOBAL_CELLS_PAN, COUNTRY_COVERAGE_PAN, FIRSTLOOK, TERRACOLOR_15, TERRACOLOR_150	3,386
18	0.6	AERIAL, GLOBEX_30CM_COLOR, CITY_SPHERE, GLOBAL_CELLS_COLOR, GLOBEX_NAIP, COUNTRY_COVERAGE_COLOR, GLOBEX_SUB_METER_COLOR, GLOBAL_CELLS_PAN, COUNTRY_COVERAGE_PAN, FIRSTLOOK, TERRACOLOR_15, TERRACOLOR_150	1,693
19	0.3	AERIAL, GLOBEX_30CM_COLOR, CITY_SPHERE, GLOBAL_CELLS_COLOR, GLOBEX_NAIP, COUNTRY_COVERAGE_COLOR, GLOBEX_SUB_METER_COLOR, GLOBAL_CELLS_PAN, COUNTRY_COVERAGE_PAN, FIRSTLOOK, TERRACOLOR_15, TERRACOLOR_150	846
20	0.15	AERIAL, GLOBEX_30CM_COLOR, CITY_SPHERE, GLOBAL_CELLS_COLOR, GLOBEX_NAIP, COUNTRY_COVERAGE_COLOR, GLOBEX_SUB_METER_COLOR, GLOBAL_CELLS_PAN, COUNTRY_COVERAGE_PAN, FIRSTLOOK, TERRACOLOR_15, TERRACOLOR_150	423

Note: For zoom levels 11-20, TERRACOLOR_150 is only used in areas of pure ocean coverage with no landmass. COUNTRY_COVERAGE_COLOR, COUNTRY_COVERAGE_PAN: lowest cloud cover on top, then by currency (newest on top). All Other buckets: newest on top"

3.2.2 ZOOM LEVELS

DigitalGlobe has worked with customers to identify regions of interest as well as the zoom levels that should be delivered for each of those regions. Zoom Levels for reach region, for all deliveries, are as follows:
- US/Western Europe: All imagery to Zoom Level 20 (15 cm)
- Consumer: Zoom levels 14-17 (120cm display GSD)
- Consumer-Color: Zoom levels 14-19 (30cm display GSD)
- Rest of Landmass – All imagery to Zoom Level 16 (2.4 m)
- Anywhere Imagery is better than Landsat – Zoom Level 19 (30 cm)
- Ocean – Zoom Level 13 (38 m)

3.2.3 HOLDBACK RESTRICTIONS

There are two DigitalGlobe holdback restrictions that apply to the content based on DigitalGlobe's Web Policy. The first holdback restriction requires that certain data be held back from public portals until six months after the latest acquisition date. This restriction only affects the Country Coverage Content. Global Basemap mosaics, Aerial, and Cities are exempt from the holdback and will be delivered as soon as made available commercially.

The second holdback restriction is for "active military theatres", over which no high resolution satellite data can be provided; only Global Basemap Globe data will be provided. To find out the latest list of active military theatres, contact your DigitalGlobe representative.

3.3 Content Deliveries

Two different methods are used to determine the content that will be delivered: "Initial Delivery" and "Updates". Ingested content will only be delivered if it meets the product specifications. All content deliveries will meet the requirements as described in the following sections.

3.3.1 INTELLIGENT UPDATE SERVICE

Your content delivery and updates are determined per your contract with DigitalGlobe.

The Intelligent Update Service (IUS) is the system that was created to evaluate the partitions for change. If a change has occurred, the entire partition will be produced and delivered to the customer. DigitalGlobe will evaluate the partitions quarterly and determine what partitions have changed based on the following criteria:
- Any change in Aerial Coverage of a visible feature
- Any change in visible Landsat (15m data)
- > 40% change in visible Satellite data

4 Tile Format, Metadata, and Download Protocol

4.1 Tile Format

Each of the delivered jpg tiles is generated based on the following parameters:
- JPEG quality setting of 85%.
- Resampling kernel varies depending on data content of a tile:
    - Nearest neighbor for satellite at zooms 1-18.
    - Bilinear for aerial at zooms 14-18.
    - Bilinear for all zoom 19 and 20 tiles (aerial and satellite), if available.
- Tile Width=Height=256 pixels.
- If present, null data is represented as white (value of 255).

4.2 Tile Metadata

Each tile contains embedded tile metadata. This embedded metadata is contained in the JPG EXIF fields, using minimal formatting to reduce tile size. This embedded metadata is defined in Table 4.1.

One data element of particular interest is **TileIdentifier**. This field provides change tracking at the tile level; this identifier will change ONLY when the tile is updated in a new work order; therefore it can be used to compare two tile versions for differences. This identifier is also the key to the tile_master.lst file to access additional tile metadata.

