STDI-0006
18 February 2010
Total Pages: 78

NATIONAL GEOSPATIAL-INTELLIGENCE AGENCY (NGA)

NATIONAL IMAGERY TRANSMISSION FORMAT (NITF)

VERSION 2.1 COMMERCIAL DATASET

REQUIREMENTS DOCUMENT (NCDRD)

21 October 2004

Abstract: This document provides the requirements for commercial imagery datasets provided by Commercial Data Providers (CDPs) in National Imagery Transmission Format (NITF) Version 2.1 to elements of the National Geospatial-Intelligence Agency (NGA) for dissemination to worldwide customers and follow-on applications.

Key Words: National Imagery Transmission Format (NITF), Commercial Imagery, National Geospatial-Intelligence Agency (NGA), Commercial Data Provider (CDP), Datasets, Headers, Subheaders, Tagged Record Extension (TRE), Data Extension Segment (DES), Joint Photographic Experts Group 2000 Standard (JPEG 2000)

DISTRIBUTION LIST

Copies of this document have been provided to the distribution noted below. Requests for additional copies of the document or changes to the Distribution List should be directed to the NGA/AE.

CM Libraries

NGA St. Louis CM Library/Marianne Smith

NGA Newington CM Library/Lea Smith

TASC EE CM Library/Jennifer Madeoy

System/Segment Contractors

DigitalGlobe

Bob Kudola	bkudola@digitalglobe.com
Nikki Robinson	nrobinson@digitalglobe.com

GeoEye

David Barlow	barlow.david@geoeye.com
Dale Crittenden	crittenden.dale@geoeye.com

IESS

Larry Turner	Lawrence.L.Turner@nga.mil

JITC

Kevin McCormish	Kevin.McCormish.ctr@disa.mil

NES

Deron Brookins	Deron.L.Brookins@nga.mil

NGA Library

LtCol Vic Wheeler	Victor.B.Wheeler@nga.mil
Bryan Dyer	Bryan.L.Dyer@nga.mil

PMAA

Martin Delaney	Martin.M.Delaney@nga.mil

STIL

Dave Serley	David.M.Serley.ctr@nga.mil

WARP

Capt Andy DeBerry	Andrew.N.DeBerry@nga.mil

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

TBD/TBR LISTING				
PARAGRAPH/ FIGURE/TABLE	**PAGE NO.**	**TBD**	**TBR**	**DESCRIPTION**

CHANGE LOG			
TITLE: NITF 2.1 Commercial Dataset Requirements Document (NCDRD)			
SCN/ REV	**DATE**	**ITEMS AFFECTED**	**REMARKS RFC AUTHORITY**
000	21 October 2004	All – Initial Issue	RFC N01-0411/ NCCB
001	15 September 2005	i, ib, iia, iic, iii, 1-1, 1-2, 2-1, 2-2, 2-3, 2-5 through 2-9, 2-11, 2-12, 2-14, 2-17, 2-19, 2-20, 2-23 through 2-31, 2-33 through 2-37, 3-2, 3-6, 3-7, 3-14, 3-15, 3-16, 3-18, 3-21, 5-2	RFC N99-0013/NCCB S-0122 dtd 20 September 2005
002	16 February 2006	i, ia-1, ib, ii, iia, iib, iic, iii, 1-2, 2-3, 2-9, 2-11, 2-11a, 2-17, 2-32, 2-33, 2-34, 2-35, 2-36, 2-36a, 2-37, 4-3, 4-4	RFC N01-0441 / NCCB S/NF-0016-06 dtd 23 Feb 2006
003	20 December 2006	All Pages – Reissue Change Log history for SCNs 000 through 002 has been archived. Document reformatted to accommodate DOORS processing.	RFC N01-0467 NCCB TS//TK//NF-0120-06 dtd 29 December 2006
004	20 December 2006	Paragraphs 1.5.2, 2.1.1.2, 2.1.1.2-1, 2.1.1.2-2, 2.1.1.2-3, 2.1.2, 2.1.5-3, 2.2.1.1-1, 2.2.3.1-1, 2.2.3.1-2, 2.4.1.1.1, 2.4.1.1.2, 2.4.1.1.3, 2.4.2.1.1, 2.4.3.1.1, 2.5.4, 2.5.10, 2.5.10-1, 2.5.13, 2.5.14, 2.5.14-1, 2.5.14-2, 2.5.14-3, 2.5.15-2 Figures 2.1-2, 2.2-2, 2.2-3 Tables 2.1-2, 2.1-3, 2.1-4, 2.1-6, 2.1-7, 3.1-1, 3.2-1, 3.3-1, 3.4-1, 3.5-1, 3.6-1, 3.7-1, 3.8-1, 4.1-1, 4.2-1	RFC N01-0467 NCCB TS//TK//NF-0120-06 dtd 29 December 2006
005	23 July 2008	Pages ii, x(d) Paragraphs 1.5.1, 2.1.2, 2.1.4.2, 2.2.3.1, 2.3.1.1, 2.5.5, 2.5.10, 2.5.13, 2.5.15, 2.5.16, 2.5.17, 2.5.18, 2.5.19, 2.6.2, 5 Figures 2.1.2-1 Tables 2.1-1, 2.1-3, 2.1-4, 2.1-7, 3.3-1, 3.5-1, 3.7-1, 3.8-1	RFC N01-0523J NCCB S//TK//REL-0078-08/AEI/CM dtd 24 Jul 2008
006	18 February 2010	Pages i, ii, Change Log, Effectivity Log, Added Requirement, Section 2.2, Paragraph 5, Tables 2.1-2, 2.1-3, 2.1-7, 3.5-1, 3.7-1	RFC N01-0550J NCCB S//TK//NF-0002-10//AEI/CM dtd 12 January 2010

(a) indicates added page; and (d) indicates deleted page

EFFECTIVITY LOG

Unless identified otherwise by Effectivity number (NEn), all requirements of this document are baselined in accordance with approved Program Master Schedule(s).

NO.	SCN	EFFECTIVE PER/ON	TITLE
NE344	006	NMS/WorldView-2 IOC WorldView-2 FOC	Initialization and Integration of Commercial Imagery, WorldView-2 (WV02) Data into NSG, Phase-2 and PR Resolution (RFC N01-0550J)

Note: Added requirements are identified with an Effectivity number (NEn) in the right margin.

ADDED REQUIREMENT – EFFECTIVITY NO. NE344	
INITIATING RFC NO: N01-0550J	
EFFECTIVITY TITLE: WorldView-2 Integration into the NSG	
SUMMARY OF ADDED EFFECTIVITY: Integrates DigitalGlobe WorldView-2 satellite imagery and supporting data into the National System for Geospatial-Intelligence (NSG) to enable tasking, collection, processing, exploitation, and dissemination of this new Commercial Imagery data source. The integration of WorldView-2 capabilities and functionality is being delivered in two (2) increments, initial and final. The initial increment (NE344i) provides panchromatic and 4-band multispectral imagery to the NSG. The final increment (NE344f) completes the integration by providing 8-band multispectral imagery to the NSG.	
NMS EFFECTIVITY MILESTONE: WorldView-2 IOC; WorldView-2 FOC	
Paragraph/Figure/Table Impacted	**Add/Replace/Delete**
Table 2.1-3	Add

WAIVER LOG			
WAIVER NO	WAIVER SCN	DISPOSITION[1]	TITLE/REMARKS

1. Disposition is "OPEN" or "CLOSED"

1 INTRODUCTION

1.1 Scope

This document specifies the requirements for imagery datasets generated by Commercial Data Providers (CDP) and delivered to the United States Government (USG) at the designated delivery ingest. These datasets will then be utilized as source material for a variety of analyses and derived products. The Image Product Types depicted in Table 2.1-7 represents the complete list of covered product types.

1.2 Configuration Control

The office of primary responsibility for this document is the NGA/AED. This document is under the configuration control of the NGA Configuration Control Board (NCCB). All changes to this document shall be documented via the Request for Change procedure and approved by the NCCB prior to change incorporation.

1.3 Applicability

This document applies to all CDPs providing commercial imagery to USG to include NGA entities. This document also applies to USG elements to be able to process the CDP-provided commercial imagery.

Implementation details of these requirements for the CDPs can be found in the appropriate CDP National Imagery Transmission Format (NITF) Version 2.1 specification. Implementation details of these requirements for the USG user community will be promulgated in NCCB-approved changes to appropriate requirements and specification documents.

1.4 Organization of this Document

Section 2 of this document covers the high-level requirements for commercial datasets. The section describes the dataset identifier, and the population of NITF headers and subheaders. The section includes a brief discussion of the wideband data format and compression methods and concludes with alphabetically ordered lists of each Tagged Record Extension (TRE) and each Data Extension Segment (DES).

Section 3 presents the detailed layouts of each TRE, while Section 4 presents the details of each DES. Section 5 supplies a list of acronyms.

1.5 References

The following sources, as cited in the text of this document, provide amplifying detail and, as stated in this document, additional requirements.