TABLE 4.1 EMBEDDED TILE METADATA

ELEMENT	EXIF TAG	DATA TYPE	EXAMPLE VALUE	DESCRIPTION
tileIdentifier	UserComment, field 1	String	3857_17_23375_ 51223_50000039	A unique identifier for each tile. Each tile will have this tileIdentifier in the EXIF metadata to tie it back to the tile_master.lst.
upsampledFromNative	UserComment, field 2; pipe-delimited from tileIdentifier	String	upsampledFromNative=true	Set to "true" if tile contains QB02, WV01, or WV02 data that is resampled beyond native resolution as defined by the GSD value of the source feature; otherwise value is "false".
copyright	Copyright	String	Copyright 2011 DigitalGlobe, Inc., Copyright 2011 ACME Inc.	Copyright owner of the imagery used in this tile. Comma-delimited list for multiple copyrights.

4.3 Tile Download Protocol

When a Delivery Notification Message for a partition has been sent, the tar file representing the delivery is available for retrieval from a DigitalGlobe server. Contact your DigitalGlobe representative for the server address.

5 Web Service Message API

This section defines message interaction between DigitalGlobe and the Tile customer.

5.1 Message Protocol

The message protocol used for these interfaces will be an HTTP POST, using the HTTP/1.1 standard as defined by the World Wide Web Consortium (www.w3.org).

5.2 Message Security

Service authentication will be handled at the network level to only allow the authorized Service consumer to access the provided Service.

5.3 Message Format

The message format used will be an XML-based document that is structured into a mandatory Header part and Body part. The Header part is intended to contain technical data around the message not directly related to the actual business data. The message payload contains business data and is intended to be placed in the Body part. The standard message request Header to be used in each service is defined in this section. The payload, which is contained in the message body, is also defined in this section.

5.4 HTTP Headers

The Web Service Message API will use the list of HTTP response status codes defined in Table 5.1. This includes codes from IETF internet standards as well as other custom codes. The first digit of the status code specifies one of five classes of response. The bare minimum for an HTTP client is that it recognizes these five classes. The phrases used are the standard examples, but any human-readable alternative can be provided. Unless otherwise stated, the status code is part of the HTTP/1.1 standard. Additionally, the Content-type in the HTTP header must be set to "text/xml".

TABLE 5.1 MESSAGE ACKNOWLEDGEMENT STATUS CODES

STATUS CODE	ERROR DESCRIPTION	CUSTOMER ACTION
001-199	CUSTOM: The status codes in this range are reserved for custom statuses. Status codes in this range will be developed and agreed upon by both the service consumer and service provider.	Take appropriate action based on custom status code.
200-299	SUCCESS: The action requested by the client was received, understood, and accepted.	Update status and log any important information.
300-399	REDIRECTION: The 3xx codes are intended for cases in which further action needs to be taken by the service consumer in order to fulfill the request.	Contact DigitalGlobe's customer support.
400-499	ERROR: The 4xx codes are intended for cases in which the client seems to have erred.	Fix error and resubmit. Contact DigitalGlobe Customer Support if assistance is required.
500-599	ERROR: The 5xx codes are intended for cases in which the server is aware that the server has erred.	Resubmit. Contact DigitalGlobe Customer Support if assistance is required.

5.5 Standard XML Message Headers

Along with the standard http headers, standard request and response message headers will be used in the XML to allow for message identification and error detail for audit logging and troubleshooting purposes. Refer to

Table 5.2 and Table 5.3 for the standard XML message headers to be included in all XML messages requests and responses.

TABLE 5.2 REQUEST HEADER ELEMENT DESCRIPTION

ELEMENT NAME	DATA TYPE	FIELD LENGTH	DESCRIPTION	EXAMPLE
serviceName*	String	≤ 50	Identifies the Service name the consumer is trying to invoke.	deliveryNotification
serviceVersion*	String	11	Specifies the Service version being used. The three level versioning structure will be expressed as three numbers separated by a period (major.minor.subminor), with each number containing three integers (001.001.001).	001.001.009
sendTimeStamp*	Date	≤ 12	Date/Timestamp from the sending system setting the time the message was sent to the Service provider.	yyyyMMddHHmmssZ
messageId*	String	≤ 36	Defines the unique ID assigned to each request message submitted by the consumer.	74d1bdb5-6b15-42bd-a7bd-08cd095cf7db

* Mandatory element

TABLE 5.3 MESSAGE ACKNOWLEDGEMENT ELEMENT DESCRIPTION

ELEMENT NAME	DATA TYPE	FIELD LENGTH	DESCRIPTION	EXAMPLE
serviceName*	String	≤ 50	Identifies the Service name the consumer invoked.	deliveryNotification
serviceVersion*	String	11	Specifies the Service version invoked.	001.001.009
responseTimeStamp*	Date	≤ 12	Date/Timestamp when the message was received by the service provider.	yyyyMMddHHmmssZ
messageId*	String	≤ 36	The unique ID that was assigned and submitted by the consumer to identify the message.	74d1bdb5-6b15-42bd-a7bd-08cd095cf7db
isError*	Boolean	true,false	Specifies if there is an error as part of the response. Boolean true or false value.	true
statusCode*	Integer	1-999999	Specifies the particular HTTP status code. These codes are defined by the HTTP reserved codes. This code should match the code returned in the HTTP header response.	200
statusDesc*	Text	256	Free text string describing the status of the message.	XSD Validation error occurred for element "fileSize".

* Mandatory element

5.6 Delivery Notification Message

Upon completion of each partition, DigitalGlobe sends a Delivery Notification message. This message contains all information necessary for the customer to download the available partition.

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Table 5.4 defines each data element of this message. The XSD is provided in Appendix B.

TABLE 5.4 DELIVERY NOTIFICATION DATA ELEMENTS

ELEMENT NAME	DATA TYPE	DEFINITION
DeliveryNotification		Root Element.
Header		Message Header containing technical data elements.
serviceName	String	Identifies the Service name the consumer is trying to invoke.
serviceVersion	String	Specifies the Service version being used. The three-level versioning structure will be expressed as three numbers separated by a period (major.minor.subminor) with each number containing three integers (001.001.001).
sendTimeStamp	Date	Date/Timestamp from the sending system setting the time the message was sent to the Service provider.
messageId	String	Defines the unique ID assigned to each request message submitted by the consumer.
Body		Message Payload containing business data elements.
workOrderId	string	The workOrderId tied to the partition delivered. This ID also exists in the tar file name as stated in previous sections.
releaseNote	string	Free-form text used to communicate anything of particular interest about this notification.
Tarfile:name	string	The name of the tarfile; per the naming convention, this will uniquely identify one and only one delivered tarfile.
Tarfile:numpackedfiles	Int	Total files contained in this tarfile, including subdirectories.
Tarfile:size	Long	Size of this tarfile in bytes.
Tarfile:checksum	string	The MD5 checksum computed for this tarfile.
Tarfile: status	enum	OK. This will always be set to "OK" in Delivery Notification Messages.

5.6.1 DELIVERY NOTIFICATION MESSAGE TECHNICAL ACKNOWLEDGEMENT

The Tile Customer will respond to the Delivery Notification Message with a synchronous technical acknowledgement verifying that the message was received. This technical acknowledgement will contain the standard XML response header as defined in

Table 5.4.

5.7 Delivery Notification Response Message

The Tile Customer will provide an asynchronous Delivery Notification Response Message. This asynchronous response message is used to identify that the product was downloaded successfully or errors occurred with the product.

5.7.1 DELIVERY NOTIFICATION RESPONSE: TARFILE STATUS MESSAGE

The Delivery Notification Response message will contain different subsets of the data elements defined in Table 5.5 and will adhere to the XSD shown in Appendix B.

Usage Notes:
- Receipt of a "DOWNLOAD_COMPLETE" indicates that the delivery has been successfully downloaded from the DigitalGlobe FTP site, and DigitalGlobe may, at their discretion, remove the associated tar file.
- If a status of "PROBLEM" is sent, then the message MUST contain one or more tarFile or jpegTile data elements to define the nature of the problem; if not, the message will be rejected as invalid with an HTTP(200) response and an embedded error message.
- If a status of "FEEDBACK" is sent, then an additional jpeg tile status message containing one or more jpegTile elements is expected. The feedback details should be provided in the "comments" field of the jpegTile elements.
- If a tarFile status of "BAD_TILES" is sent, then an additional jpeg tile status message containing one or more jpegTile elements is expected. The data elements define the tile problem(s) within the tarFile.

TABLE 5.5 DELIVERY NOTIFICATION RESPONSE DATA ELEMENTS FOR TARFILE PROBLEMS

ELEMENT NAME	DATA TYPE	DEFINITION
DeliveryResponse		Root Element.
Header		Message Header containing technical data elements.
serviceName	String	Identifies the Service name the consumer is trying to invoke.
serviceVersion	String	Specifies the Service version being used. The three-level versioning structure will be expressed as three numbers separated by a period (major.minor.subminor) with each number containing three integers (001.001.001).
sendTimeStamp	Date	Date/Timestamp from the sending system setting the time the message was sent to the Service provider.
messageId	String	Defines the unique ID assigned to each request message submitted by the consumer.
Body		Message Payload containing business data elements.
workOrders:workOrderId	string	The workOrderId tied to the partition delivered. This ID also exists in the tar file name as stated in previous sections.
workOrders:Status	enum	"DOWNLOAD_COMPLETE". Sent to indicate that the data has been successfully downloaded from the DigitalGlobe FTP site. "PROBLEM". Sent to indicate that a problem with the data has been encountered after it has been downloaded from the DigitalGlobe FTP site. When this status is used, one or more tarFile and/or jpegTile elements must be included to define the problem type. "FEEDBACK". Sent to indicate that there is not a problem, but simply feedback on the partition. This would be accompanied by "comments" at the jpeg level.
workOrders:tarFile:name	string	The name of the tar file for which status is being provided; this must match the name of the tarfile provided in the Delivery Notification message.
workOrders:tarFile:status	enum	Status of the received tarfile. One of the following values: SIZE_MISMATCH: Indicates the customer downloaded tarfile size does not match the value of the size element provided in the Delivery Notification for