1.5.1 Government Documents

MIL-STD-2500C	National Imagery Transmission Format Version 2.1 for the National Imagery Transmission Format Standard	01 May 2006
STDI-0002	The Compendium of Controlled Extensions (CE) for the National Imagery Transmission Format (NITF), Version 3.0	01 Aug 2007

1.5.2 Non-Government Publications

754-1985	IEEE Standard for Binary Floating Point Arithmetic	12 Aug 1985
DIGEST	The Digital Geographic Information Exchange Standard (DIGEST), Part 2 – Annex D, Edition 2.1	Sep 2000
	ESRI Shapefile Technical Description, ESRI White Paper J-7855, Environmental Systems Research Institute, Inc.	Jul 1998
BPJ2K01.00	BIIF Profile for JPEG 2000, Version 01.00	30 Jul 2004
ISO/IEC 15444-1:2004(E)	JPEG 2000 Image Coding System – Core Coding System	15 Sep 2004

2 DATASET REQUIREMENTS

2.1 Commercial Dataset Format

2.1.1 Commercial Dataset Identification and Image Identifiers

This section provides clarifying information for the identification fields used to distinguish datasets and imagery. The term “unique” is used often in this document, and particularly in dataset and imagery identification. Unless otherwise stated, the use of the term “unique” will apply to an individual CDP only. Each CDP shall attempt to provide unique identifiers within their own domain for each product delivery.

2.1.1.1 Commercial Dataset Identification

The CDP shall generate a vendor-unique file title and store that identifier in the FTITLE field of the NITF file header (see Section 2.1.3). The purpose of the file title is to provide a common identification reference for related imagery that spans multiple NITF files.

The CSDIDA Dataset Identification TRE, which is described in Section 2.5.3, provides basic information describing the data contained in the NITF file. The information provided in this TRE is not unique and may apply to multiple datasets.

2.1.1.2 Commercial Image ID

The Commercial Image ID is stored in the IID2 field of the NITF Image Segment Subheader and is the title of the NITF image segment. The 80 characters of IID2 are generated by the CDP’s and shall conform to the standard methodology as depicted in Figure 2.1-1, IID2 Common Identification Methodology.

The Commercial Image ID is composed of three components. These components are the Commercial Data Flag components, the Vendor-assigned Unique ID component, and Reserved for Chipping component.

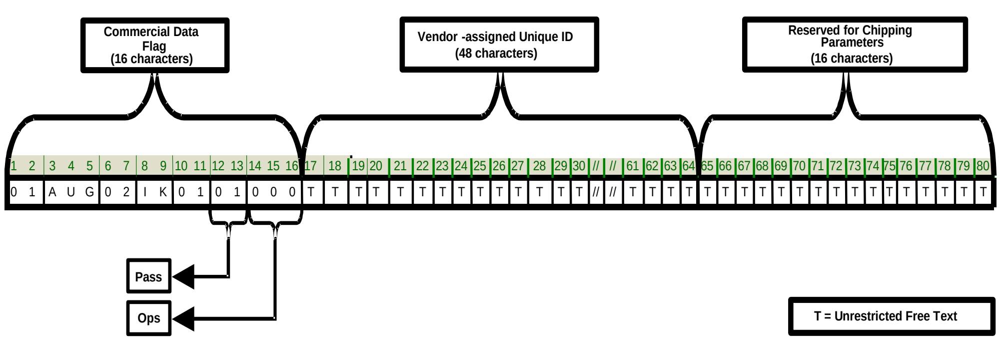

Figure 2.1-1 – IID2 Common Identification Methodology

Table 2.1-1 – Commercial Data Flag Description

Field Name	Data Type	Range of Values
Day (DD)	Numeric	01-31
Month (MMM)	Alpha	JAN-DEC, inclusive
Year (YY)	Numeric	00-99
CDP Platform Code (AA)	Alpha	QB, IK, OV, WV (see Acronyms for meanings)
CDP Vehicle ID (NN)	Numeric	00-99
Pass (WW)	Numeric	01-99
Operation (XXX)	Numeric	000-999 (see Table 3.3-1 for allowed deviations)

1. The Commercial Data Flag component format is standard for all CDP's-DDMMMYYAANNWWXXX. This component is composed of 16 characters and is described in the Commercial Data Flag fields are given in Table 2.1-1.

2. The Vendor-assigned Unique ID component consists of the CDP's image identifier. This component is composed of 48 characters and shall be

   a. a unique ID
   b. contained within the 48 characters allocated in the IID2 field or if the Unique ID is less than 48 characters
   c. filled with BCS space (0x20) space characters through character 48 if the Vendor-assigned Unique ID is less than 48 characters.
   d. limited to BCS spaces (0x20), dashes, underscores, hyphens, upper and lower case alpha characters, and numbers.
   e. unique (i.e., different) for products that are created from the same underlying raw source imagery but only differ by some combination of processing parameters. The situation where the exact same imagery product (i.e. same area extents, same collection parameters, same processing parameters) is ordered from the CDP and a different unique identifier is applied is acceptable. Both identifiers will point to a single product as opposed to having a single identifier point to multiple imagery products.

3. The Reserved for Chipping component shall be space character filled by the CDPs with BCS spaces (0x20).

2.1.2 Commercial Dataset File Structure and Content

1. CDP datasets shall be delivered in the NITF 2.1 file format specified in Section 5 of *MIL-STD-2500C*.
2. Datasets shall consist of an NITF 2.1 file header, NITF image segments, a text segment, and DESs, as shown in Figure 2.1.2-1. The structure depicted in this figure is referred to as an NITF dataset.

Single or multiple image segments within the NITF structure that are produced from the same sensor are recognized as a "Sub-Image" as shown in Figure 2.1.2-1

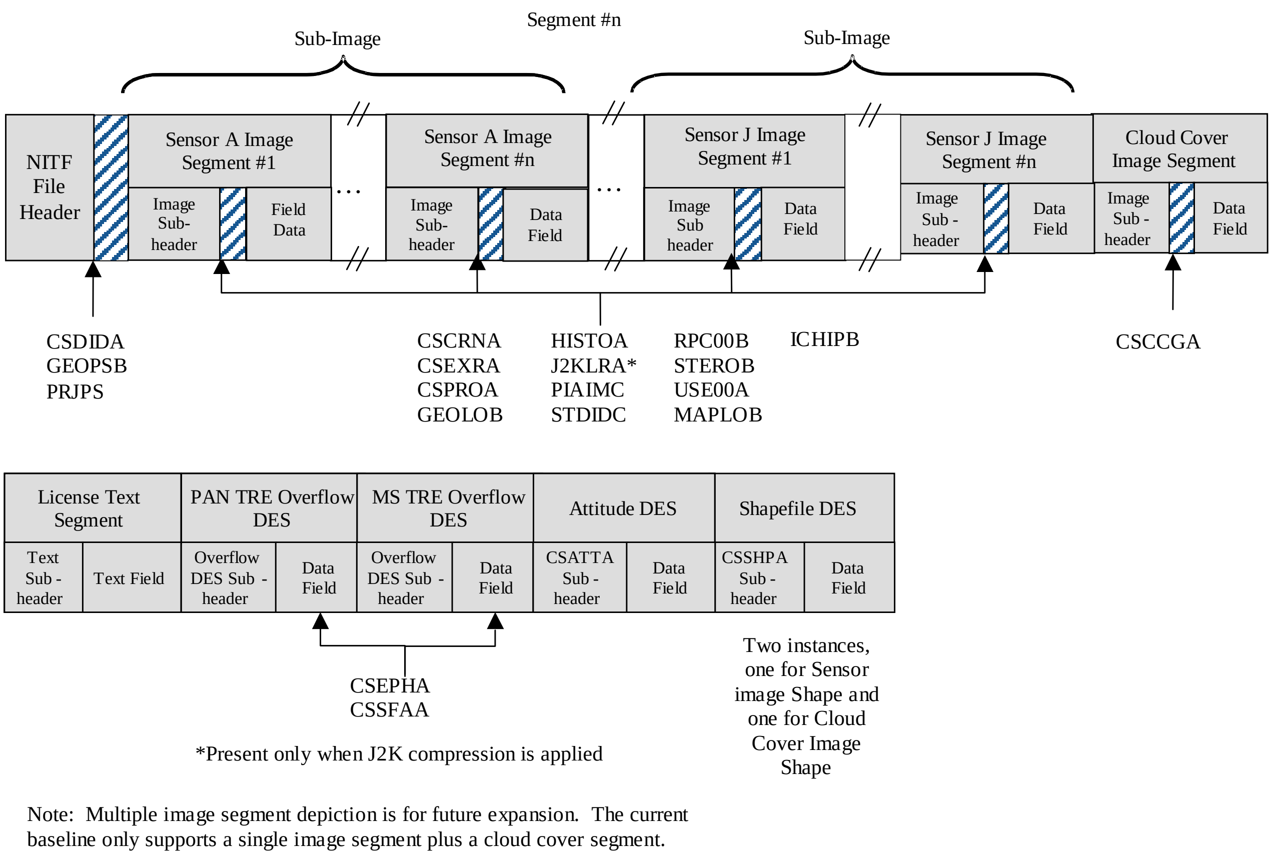

Figure 2.1.2-1 – Commercial NITF 2.1 File Layout

2.1.3 NITF File Header

1. The NITF file header shall be in accordance with *MIL-STD-2500C* Section 5.1.6 and Table A-1.
2. The file header shall also comply with the detailed format and contents for commercial datasets as shown in Table 2-1-2.