ELEMENT NAME	DATA TYPE	DEFINITION
		this tarfile.
		BAD_CHECKSUM: Indicates the customer-computed checksum does not match the md5_checksum element provided in the Delivery Notification for this tarfile.
		BAD_TILES: Indicates that the customer believes one or more "bad" tiles were found in the tarfile during processing; the exact nature of the tile problem(s) will be defined in one or more jpegTile data elements. Refer to the previous section, 5.7.1 Delivery Notification Response: TarFile Status Message.
		BAD_PARTITION: Like BAD_TILES, but used to indicate that so many "bad" tiles (threshold TBD) were found that the entire partition should be replaced. When possible, the exact nature of the tile problem(s) should be defined in one or more (but fewer than the threshold) jpegTile data elements.

5.7.2 DELIVERY NOTIFICATION RESPONSE: JPEG TILE STATUS MESSAGE

The customer provides Delivery Notification Response messages with jpeg tile data elements to indicate a problem exists with tiles within a downloaded tar file. For this case, the Delivery Notification Response message contains a status of "PROBLEM", includes a subset of the data elements defined in Table 5.5 to define the jpeg tile problem, and adheres to the XSDs shown in Appendix B.

➔ NOTE: If a status of "PROBLEM" is sent, then the message MUST contain one or more tarFile or jpegTile data elements to define the nature of the problem. If not, the message will be rejected as invalid with an HTTP(200) response and an embedded error message.

TABLE 5.6 DELIVERY NOTIFICATION RESPONSE DATA ELEMENTS FOR JPEG TILE PROBLEMS

ELEMENT NAME	DATA TYPE	DEFINITION
DeliveryResponse		Root Element.
Header		Message Header containing technical data elements.
serviceName	String	Identifies the Service name that the consumer is trying to invoke.
serviceVersion	String	Specifies the Service version being used. The three-level versioning structure will be expressed as three numbers separated by a period (major.minor.subminor), with each number containing three integers (001.001.001).
sendTimeStamp	Date	Date/Timestamp from the sending system setting the time the message was sent to the Service provider.
messageId	String	Defines the unique ID assigned to each request message submitted by the consumer.
Body		Message Payload containing business data elements.
workOrders:workOrderId	string	The workOrderId tied to the partition delivered. This ID also exists in the tar file name as stated in previous sections.
workOrders:status	enum	"PROBLEM". Sent to indicate that a problem with the data has been encountered after it has been downloaded from the DigitalGlobe FTP site. When this status is used, one or more tarFile and/or jpegTile elements must be included to define the problem type.
workOrders:jpegTile:tileId	string	The name of the jpeg file for which status is being provided. This must be the fully qualified name, including the full directory structure from which the tile was extracted.
workOrders:jpegTile:viewURL	string	A customer-generated URL that allows the message recipient to view the tile identified by this element. This helps the message recipient visualize

ELEMENT NAME	DATA TYPE	DEFINITION
		the problem.
workOrders:jpegTile:status	enum	The status of the tile identified by this element. One of the following values: **Image_Quality:** Indicates bad Dynamic Range Adjustment (DRA), poor color enhancement, bad color balance, poor contrast, etc. Note that this seasonality affects color balance, but seasonal variation is allowed on Global Basemap. **Excessive _Input_Images:** The partition has too many features, causing an excessive patchwork look. Usually eight features per partition are the maximum acceptable, but the overall partition quality is the determining factor. **Geometric_Break:** There is a geometric break ≥ 50m. Breaks smaller than 50 meters are within spec. **Improper_Stacking:** The feature stacking profile was incorrectly implemented in a partition. **Metadata:** There is a metadata error. **Mosaic_Anomaly:** An individual feature has an error, such as a tear (no imagery) due to seamlines, etc. **Processing_Error:** Unacceptable white or black lines in the middle of features or on feature boundaries. **Small_Image_Subsetting:** Slivers exist in high value areas. **NOT_IN_MANIFEST:** Tile was provided in tar, but not included in the manifest file. **Information_Only:** There is something to point out, but doesn't actually fail the spec. Use the comment field for details.
workOrders:jpegTile:comment	String	2000 characters maximum. This is to provide additional feedback details about the tile.