Table 2.1-2 – Commercial NITF File Header

(Detailed format for this Header is in Appendix A of MIL-STD-2500C)

NITF File Header Format		Commercial Implementation	
Field	**Name**	**Value**	**Comment**
FHDR	File Profile Name	NITF	Per *MIL-STD-2500C*
FVER	File Version	02.10	NITF Version 2.10
CLEVEL	Complexity Level	Generate	Per *MIL-STD-2500C*, Table A-10, NITF 02.10 Complexity Level (CLEVEL)
STYPE	Standard Type	BF01	
OSTAID	Originating Station ID	Generate	CDP generated unique station ID
FDT	File Date and Time	Generate	Dataset File generation time
FTITLE	File Title	Generate	A CDP generated unique file title with space character fills to complete 80 characters
FSCLAS	File Security Classification	U	Unclassified
FSCLSY	File Security Classification System	US	United States
FSCODE	File Codewords	11 spaces	
FSCTLH	File Control and Handling	2 spaces	
FSREL	File Releasing Instructions	20 spaces	
FSDCTP	File Declassification Type	2 spaces	
FSDCDT	File Declassification Date	8 spaces	
FSDCXM	File Declassification Exemption	4 spaces	
FSDG	File Downgrade	1 space	
FSDGDT	File Downgrade Date	8 spaces	
FSCLTX	File Classification Text	43 spaces	
FSCATP	File Classification Authority Type	1 space	
FSCAUT	File Classification Authority	40 spaces	
FSCRSN	File Classification Reason	1 space	
FSSRDT	File Security Source Date	8 spaces	
FSCTLN	File Security Control Number	15 spaces	
FSCOP	File Copy Number	00000	CDP does not track the number of file copies.
FSCPYS	File Number of Copies	00000	CDP does not track the number of file copies.
ENCRYP	Encryption	0	CDP datasets are not encrypted
FBKGC	File Background Color	0x7E, 0x7E, 0x7E	
ONAME	Originator's Name	Generate	CDP company name, space character padded as necessary

NITF File Header Format		Commercial Implementation	
Field	**Name**	**Value**	**Comment**
OPHONE	Originator's Phone Number	Generate	CDP company phone number, space character padded as necessary
FL	File Length	Generate	Number of bytes in file
HL	NITF File Header Length	Generate	Number of bytes in file header
NUMI	Number of Image Segments	Generate	Number of image segments
. . . . . Begin repeat for each image segment LISHn, Lin			
NOTE: LISHn and LIn repeat in pairs such that LISH001, LI001; LISH002, LI002, . . . LISHn, LIn			
LISHn	Length nth Image Subheader	Generate	Length in bytes of the image subheader of the nth image segment.
LIn	Length of nth Image Segment	Generate	This field will contain a valid length in bytes of the data portion of the nth Image Segment
. . . . . End for each image segment LISHn, Lin			
NUMS	Number of Graphic Segments	000	Not used
NUMX	Reserved for Future Use	000	Reserved for future use. Fill with zeros.
NUMT	Number of Text Segments	001	Text segment covers licensing information
. . . . . Begin repeat for each text segment LTSHn, LTn			
NOTE: LTSHn and LTn repeat in pairs such that LTSH001, LT001; LTSH002, LT002, . . . LTSHn, LTn			
LTSHn	Length nth Text Subheader	Generate	Length in bytes of the subheader of the nth text segment.
LTn	Length of nth Text Segment	Generate	This field will contain a valid length in bytes of the data portion of the nth Text Segment
. . . . . End for each text segment LTSHn, LTn			
NUMDES	Number of Data Extension Segments	Generate	Values will be calculated based on the number of DESs included in the dataset.
. . . . . Begin repeat for each DES LDSHn, LDn			
NOTE: LDSHn and LDn fields repeat in pairs such that LDSH001, LD001; LDSH002, LD002; . . . LDSHn, LDn			
LDSHn	Length of nth Data Extension Segment Subheader	Generate	Calculated based on DES definitions in Section 4 of this document.
LDn	Length of the data portion of the nth Data Extension Segment	Generate	Calculated based on DES definitions in Section 4 of this document.
. . . . . End for each DES LDSHn, LDn; the number of loop repetitions is the value specified in the NUMDES field			
NUMRES	Number of Reserved Extension Segments	000	Not used
UDHDL	User Defined Header Data Length	00000	Not used
XHDL	Extended Header Data Length	Generate	Calculate based on length of extended header data (XHD)
XHDLOFL	Extended Header Data Overflow	000	The Extended Header Data does not require TRE_OVERFLOW
XHD	Extended Header Data	Generate	CSDIDA, GEOPSB (if required)

2.1.4 Image Segments

2.1.4.1 Wideband Imagery Data

Data comprising a wideband imagery product may be thought of as a sequence of up to 19 sub-images (one sub-image for each group of sensors combined into a single stream within the NITF dataset, media or other file size restrictions, see Section 2.2.3.1 for the origin of this upper limit), each of which is expressed in one or more NITF image segments, depending on the amount of data in the product.

1. All sensor data being delivered in a given product shall be packaged within the same NITF dataset for delivery to the USG. If it is necessary to package delivered imagery from a given collection into multiple NITF datasets (i.e., panchromatic in one dataset and MS in another dataset), that is allowable under certain restrictions. Each multiple NITF dataset shall strictly adhere to the guidelines in this section for dataset file structure and content, even if there is apparent duplicity (i.e., cloud cover image segment). In addition, there will be links between the multiple datasets to allow dataset correlation for geopositioning and data integrity in general.
2. The data field of every NITF image segment containing wideband imagery data may be uncompressed or if compressed using JPEG 2000.
3. Each image segment shall be composed of an image segment subheader (containing selected tagged record extensions [TREs]) and a data field.
4. NITF image segment subheaders for commercial datasets shall be in NITF 2.1 format in accordance with *MIL-STD-2500C* Section 5.1.6 and Table A-3. Image segment subheaders shall also comply with the detailed format and contents for image subheaders in commercial datasets as shown in Table 3.1-3. TREs included in image segments shall be as described in Section 2.5 and shown in Table 2.1-4. Additional Support Data Extensions (SDE), as described in *STDI-0002*, may also be included in the image segments to meet CDP-specific needs for image processing. Specifically, the STDIDC (Standard ID), USE00A (Exploitation Usability), and PIAIMC (Imagery Access) SDEs are required to be included in the image segments. However, fields populated in the TREs listed in this document will take precedence over the fields populated in those legacy SDEs to avoid potential data conflicts.
5. Data fields in commercial image segments shall be as described in Section 2.4.

Table 2.1-3 – Commercial NITF Image Segment Subheader

NITF Subheader		Commercial Implementation	
Field	**Name**	**Value**	**Comment**
IM	File Part Type	IM	*Per MIL-STD-2500C* requirements
IID1	Image Identifier 1	Px Mx CC	This is a 10-character field with the first 2 character entries left justified and the remaining 8 characters filled with spaces or populated at vendor discretion: Px for Pan image segment (x is 1 for 1st image segment, 2 for 2nd image segment, and so on) Mx for MS image segment (x is 1 for 1st image segment, 2 for 2nd image segment, and so on) CC for cloud cover segment
IDATIM	Image Date and Time	Generate	Per *MIL-STD-2500C*, Table A-3, Image Time (UTC). CCYYMMDDhhmmss. First row of data.
TGTID	Target Identifier	17 Spaces	Not used
IID2	Image Identifier 2	Generate	Per Section 2.1.1.2 of this document Cloud cover segment has the same IID2 as its corresponding Pan or Multispectral image segment.
ISCLAS	Image Security Classification	U	Unclassified
ISCLSY	Image Security Classification System	US	United States
ISCODE	Image Codewords	11 spaces	
ISCTLH	Image Control and Handling	2 spaces	
ISREL	Image Releasing Instructions	20 spaces	
ISDCTP	Image Declassification Type	2 spaces	
ISDCDT	Image Declassification Date	8 spaces	
ISDCXM	Image Declassification Exemption	4 spaces	
ISDG	Image Downgrade	1 space	
ISDGDT	Image Downgrade Date.	8 spaces	
ISCLTX	Image Classification Text	43 spaces	
ISCATP	Image Classification Authority Type	1 space	
ISCAUT	Image Classification Authority	40 spaces	
ISCRSN	Image Classification Reason	1 space	
ISSRDT	Image Security Source Date	8 spaces	
ISCTLN	Image Security Control Number	15 spaces	
ENCRYP	Encryption Data	0	Commercial datasets are not encrypted
ISORCE	Image Source	Generate	CDP generated source description (e.g., company name, satellite name, sensor name, collection platform name, mission identifier, or similar), space character filled to 42 characters
NROWS	Number of Significant Rows in Image Segment	Generate	Calculated based on the number of significant rows.