5.7.3 DELIVERY NOTIFICATION RESPONSE MESSAGE TECHNICAL ACKNOWLEDGEMENT

DigitalGlobe will respond to the Delivery Notification Response Message from the Tile Customer with a synchronous technical acknowledgement verifying that the message was received. This technical acknowledgement will contain the standard XML response header as defined in

Table 5.2 and Table 5.3.

5.8 Delivery Notification Message and Delivery Response Message Sequences

Figure 5.1 is a sequence diagram showing a typical interchange of messages and data between DigitalGlobe and the tile customer, when no errors occur.

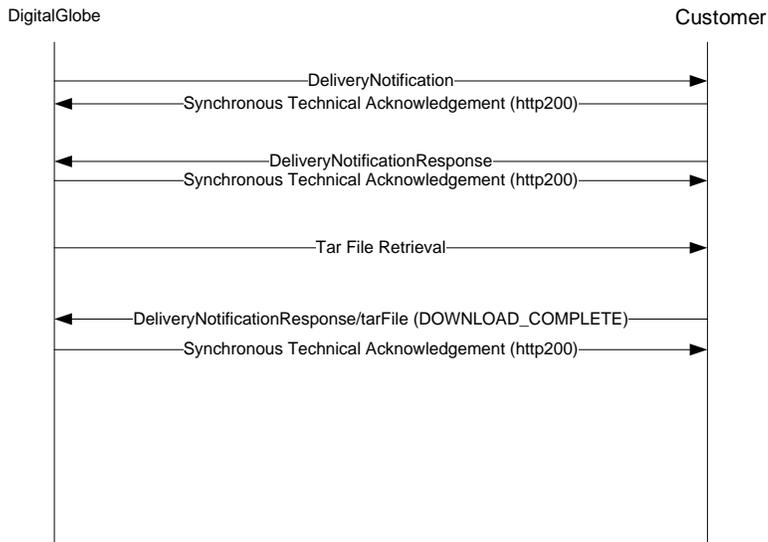**FIGURE 5.1 MESSAGING INTERACTION SEQUENCE: NO ERRORS**

Figure 5.2 is a sequence diagram showing the interaction when an error is detected in the downloaded tarfile.
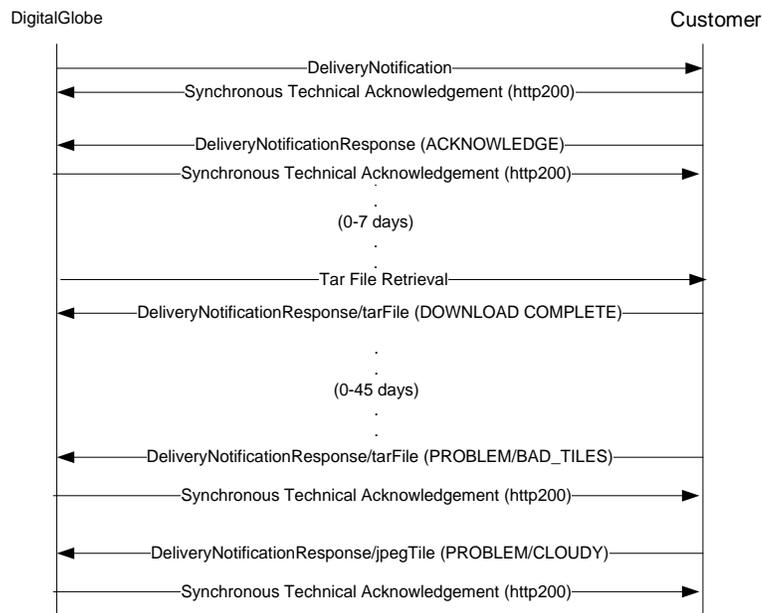
FIGURE 5.2 MESSAGING INTERACTION SEQUENCE: TAR FILE ERRORS

Figure 5.3 is a sequence diagram showing the interaction when an error is detected with one or more jpeg tiles within a downloaded tarfile.

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DigitalGlobe   Customer

DeliveryNotification →

← Synchronous Technical Acknowledgement (http200)

← DeliveryNotificationResponse

Synchronous Technical Acknowledgement (http200) →

Tar File Retrieval →

← DeliveryNotificationResponse/tarFile (PROBLEM/SIZE_MISMATCH)

Synchronous Technical Acknowledgement (http200) →

FIGURE 5.3 MESSAGING INTERACTION SEQUENCE: JPEG TILE ERRORS

5.9 Message URLs

To determine your message URLs, contact your DigitalGlobe representative.

Appendix A: Partition Layout Example

The following example represents the tile delivery layout after tar expansion, for workorder "D1" created on 2011-10-01 for the Level 9 grid cell where x =176, and y = 146.
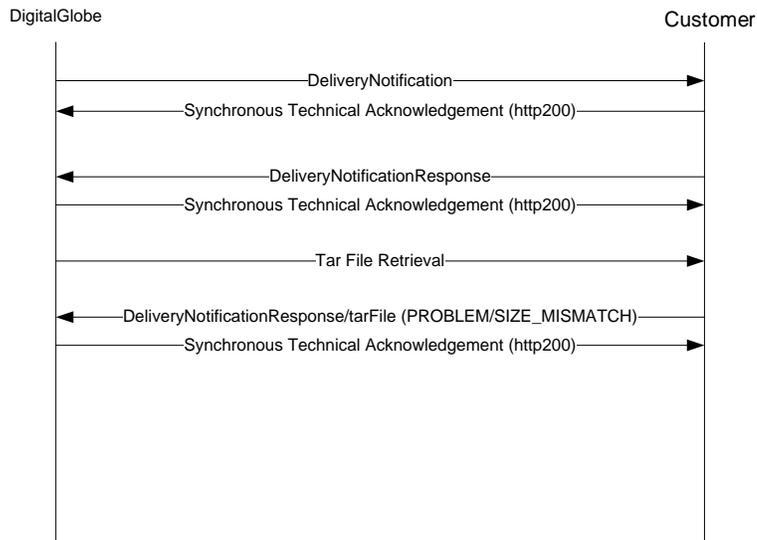
```
3857_9_176_146_20111001_D1/
jpg/
tile_master.lst
3857_9_176_146_20111001_D1.zip
3857_9_176_146_20111001_D1.jpg

./3857_9_176_146_20111001_D1/jpg:
12/
13/
14/
 …
20/

./3857_9_176_146_20111001_D1/jpg/12:
1408/
1409/
1410/
1411/
1412/
1413/
1414/
1415/

./3857_9_176_146_20111001_D1/jpg/12/1408:
1168.jpg
1169.jpg
1170.jpg
1171.jpg
1172.jpg
1173.jpg
1174.jpg
1175.jpg

./3857_9_176_146_20111001_D1/jpg/12/1409:
1168.jpg
1169.jpg
1170.jpg
1171.jpg
1172.jpg
1173.jpg
1174.jpg
1175.jpg

…

./3857_9_176_146_20111001_D1/jpg/12/1415:
1168.jpg
1169.jpg
1170.jpg
1171.jpg
1172.jpg
1173.jpg
1174.jpg
1175.jpg
```

Appendix B: Tile Delivery XSDs

The tile delivery schema is organized into five .xsd files provided by DigitalGlobe as separate attachments:

```xml
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<xs:schema xmlns:dg="http://xsd.digitalglobe.com/xsd/wm/tileDelivery"
xmlns:xs="http://www.w3.org/2001/XMLSchema"
targetNamespace="http://xsd.digitalglobe.com/xsd/wm/tileDelivery"
elementFormDefault="qualified" version="1.1.1">
        <xs:include schemaLocation="tar.xsd"/>
        <xs:include schemaLocation="header.xsd"/>
        <xs:element name="DeliveryNotification">
                <xs:complexType>
                        <xs:sequence>
                                <xs:element ref="dg:Header"/>
                                <xs:element name="Body">
                                        <xs:complexType>
                                                <xs:sequence>
                                                        <xs:element
name="workOrderId" type="xs:string"/>
                                                        <xs:element
name="releaseNote" type="xs:string" minOccurs="0"/>
                                                        <xs:element
name="tarFile" type="dg:tarFile" nillable="false"/>
                                                </xs:sequence>
                                        </xs:complexType>
                                </xs:element>
                        </xs:sequence>
                </xs:complexType>
        </xs:element>
</xs:schema>
```

FIGURE 5.4 DELIVERY NOTIFICATION (REQUIRES 4 AND 5) – DELIVERYNOTIFICATION.XSD

```xml
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<xs:schema xmlns:dg="http://xsd.digitalglobe.com/xsd/wm/tileDelivery"
xmlns:xs="http://www.w3.org/2001/XMLSchema"
targetNamespace="http://xsd.digitalglobe.com/xsd/wm/tileDelivery"
elementFormDefault="qualified" version="1.1.1">
        <xs:include schemaLocation="tar.xsd"/>
        <xs:include schemaLocation="header.xsd"/>
        <xs:simpleType name="DeliveryResponseStatusEnum">
                <xs:restriction base="xs:string">
                        <xs:enumeration value="ACKNOWLEDGE"/>
                        <xs:enumeration value="DOWNLOAD_COMPLETE"/>
                        <xs:enumeration value="PROBLEM"/>
                </xs:restriction>
        </xs:simpleType>
        <xs:element name="DeliveryResponse">
                <xs:complexType>
                        <xs:sequence>
<xs:element ref="dg:Header"/>
                                <xs:element name="Body">
                                        <xs:complexType>
                                                <xs:sequence>
                                                        <xs:element
name="workOrders" maxOccurs="unbounded">
Continued…
```

```
…Continued
        <xs:complexType>
        <xs:sequence>
<xs:element name="workOrderId" type="xs:string"/>

<xs:element name="status" type="dg:DeliveryResponseStatusEnum"/>

        <xs:element name="tarfile" type="dg:tarFile" nillable="true"
minOccurs="0"/>
                                        <xs:element name="jpegTile"
type="dg:jpegTile" nillable="true" minOccurs="0" maxOccurs="unbounded"/>

        </xs:sequence>
                                                        </xs:complexType>
                                                </xs:element>
                                        </xs:sequence>
                                </xs:complexType>
                        </xs:element>
                </xs:sequence>
        </xs:complexType>
        </xs:element>
</xs:schema>
```