NITF Subheader		Commercial Implementation	
Field	**Name**	**Value**	**Comment**
NCOLS	Number of Significant Columns in Image Segment	Generate	Calculated based on the number of significant columns.
PVTYPE	Pixel Value Type	Generate	INT
IREP	Image Representation	Generate	MONO followed by 4 spaces for PAN NODISPLY for CLOUD MULTI followed by 3 spaces for MS, 4-band (BGRN) Pan-Sharpened, and 3 band Pan-Sharpened False Color RGB followed by 5 spaces for 3-band Pan-Sharpened True Color
ICAT	Image Category	Generate	Sensor source (padded with space characters to 8 characters, as required) VIS for Pan MS for Multispectral CLOUD for Cloud Cover Grid
ABPP	Actual Bits-Per-Pixel Per Band	Generate	For images, CDP populates this field with the actual number of bits per pixel 08 for CLOUD (1 byte per value in cloud cover grid)
PJUST	Pixel Justification	R	Pixels are right justified
ICORDS	Image Coordinate Representation	1 space	U, G, N, S, D or space (selected by CDP in accordance with MIL-STD-2500C, Table 4-3)
IGEOLO	Approximate geo-location	Generate	Generated by CDP
NICOM	Number of Image Comments	Generate	May be 0-5, depending on the number of comments (instances of ICOMn). If 0, ICOMn is omitted Cloud cover segment has the same number of comments as its corresponding Pan or Multispectral image segment.
….. Begin repeat for each image comment ICOMn (only if NICOM value is not equal to zero)			
ICOMn	Copyright/restricted rights legend	Generate	CDP supplied text, as needed Cloud cover segment has the same comments as its corresponding Pan or Multispectral image segment.
….. End for each image comment ICOMn			
IC	Image Compression	Generate	NC = No Compression C8 = JPEG 2000
COMRAT	Compression Rate Code	Generate	Omit if IC = NC Nxyz = JPEG 2000 numerically lossless, where "xyz" indicates the expected achieved bit rate (in bits per pixel per band) for the final layer in each tile. The decimal point is implicit and assumed to be one digit from the right, i.e. xy.z Vxyz = JPEG 2000 visually lossless, where "xyz" indicates the target bit rate (in bits per pixel per band) for the final layer in each tile. The decimal point is implicit and assumed to be one digit from the right, i.e. xy.z See ISO/IEC BIIF Profile for JPEG 2000, Table 9-2.
NBANDS	Number of Bands	Generate	1,3, or 4 (Delete at NE344f)
NBANDS	Number of Bands	Generate	1 to 9, or 0 if more than 9 If 0, then XBANDS field is required where XBANDS>9 **(NE344f)**

NITF Subheader		Commercial Implementation	
Field	**Name**	**Value**	**Comment**
XBANDS	Number of Multispectral Bands	Generate	Omit if NBANDS field is 1 to 9. When NBANDS contains the value BCS zero (0x30), this field shall contain the number of bands or data points comprising the multiple band image. BCS-N positive integer 00010 to 99999 **(NE344f)**
….. Begin repeat for band fields IREPBANDn, ISUBCATn, IFCn, IMFLTn, and NLUTn			
NOTE: IREPBANDn through NLUTn repeat in groups for each ;band the number of times indicated in the NBANDS field			
IREPBANDn	nth Band Representation	Generate	For IREP = MONO (PAN case); M followed by a space For IREP = MULTI (Multispectral case other than 3 band pan-sharpened); B, G, R followed by a space where B, G, R align with the bands with center wavelengths for Blue, Green, and Red, respectively; 2 spaces for all other bands; N for one Near IR band is allowed For IREP = RGB (3 band pan-sharpened case, no Near IR, True Color); R, G, B followed by a space where R, G, B align with the bands with center wavelengths for Red, Green, and Blue, respectively For IREP = MULTI (3 band pan-sharpened case, with Near IR, False Color); R, G B followed by a space where R, G, B align with the bands with center wavelengths for Near IR, Red, and Green, respectively For IREP = NODISPLY (CLOUD case); 2 spaces
ISUBCATn	nth Band Subcategory	Generate	PAN = 6 spaces or the Wavelength in nanometers of the PAN sensor, left justified and filled BCS spaces MS = Center Wavelength for nth band in nanometers, left justified and filled BCS spaces CLOUD = 6 spaces For 3-band imagery products with Near IR data as one of the bands, center wavelength values are required.
IFCn	nth Band Image Filter Condition	N	Reserved
IMFLTn	nth Band Standard Image Filter Code	3 Spaces	Reserved
NLUTSn	Number of LUTS for the nth Image Band	0	
….. End for each group of band fields IREPBANDn, ISUBCATn, IFCn, IMFLTn, and NLUTn			
ISYNC	Image Sync code	0	Reserved
IMODE	Image Mode	Bor S	B= Band Interleaved by Block, S=Band Sequential
NBPR	Number of Blocks Per Row Per Image Segment	Generate	PAN = (end column block) – (start column block) +1 MS = (end column block) – (start column block) +1 CLOUD = 0001
NBPC	Number of Blocks Per Column Per Image Segment	Generate	PAN = (end row block) – (start row block) +1 MS = (end row block) – (start row block) +1 CLOUD = 0001
NPPBH	Number of Pixels Per Block Horizontal.	Generate	1024 for: PAN MS For CLOUD: NCOLS if NCOLS≤8192 and NROWS≤8192, otherwise 0000

NITF Subheader		Commercial Implementation	
Field	**Name**	**Value**	**Comment**
NPPBV	Number of Pixels Per Block Vertical	Generate	1024 for: PAN MS For CLOUD: NROWS if NCOLS≤8192 and NROWS≤8192, otherwise 0000
NBPP	Number of Bits Per Pixel Per Band	Generate	CLOUD = 08 For PAN or MS imagery, NBPP may be 08 or 16, depending on the number of bits per pixel in the image segment. If IC = C8 or M8, this field shall contain the number of bits of precision (01-38) used in the JPEG 2000 compression of the data.
IDLVL	Image Display Level	Generate	Per *MIL-STD-2500C* Unique for every segment, see Section 2.2.3.
IALVL	Image Attachment Level	Generate	Per *MIL-STD-2500C* Attachment value to the Display Level of previous segment within sensor type as described in Section 2.2.3. PAN: generate MS: generate CLOUD: 000
ILOC	Image Location	Generate	As described in Section 2.2.3. Pan: generate MS: generate CLOUD: 0000000000
IMAG	Image Magnification	1.0 followed by a space	
UDIDL	User Defined Image Data Length	00000	CDP uses IXSHD for Data Extensions.
IXSHDL	Image Extended Subheader Data Length	Generate	Contains the length of the TREs in the image segment subheader, plus 3 bytes.
IXSOFL	Image Extended Subheader Overflow	Generate	Sequence number of the TRE_OVERFLOW DES in the dataset Generate for PAN, MS image segments 000 for Cloud Cover Grid
IXSHD	Image Extended Subheader Data	Generate	Contains the TREs for an image segment See Table 2.1-4

Table 2.1-4 – TRE and DES Locations in Commercial Datasets

Name	TRE (T) or DES (D)	NITF File Header	Image Segment Subheader for each Sensor	Other Image Segment Subheader	TRE_ OVERFLOW DES	Independent DES
CSCRNA	T		All product types			
CSDIDA	T	All product types				
CSATTA	D					Required only for P1, P2, P3 product types
CSCCGA	T See note 2.			All product types– in Cloud Cover Grid segment. Exists only if Cloud Cover Image Segment is present.		
CSEPHA	T				Required only for P1, P2, P3 product types	
CSEXRA	T See note 4		All product types			
CSPROA	T		All product types			
CSSHPA	D See note 3.					All product types (two instances). Exists only if Cloud Cover Image Segment is present.
CSSFAA	T				Required only for P1, P2, P3 product types	
GEOLOB	T		Required for Geographic Coordinate Systems for G and R product types			
GEOPSB	T	Required for Geographic Coordinate Systems and Cartographic Coordinate Systems			Alternate location	GEOPSB
HISTOA	T		All product types			
ICHIPB	T		Required for all chipped images			
J2KLRA	T		All compressed product types			

Name	TRE (T) or DES (D)	NITF File Header	Image Segment Subheader for each Sensor	Other Image Segment Subheader	TRE_ OVERFLOW DES	Independent DES
MAPLOB	T		Required for Cartographic Coordinate Systems for G and R product types			
PIAIMC	T		All product types			
PRJPS	T	Required for Cartographic Coordinate Systems for G and R product types.			Alternate location	
RPC00B	T		Required only for P1, P2, P3, G1, G2, G3 product types			
STDIDC	T		All product types			
STREOB	T		All product types (stereo imagery only)			
USE00A	T		All product types			

Note 1: Table entries indicate which product types, as listed in Table 2.1-7, require the TREs and DESs shown at a minimum. As noted in Section 2.1.4.1, additional TREs populated by the data providers can be accepted though all or selected fields in some may not be used.
Note 2: As noted in Section 2.1.4.2, the CSCCGA TRE will be absent if there is no Cloud Cover Image Segment.
Note 3: As noted in Section 2.6.2, the CSSHPA DES for the cloud Shapefile will be absent if there is no Cloud Cover Image Segment.
Note 4: As noted in Section 2.5.5, the CSEXRA is information for the product as it is acquired not the post-processed imagery.

2.1.4.2 Cloud Cover Data

Commercial datasets shall normally contain an image segment to describe cloud cover over the dataset's geographic area as well as a cloud shape DES (described in Section 2.6.2). When there is prior agreement between USG and a CDP for the exclusion of cloud information for a specific requested dataset or category of datasets, the Cloud Cover Image Segment and Cloud Shape DES will be absent from the dataset.