FIGURE 5.5 DELIVERY NOTIFICATION RESPONSE – DELIVERYRESPONSE.XSD

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:dg="http://xsd.digitalglobe.com/xsd/wm/ack"
xmlns:xs="http://www.w3.org/2001/XMLSchema"
targetNamespace="http://xsd.digitalglobe.com/xsd/wm/ack"
elementFormDefault="qualified" version="1.1">
        <xs:element name="msgAck">
                <xs:complexType>
                        <xs:sequence>
                                <xs:element name="serviceName">
                                        <xs:annotation>
<xs:documentation>Identifies the Service name the consumer
invoked</xs:documentation>
                                        </xs:annotation>
                                        <xs:simpleType>
                                                <xs:restriction
base="xs:string">
                                                        <xs:minLength
value="1"/>
                                                        <xs:maxLength
value="50"/>
                                                </xs:restriction>
                                        </xs:simpleType>
                                </xs:element>
                                <xs:element name="serviceVersion">
                                        <xs:annotation>
                                                <xs:documentation>Current
version of service.</xs:documentation>
                                        </xs:annotation>
                                        <xs:simpleType>
                                                <xs:restriction
base="xs:string">
Continued…
```

```
…Continued
                                                    <xs:length value="11"/>
                                            </xs:restriction>
                                    </xs:simpleType>
                            </xs:element>
                            <xs:element name="responseTimeStamp">
                                    <xs:annotation>
                                            <xs:documentation>Datetime
message was sent</xs:documentation>
                                    </xs:annotation>
                                    <xs:simpleType>
                                            <xs:restriction
base="xs:dateTime"/>
                                    </xs:simpleType>
                            </xs:element>
                            <xs:element name="messageId">
                                    <xs:annotation>

<xs:documentation>Random generated id to identify message (ex:
UUID)</xs:documentation>
                                    </xs:annotation>
                                    <xs:simpleType>
                                            <xs:restriction
base="xs:string">
                                                    <xs:maxLength
value="36"/>
                                            </xs:restriction>
                                    </xs:simpleType>
                            </xs:element>
                            <xs:element name="isError"
type="xs:boolean">
                                    <xs:annotation>

     <xs:documentation>Boolean</xs:documentation>
                                    </xs:annotation>
                            </xs:element>
                            <xs:element name="statusCode"
type="xs:integer">
                                    <xs:annotation>
                                            <xs:documentation>HTTP status
code (ex: 200, 400, 500 etc)</xs:documentation>
                                    </xs:annotation>
                            </xs:element>
                            <xs:element name="statusDesc">
                                    <xs:annotation>
<xs:documentation>Free text string describing the status of the
message.</xs:documentation>
                                    </xs:annotation>
                                    <xs:simpleType>
                                            <xs:restriction
base="xs:string">
                                                    <xs:maxLength
value="256"/>
                                            </xs:restriction>
                                    </xs:simpleType>
                            </xs:element>
                    </xs:sequence>
            </xs:complexType>
      </xs:element>
```

FIGURE 5.6 SYNCHRONOUS TECHNICAL ACKNOWLEDGMENT – MESSAGEACKNOWLEDGEMENT.XSD

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```xml
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
xmlns:dg="http://xsd.digitalglobe.com/xsd/wm/tileDelivery"
targetNamespace="http://xsd.digitalglobe.com/xsd/wm/tileDelivery"
elementFormDefault="qualified" attributeFormDefault="unqualified"
version="1.2">
        <xs:simpleType name="jpegTileStatusEnum">
                <xs:restriction base="xs:string">
                        <xs:enumeration value="MISSING"/>
                        <xs:enumeration value="CORRUPT"/>
                        <xs:enumeration value="CLOUDY"/>
                        <xs:enumeration value="ALIGNMENT_PROBLEM"/>
                        <xs:enumeration value="COLOR_PROBLEM"/>
                        <xs:enumeration value="NOT_IN_MANIFEST"/>
                </xs:restriction>
        </xs:simpleType>
        <xs:simpleType name="tarFileStatusEnum">
                <xs:restriction base="xs:string">
                        <xs:enumeration value="SIZE_MISMATCH"/>
                        <xs:enumeration value="BAD_CHECKSUM"/>
                        <xs:enumeration value="BAD_TILES"/>
                        <xs:enumeration value="BAD_PARTITION"/>
                        <xs:enumeration value="OK"/>
                </xs:restriction>
        </xs:simpleType>
        <xs:complexType name="jpegTile">
                <xs:sequence>
                        <xs:element name="tileId" type="xs:string"/>
                        <xs:element name="version" type="xs:int"/>
                        <xs:element name="viewURL" type="xs:string"
minOccurs="0"/>
                        <xs:element name="status"
type="dg:jpegTileStatusEnum"/>
                </xs:sequence>
        </xs:complexType>
        <xs:complexType name="tarFile">
                <xs:sequence>
                        <xs:element name="name" type="xs:string"/>
                        <xs:element name="numpackedfiles" type="xs:int"/>
                        <xs:element name="size" type="xs:long"/>
                        <xs:element name="checksum" type="xs:string"/>
                        <xs:element name="status"
type="dg:tarFileStatusEnum"/>
                </xs:sequence>
        </xs:complexType>
</xs:schema>
```

FIGURE 5.7 TAR FILE AND JPEG FILE STRUCTURE – TAR.XSD

```xml
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
xmlns:dg="http://xsd.digitalglobe.com/xsd/wm/tileDelivery"
targetNamespace="http://xsd.digitalglobe.com/xsd/wm/tileDelivery"
elementFormDefault="qualified" version="1.1">
      <xs:element name="Header">
            <xs:complexType mixed="0">
                  <xs:sequence>
                        <xs:element name="serviceName">
                              <xs:annotation>
                                    <xs:documentation>Identifies the
Service name the consumer
is trying to invoke</xs:documentation>
                              </xs:annotation>
                              <xs:simpleType>
                                    <xs:restriction base="xs:string">
                                          <xs:minLength value="1"/>
                                          <xs:maxLength value="50"/>
                                    </xs:restriction>
                              </xs:simpleType>
                        </xs:element>
                        <xs:element name="serviceVersion">
                              <xs:annotation>
                                    <xs:documentation>Current service
version</xs:documentation>
                              </xs:annotation>
                              <xs:simpleType>
                                    <xs:restriction base="xs:string">
                                          <xs:length value="11"/>
                                    </xs:restriction>
                              </xs:simpleType>
                        </xs:element>
                        <xs:element name="sendTimeStamp"
type="xs:dateTime">
                              <xs:annotation>
                                    <xs:documentation>Datetime
message was sent</xs:documentation>
                              </xs:annotation>
                        </xs:element>
                        <xs:element name="messageId">
                              <xs:annotation>
<xs:documentation>Random generated id to identify message (ex:
UUID)</xs:documentation>
                              </xs:annotation>
                              <xs:simpleType>
                                    <xs:restriction base="xs:string">
                                          <xs:minLength value="1"/>
                                          <xs:maxLength value="36"/>
                                    </xs:restriction>
                              </xs:simpleType>
                        </xs:element>
                  </xs:sequence>
            </xs:complexType>
      </xs:element>
</xs:schema>
```

FIGURE 5.8 HEADER STRUCTURE – HEADER.XSD

Glossary

AOI

Area of Interest. The area on the Earth that you want to view.

Bilinear Interpolation

Bilinear interpolation uses the value of the four nearest cell centers to determine the value on the output raster. The new value is a weighted average of these four values, adjusted to account for their distance from the center of the output cell. The result is a smoother-looking surface than provided by "nearest neighbor".

Bicubic Interpolation

Bicubic interpolation combines data points on a two-dimensional grid. This method outputs the smoothest surface of all interpolation methods.

GeoTIFF format

A GeoTIFF file is a TIFF file that is embedded with geographic data tags.

GML

Geography Markup Language. GML is XML code used to express geographical features.

Nearest Neighbor Interpolation

Uses the value of the closest point and disregards all other values, yielding a piecewise-constant interpolant.

OGC

Open GIS Consortium. An international standards organization comprised of commercial, governmental, nonprofit and research organizations. They support geospatial content development as well as data processing and sharing.

OWS

OGC Web Service Common.

Partition

Partitions are the delivery unit for DigitalGlobe-created tiles and are based on the tile zoom level grid of the used projection. All tiles and associated metadata for a partition are tar-compressed into a single file for delivery.

UTM

Universal Transverse Mercator Geographic Coordinate System. UTM utilizes a two-dimensional Cartesian system to specify locations on the Earth's surface.

WCS

Web Coverage Service.

WFS

Web Feature Service.

WMS

Web Map Service.

WMTS

Web Map Tile Service.

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