The cloud cover grid is conceptually a coarse virtual pixel array (large pixels) created in the following manner:

1. CDP chooses a particular image segment in the dataset as the reference image segment for the cloud cover grid (the sensor for the image segment is identified in the REG_SENSOR field of the CSCCGA TRE (see Section 3.1)).
2. CDP chooses a size for the cloud cover grid virtual pixels as an integral number of line pixels (AS_CELL_SIZE in the CSCCGA TRE) and sample pixels (CS_CELL_SIZE in the CSCCGA TRE), thus defining a coarse array aligned with the reference image segment synthetic array. Edges of a cloud cover grid "pixel" shall be no larger than 0.5 nautical miles and no smaller than 0.1 nautical miles.
3. The cloud cover grid is aligned with the first pixel of the image segment array, so that the parameters ORIGIN_LINE and ORIGIN_SAMPLE of the CSCCGA TRE are each set to 1.
4. CDP chooses source sensors for determining whether clouds exist in the image (these sensors are identified in CCG_SOURCE of the CSCCGA TRE).
5. By a CDP-selected algorithm, CDP determines whether each virtual pixel is judged to be "cloud free" or "cloud covered". Cloud-free virtual pixels are set to 0x00 and cloud-covered pixels are set to 0xFF (other values are reserved). The USG intends that the grid approximate the pattern that would be formed if the cloud cover shapes were overlaid on the synthetic array of the reference image segment.
6. The coarse grid of 8-bit pixels is placed in the data portion of the cloud cover grid image segment (see Section 2.4.1). The CSCCGA TRE in that segment includes the metadata about the grid.

2.1.5 License Text Segment

1. Each Commercial License text segment field and contents shall be in accordance with *MIL-STD-2500C* Section 5.7 and Table A-6.
2. Each commercial dataset shall contain one License text segment, consisting of a text segment subheader and text.
3. The text portion shall contain the text of the dataset license. As stated in *MIL-STD-2500C*, the file header contains the Text subheader length and Text Segment lengths.
4. The format and contents of the License text segment subheader shall be as Table 2.1-5.

Table 2.1-5 – Commercial NITF License Text Segment Subheader

NITF Subheader		Commercial Implementation	
Field	**Name**	**Value**	**Comment**
TE	File Part Type	TE	Per *MIL-STD-2500C* requirements
TEXTID	Text Identifier	LICENSE	This is a 7-character field indicating the type of text segment
TXTALVL	Text Attachment Level	000	Not used
TXTDT	Text Date and Time	Generate	License effective date, expressed as YYYYMMDDhhmmss (BCS-N positive integer)
TXTITL	Text Title	Generate	This is an 80-character field stating the license type. Valid values are available in CDP NITF 2.1 specification documents.
TSCLAS	Text Security Classification	U	Unclassified
TSCLSY	Text Security Classification System	US	United States
TSCODE	Text Codewords	11 spaces	
TSCTLH	Text Control and Handling	2 spaces	
TSREL	Text Releasing Instructions	20 spaces	
TSDCTP	Text Declassification Type	2 spaces	
TSDCDT	Text Declassification Date	8 spaces	
TSDCXM	Text Declassification Exemption	4 spaces	
TSDG	Text Downgrade	1 space	
TSDGDT	Text Downgrade Date.	8 spaces	
TSCLTX	Image Classification Text	43 spaces	
TSCATP	Text Classification Authority Type	1 space	
TSCAUT	Text Classification Authority	40 spaces	
TSCRSN	Text Classification Reason	1 space	
TSSRDT	Text Security Source Date	8 spaces	
TSCTLN	Text Security Control Number	15 spaces	
ENCRYP	Encryption Data	0	Commercial datasets are not encrypted
TXTFMT	Text Format	STA	
TXSHDL	Text Extended Subheader Data Length	00000	Not used
TXSOFL	Text Extended Subheader Overflow	000	Not used

2.1.6 Data Extension Segments

NITF 2.1 Data Extension Segment (DES) subheader field contents and constraints shall be in accordance with *MIL-STD-2500C* Section 5.1.6 and Table A-8. Commercial datasets contain two types of DESs: (1) TRE overflow DESs, and (2) independent DESs, each described in sections below.

2.1.6.1 TRE_OVERFLOW DES

1. Commercial datasets shall contain one TRE_OVERFLOW DES for each sensor type, even when the image data from a specific sensor type spans across multiple NITF image segments. The subheader for the TRE_OVERFLOW DES shall be implemented as shown in Table 2.1-6.
2. TRE_OVERFLOW DESs shall contain the TREs shown in Table 2.1-4.

Table 2.1-6 – TRE_OVERFLOW DES Subheader
(Type "R" = Required)

Field	Name/Description	Size	Format	Units	Value Range	Accuracy	Type
DE	File Part Type	2	BCS-A	N/A	DE	N/A	R
DESID	Unique DES Type Identifier	25	BCS-A	N/A	TRE_OVERFLOW	N/A	R
DESVER	Version of the Data Definition	2	BCS-N	N/A	01	N/A	R
DECLAS	Data Extension File Security Classification	1	BCS-A	N/A	U	N/A	R
DESCLSY	DES Security Classification System	2	BCS-A	N/A	US	N/A	R
DESCODE	DES Codewords	11	BCS-A	N/A	Space character filled	N/A	R
DESCTLH	DES Control and Handling	2	BCS-A	N/A	Space character filled	N/A	R
DESREL	DES Releasing Instructions	20	BCS-A	N/A	Space character filled	N/A	R
DESDCTP	DES Declassification Type	2	BCS-A	N/A	Space character filled	N/A	R
DESDCDT	DES Declassification Date	8	BCS-A	N/A	Space character filled	N/A	R
DESDCXM	DES Declassification Exemption	4	BCS-A	N/A	Space character filled	N/A	R
DESDG	DES Downgrade	1	BCS-A	N/A	Space character filled	N/A	R
DESDGDT	DES Downgrade Date	8	BCS-A	N/A	Space character filled	N/A	R
DESCLTX	DES Classification Text	43	BCS-A	N/A	Space character filled	N/A	R
DESCATP	DES Classification Authority Type	1	BCS-A	N/A	Space character filled	N/A	R
DESCAUT	DES Classification Authority	40	BCS-A	N/A	Space character filled	N/A	R
DESCRSN	DES Classification Reason	1	BCS-A	N/A	Space character filled	N/A	R
DESSRDT	DES Security Source Date	8	BCS-A	N/A	Space character filled	N/A	R

Field	Name/Description	Size	Format	Units	Value Range	Accuracy	Type
DESCTLN	DES Security Control Number	15	BCS-A	N/A	Space character filled	N/A	R
DESOFLW	Overflowed Header Type	6	BCS-A	N/A	IXSHD (from Image Subheader)	N/A	C
DESITEM	Data Item Overflowed	3	BCS-N	N/A	Generate. Sequence number of the first image segment of the specific sensor type to which the DES corresponds.	N/A	C
DESSHL	DES User-defined Subheader Length	4	BCS-N	Bytes	0000	N/A	R

2.1.6.2 CSATTA DES

Commercial datasets can contain a separately formatted DES for sensor attitude information (Attitude Data DES (CSATTA)). Table 2.1-4 shows where this DES is applicable. A detailed description of the DES is given in Section 2.6.1.

2.1.6.3 CSSHPA DES

Commercial datasets will contain a separately formatted DES for shapefiles (Shapefile DES (CSSHPA)) describing aspects of the dataset. Table 2.1-4 shows where this DES is applicable. A detailed description of the DES is given in Section 2.6.2.

2.1.7 Image Product Types

The definition of valid parameter combinations for the different product types covered within this document can be found in Table 2.1-7.

Table 2.1-7 – Image Product Types

Processing Level	Product Type		NITF 2.1 Product Band Fields (see Table 2.1.3-1)					
	Spectral Bands	**NSG Product Code (1)**	**IREP**	**ICAT**	**IREPBANDn**	**ISUBCATn (3)**	**NBANDS**	**IMODE (2)**
Pre-Processed (also known as Radiometrically-Corrected) – Basic level of image processing to provide radiometric and sensor corrections.	Panchromatic	P1	MONO	VIS	M	Spaces or Center Wavelength	1	B
	Multispectral	P2	MULTI	MS	B, G, R, N, and spaces (see IREPBANDn in Table 2.1-3)	Center Wavelength	CDP specified	B or S
	Pan-Sharpened	P3	RGB	MS	R, G, B, (true color)	Center Wavelength	3	B or S
			MULTI	MS	R, G, B, for 3-band products and B, G, R, N for 4-band products	Center Wavelength	3 or 4	
Geo-Referenced (also known as Geo-Rectified) – Pre-Processed level of processing plus additional image processing to provide geometric corrections and mapping to a cartographic projection.	Panchromatic	G1	MONO	VIS	M	Spaces or Center Wavelength	1	B
	Multispectral	G2	MULTI	MS	B, G, R, N, and spaces (see IREPBANDn in Table 2.1-3)	Center Wavelength	CDP specified	B or S
	Pan-Sharpened	G3	RGB	MS	R, G, B, (true color)	Center Wavelength	3	B or S
			MULTI		R, G, B, for 3-band products and B, G, R, N for 4-band products		3 or4	
Ortho-Rectified – Geo-Referenced level of processing plus additional image processing to remove terrain relief displacement with ground control points and/or digital elevation models.	Panchromatic	R1	MONO	VIS	M	Spaces or Center Wavelength	1	B
	Multispectral	R2	MULTI	MS	B, G, R, N, and spaces (see IREPBANDn in Table 2.1-3)	Center Wavelength	CDP specified	B or S
	Pan-Sharpened	R3	RGB	MS	R, G, B, (true color)	Center Wavelength	3	B or S
			MULTI		R, G, B, for 3-band products and B, G, R, N for 4-band products		3 or 4	

Notes:
1. Product Code is in the form LN, where; L = processing level (P: pre-processed, or radiometrically corrected; G: geo-referenced, or geo-rectified; R: orthorectified), N = product number (1: panchromatic, or black-and-white; 2: multispectral; 3: pan-sharpened)
2. IMODE is set to B (Band Interleaved) if the wideband data is JPEG 2000-compressed (see ISO/IEC BIIF Profile for JPEG 2000, Section 9.2.2), IMODE is set to B or S (Band Sequential) if the multiband data is uncompressed.
3. ISUBCATn for Panchromatic P1, G1 and R1 should contain the center wavelength when available. Blank can be used if the center wavelength is unknown.

2.2 Structure of Commercial Wideband Data

Image data from a sensor is conceptually divided into equal-sized blocks, or tiles, of 1024 pixels by 1024 pixels. Logically, block numbers progress in raster order along a row from left to right, and in rows from top to bottom, as shown in Figure 2.2-1.

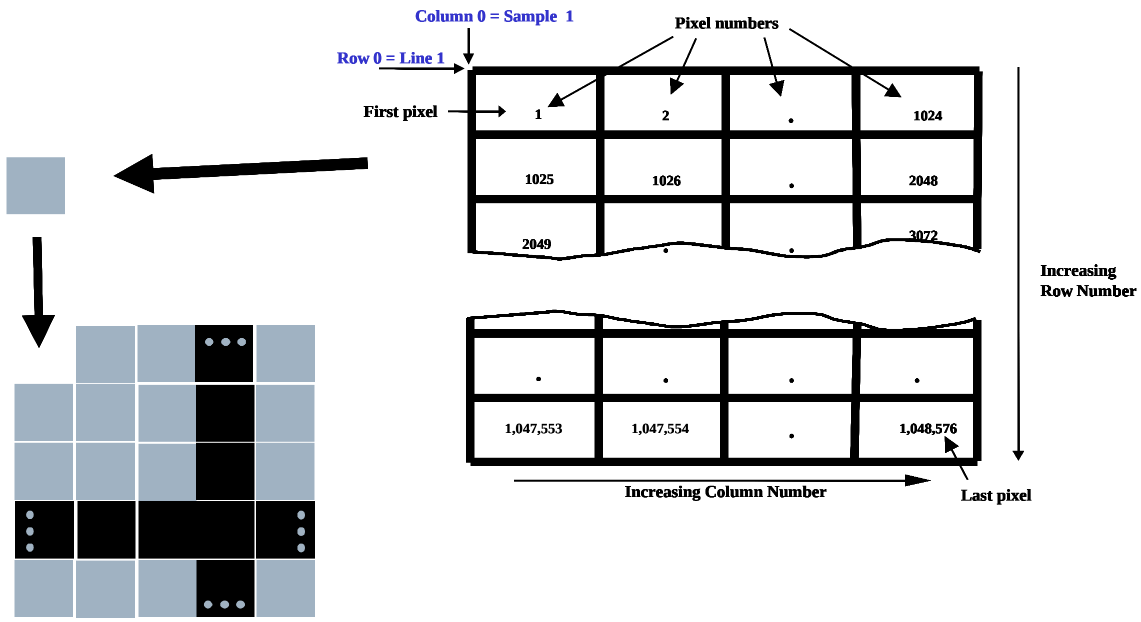

Figure 2.2-1 – Pixel Ordering Within an Image Block

2.2.1 Sub-Images within an NITF File

There may be several sub-images forming a single NITF file (dataset) delivered to the USG. Each sub-image is composed of one or more image segments, as outlined below.

2.2.1.1 Sub Image Sequencing

1. The first NITF dataset sub-image, if present, shall contain the panchromatic sensor data. The second set of sub-images, if present, shall contain multispectral bands. The concluding sub-image (always present) shall contain the cloud cover grid except when the USG and the CDPs agree not to include the cloud cover grid.
2. The USG prefers that all multispectral bands for a single collect be included within a single sub-image, though it is acceptable for as few as one band to appear in a sub-image (in that case, as noted in Table 2.1-3, IREP for image segments in that sub-image must be set to MONO, rather than MULTI; ICAT must be set to MS).

2.2.1.2 Sub-Image Pixel Alignment

Sensor data grouped in the same NITF sub-image shall have the same nominal ground sample distance and cover approximately the same ground location.

2.2.1.3 Band Ordering

For any sub-image (and its component image segments), which contains multiple (multispectral) bands (excluding image segments consisting of pan-sharpened bands), the bands shall be ordered from shortest wavelength to longest wavelength.

2.2.2 Block Fill Data

Wideband data shall be filled to its Minimum Bounding Rectangle (MBR) before compression. Fill pixels shall be of value 0x7E.

2.2.3 Partitioning of Sub-Images into NITF Image Segments

Each sub-image of a dataset shall be partitioned into NITF image segments as outlined below.

2.2.3.1 Panchromatic and Multispectral Sub-Images

1. Images satisfying both of the following criteria shall be placed in the first and only NITF IM segment of respective Sub-images.
    a. Expected data volume (excluding the uncompressed image segment subheader and TREs) is less than or equal to the NITF 2.1 image segment size limit of (10^{10}-2 bytes)
    b. Number of tiles is less than or equal to the JPEG 2000 limit of 16382 tiles in a code stream (J2K imagery only).
2. Images not satisfying both of the criteria in item 1 above shall be placed in multiple NITF IM segments. Each segment (including the first) shall be populated with columns of JPEG 2000 or uncompressed tiles until (NBPR) the first of three limits is reached:
    a. The expected number of bytes in the compressed segment exceeds the NITF image segment data volume limit (10^{10}-2 bytes); or
    b. The number of tiles exceeds the JPEG 2000 limit of 16382 tiles in a code stream with one Tile Length Marker (TLM); or
    c. The number of rows in the image segment exceeds the NITF 2.1 Image Location (ILOC) offset limit (99,999 pixels). The ILOC limit of 99,999 lines per segment may be ignored for the last image segment of a sub-image.

The segmentation methodology is illustrated in Figure 2.2-2 and Figure 2.2-3.

3. When a sub-image is partitioned into more than one NITF image segments, the partitioning shall be in the row direction only, as illustrated in Figure 2.2-2. The image segment shall contain complete rows of tiles (it is preferred that compressed tiles not contain pad pixels though padding is acceptable).
4. Setting the Image Display Level (IDLVL)
    a. The first NITF image segment shall have a display level, IDLVL = xy1, where xy =

05 for the first sub-image (panchromatic), xy = 10 for the second sub-image, xy = 15 for the third sub-image,… xy = 95 for the 19th sub-image.

b. Every subsequent image segment of a sub-image shall have a display level, IDLVL = the IDLVL of the previous image segment + 1 (note that this implies that a sub-image may have at most 49 image segments).

5. Setting the Image Attachment Level (IALVL)

   a. The first NITF image segment for each sub-image contained in the file shall have an attachment level, IALVL = 000

   b. The second and subsequent image segments for the same sensor image shall have an attachment level, IALVL = to the display level, IDLVL, for the previous image segment of the same sensor image.

6. Setting the ILOC

   a. The first NITF image segment for each sub-image shall have an offset value, ILOC = 0000000000

   b. The second and subsequent image segments for the same sub-image shall have an offset value, ILOC = equal to RRRRR00000, where RRRRR = the number of rows in the preceding NITF image segment for the same sensor image.

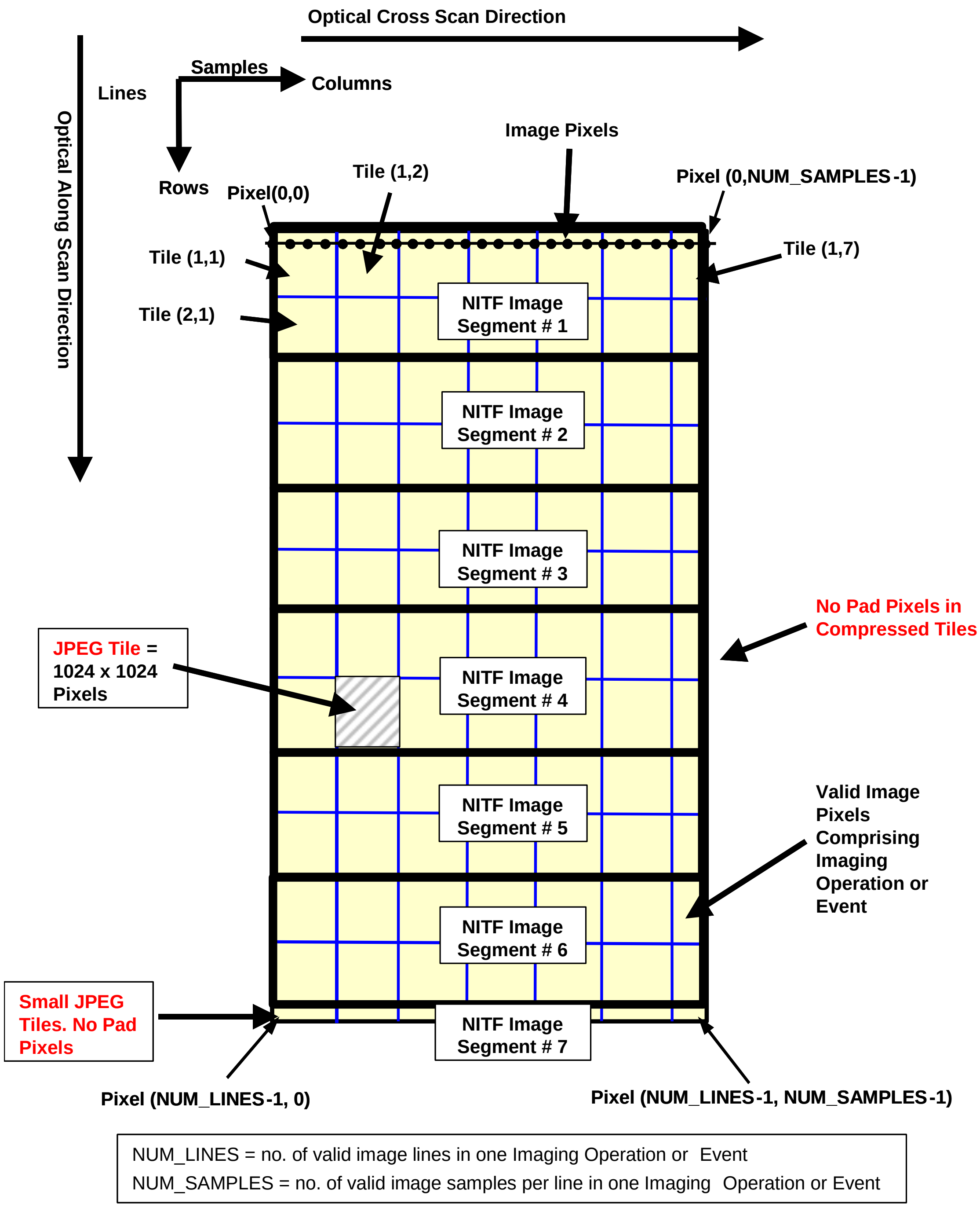

Figure 2.2-2 – Sub-Image Segmentation Example

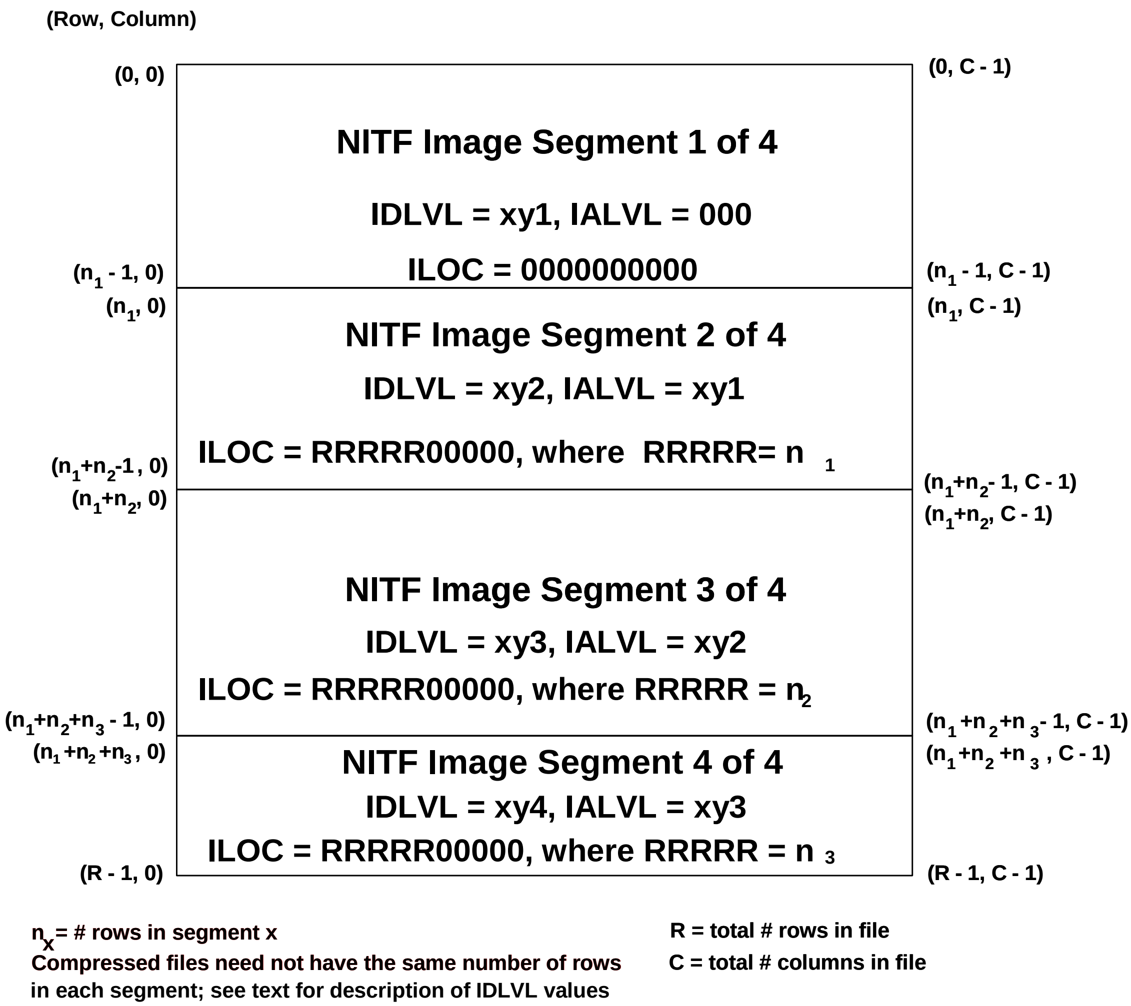

Figure 2.2-3 – Linking Image Segments of a Sub-Image

2.2.3.2 Cloud Cover Sub-Image

Data in a cloud cover sub-image shall be contained in one image segment (see Section 2.4.1). For the cloud cover image segment, the following settings shall apply:

- IDLVL = 999
- IALVL = 000
- ILOC = 0000000000

2.3 Data Compression – JPEG 2000

Each image segment that consists of wideband imagery data shall be compressed in a separate JPEG 2000 code stream that is compatible with *ISO/IEC 15444-1* (Part 1 of the JPEG 2000 standard) as described in Section 2.3.1. The compressed code stream for each image segment shall have JPEG 2000 imagery geometry segmentation as described in Section 2.3.2.

The compressed codestream for each image segment shall conform to the NSIF (NATO Secondary Imagery Format) Preferred JPEG 2000 Encoding (NPJE) recommendation described in *BPJ2K01.00* Section 8 and shall conform to the additional restrictions set forth in Section 2.3.3. The compressed code stream for each tile shall be partitioned into multiple discrete layers. The layer target bit rates are described in Section 2.3.4.

2.3.1 Compression Methods for Commercial Datasets

When compression is used, commercial image segment data fields shall be compressed using the numerically lossless or lossy mode of the JPEG 2000 algorithm in the manner described in succeeding sections.

2.3.1.1 JPEG 2000 Visually Lossless

Datasets requested at visually lossless quality shall be compressed using the lossy mode of the JPEG 2000 algorithm with the 9-7 irreversible wavelet filter and result in a code stream that complies with *ISO/IEC 15444-1*. The default method for panchromatic image segments (product types P1, G1, and R1 in Table 2.1-7) and pan-sharpened image segments (product types P3, G3 and R3) shall be lossy (Visually Lossless (VL)).

2.3.1.2 JPEG 2000 Numerically Lossless

Datasets requested at numerically lossless quality shall be compressed using the lossless mode of the JPEG 2000 algorithm with the 5-3 reversible wavelet filter and result in a code stream that complies with *ISO/IEC 15444-1*. The default method for multispectral image segments (product types P2, G2, and R2 in Table 2.1-7) shall be Numerically Lossless (NL).

2.3.2 JPEG 2000 Image Geometry Segmentation

Commercial datasets shall be organized in JPEG 2000 tiles as described in *BPJ2K01.00* Section 8.

2.3.3 NPJE for Commercial Datasets

The original image segment encoding generated by the CDPs and transmitted to USG shall be in NPJE as described in *BPJ2K01.00* Section 8. Specifically, all 'recommended' statements within the definition of NPJE in *BPJ2K01.00* are requirements for CDPs. In addition, the image segment compression shall conform to the additional restrictions described in Sections 2.3.3.1 and 2.3.3.2.

2.3.3.1 JPEG 2000 Codestream Layout

The codestream layout is a subset of the more generic NPJE format described in *BPJ2K01.00* Section 8. The extra restrictions are:

1. Main Header: Tile-part Lengths Markers (TLM) are required vice recommended.

2. Tile Header: Packet Length, in Tile-part headers (PLT) are highly recommended.

2.3.3.2 Population of JPEG 2000 Marker Segments

The image segment data fields compressed with JPEG 2000 shall have the main and header marker segments populated as described in *BPJ2K01.00* Section 8 for NPJE. In addition, the main and tile headers shall conform to the additional restrictions set forth in Sections 2.3.3.2.1 and 2.3.3.2.2.

2.3.3.2.1 NPJE JPEG 2000 Main Header

1. TLM marker segments are required.
2. Informational markers (Comment Marker (COM) or Component Registration (CRG)) are allowed.
3. The NPJE Coding Style Default (COD) values specified in *BPJ2K01.00* Table 8-10 shall be used for all COD fields except Multiple Component Transform which shall only have the value 0 (no multiple component transform).
4. Since there is a line missing in the QCC description in *BPJ2K01.00*, the complete QCC marker description is provided here.
   a. If the QCC marker is used for JPEG 2000 lossy (visually lossless) compression, QCC marker segment fields shall be as shown in Table 2.3-1.

Table 2.1-8 – QCC Parameters Content for Lossy JPEG 2000
(ISO/IEC 15444-1 Annex A.6.5)

Parameter	Size (bits)	Values	Notes
QCC	16	0xFF5D (Note 1)	Quantization component marker.
Lqcc	16	36	Length of this marker segment in bytes (not including the marker).
Cqcc	8	0 — (Csiz - 1)	Index of the component to which this marker segment relates.
Sqcc	8	0100 0010	Number of guard bits: 2. Scalar expounded values shall be used.
SPqcc[i]	16	mantissa, μ_b xxxx x000 0000 0000 — xxxx x111 1111 1111 exponent, ε_b 0000 0xxx xxxx xxxx — 1111 1xxx xxxx xxxx	Exponent and mantissa values must appear explicitly for each of the 16 subbands (the number of subbands is determined by the choice of five decomposition levels for the codestream [see Section 2.3.2]). See ISO/IEC 15444-1: Table A-30.

[1] In this notation, the "0x" prefix indicates that the following value is expressed in hexadecimal notation, and the following four characters represent the four half-bytes of a 16-bit value.

   b. If the QCC marker is used for JPEG 2000 lossless (numerically lossless), compression QCC marker segment fields shall be as shown in Table 2.3-2.

Table 2.3-1 – QCC Parameters Content for Lossless JPEG 2000
(ISO/IEC 15444-1 Annex A.6.5)

Parameter	Size (bits)	Values	Notes
QCC	16	0xFF5D	Quantization default marker.
Lqcc	16	20	Length of this marker segment in bytes (not including the marker).
Cqcc	8	0 — (Csiz - 1)	Index of the component to which this marker segment relates.
Sqcc	8	0100 0000	Number of guard bits: 2. No quantization.
SPqcc[i]	8	exponent, ε_b 0000 0xxx — 1111 1xxx	Reversible dynamic range exponent values must appear explicitly for each of the 16 subbands (the number of subbands is determined by the choice of five decomposition levels for the codestream [see Section 2.3.2]). See ISO/IEC 15444-1: Table A-29.

2.3.3.2.2 NPJE JPEG 2000 Tile Header

1. When provided, there shall be one PLT marker segment per layer.
2. The Start of Tile-part (SOT) marker shall follow the NPJE description in *BPJ2K01.00* Table 8-6, with the further clarification that the Psot field may take on the value 0 for the last tile.

2.3.4 Target Bit Rates for JPEG 2000 Layers

In order to take advantage of the scalability of JPEG 2000, additional specific truncation points (at bit rates less than the visually or numerically lossless bit rate) may be defined in the JPEG 2000 compressed codestream. (Note that implementation of truncation points should be done in such a way that later changes to bit rates can be simply accomplished, preferably without software changes. HISTOA TRE contains the NCDRD version in the EVENT01_PAS field to track changes.)

2.3.4.1 Panchromatic Imagery

1. Table 2.3-3 describes the original JPEG 2000 layers and their associated target bit rates that serve as truncation points for JPEG 2000 compressed panchromatic images. The number of layers may be chosen by the CDP from the list in Table 2.3-3, but at least layer 18 must be provided for visually lossless images and layer 19 for numerically lossless images.
2. The CDP shall independently compress each tile, and each tile shall contain the same number of layers with the same target bit rates for each layer. For tiles where not

enough bits are produced to include actual image data in every layer, the final layers for that compressed tile shall be comprised of empty packets to ensure that each tile has the same number of layers and that each layer has the same number of resolution packets.

3. For panchromatic imagery, bit rates are expressed as bits per pixel. All target bit rates are defined to be the total number of bits used for coded image data and packet header overhead divided by the nominal total number of pixels (1024 x 1024) in a full tile. Tile header overhead and JPEG 2000 main header overhead are not accounted for in the bit rate allocation. For partial tiles at the bottom and right, the bit rate is still based on a full tile of 1024 x 1024 pixels.

4. If visually or numerically lossless behavior for a tile is achieved at a bit-rate lower than the bit-rates for some previous layers (i.e., below 3.5 bpp), then it is not necessary to force the compressed data size up to the layer bit-rate bound.

Table 2.3-2 – Target Bit Rates for Each Tile in Panchromatic Image Segments

Layer	Lossy (Visually Lossless) Target Bit Rate (bpp)	Numerically Lossless Target Bit Rate (bpp)
0	0.03125	0.03125
1	0.0625	0.0625
2	0.125	0.125
3	0.25	0.25
4	0.5	0.5
5	0.6	0.6
6	0.7	0.7
7	0.8	0.8
8	0.9	0.9
9	1.0	1.0
10	1.1	1.1
11	1.2	1.2
12	1.3	1.3
13	1.5	1.5
14	1.7	1.7
15	2.0	2.0
16	2.3	2.3
17	3.5	3.5
18	All remaining bits for visually lossless quality, up to 3.9	3.9
19	Not used	All remaining bits for numerically lossless reconstruction

2.3.4.2 Multispectral Imagery

1. Table 2.3-4 describes the original JPEG 2000 layers and their associated target bit rates that serve as truncation points for JPEG 2000 compressed multispectral images. The number of layers may be chosen by the CDP from the list in Table 2.3-4, but at least layer 18 must be provided for visually lossless images and layer 19 for numerically lossless images.
2. The CDP shall independently compress each tile, and each tile shall contain the same number of layers with the same target bit rates for each layer. Each tile of a multi-band image shall contain the same number of components (bands) with the same target bit rate for each band. For tiles where not enough bits are produced to include actual image data in every layer, the final layers for that compressed tile shall be composed of empty packets to ensure that each tile has the same number of layers and that each layer has the same number of resolution packets.
3. For multispectral imagery, bit rates are expressed as bits per pixel per band. All target bit rates are defined to be the total number of bits used for coded image data and packet header overhead divided by the nominal total number of pixels (1024 x 1024 x number of bands) in a full tile. Tile header overhead and JPEG 2000 main header overhead are not accounted for in the bit rate allocation. For partial tiles at the bottom and right, the bit rate is still based on a full tile's worth of pixels.
4. If visually or numerically lossless behavior for a tile is achieved at a bit-rate lower than the bit-rates for some previous layers (i.e., below 3.5 bpp), then it is not necessary to force the compressed data size up to the layer bit-rate bound.

Table 2.3-3 – Target Bit Rates for Each Tile of Multispectral Image Segments

Layer	Lossy (Visually Lossless) Target Bit Rate (bpppb)	Numerically Lossless Target Bit Rate (bpppb)
0	0.03125	0.03125
1	0.0625	0.0625
2	0.125	0.125
3	0.25	0.25
4	0.5	0.5
5	0.6	0.6
6	0.7	0.7
7	0.8	0.8
8	0.9	0.9
9	1.0	1.0
10	1.1	1.1
11	1.2	1.2
12	1.3	1.3
13	1.5	1.5
14	1.7	1.7

Layer	Lossy (Visually Lossless) Target Bit Rate (bpppb)	Numerically Lossless Target Bit Rate (bpppb)
15	2.0	2.0
16	2.3	2.3
17	3.5	3.5
18	All remaining bits for visually lossless quality, up to 3.9	3.9
19	Not used	All remaining bits for numerically lossless reconstruction

2.4 Image Segment Data Field Definitions

2.4.1 Cloud Cover Image Segment Data Field

2.4.1.1 Blocking

2.4.1.1.1 Pixel Order

The pixel ordering convention within cloud cover image blocks shall be in accordance with Section 5.4.2.1 of *MIL-STD-2500C*.

2.4.1.1.2 Pixel Array Format

The pixel array for a cloud cover image segment shall be formatted unblocked as described in Section 5.4.2.2 of *MIL-STD-2500C*.

2.4.1.1.3 Pixel Definition

The pixels in the Cloud Cover Grid image segment shall be 8-bit data where zero (0) indicates no cloud cover present (i.e., 0 = CLOUD FREE) and 255 indicates total cloud cover is present (i.e., 255 = CLOUD FULL). Other values are reserved. Cloud cover grid pixels for which there are insufficient data to make a cloud determination shall be marked as cloud free.

2.4.1.2 Compression

The Cloud Cover image segment data shall be uncompressed and formatted as described in Section 5.4.3.3.1.1 (single-band imagery uncompressed data format) of *MIL-STD 2500C*.

2.4.1.3 Segmentation

The Cloud Cover image segment shall be unsegmented. Note that this requirement, coupled with cloud cover grid resolution restrictions (see Section 2.1.4.2), places an effective upper bound on the size of imagery deliverable in a single NITF dataset.

2.4.2 Panchromatic Image Segment Data Field

2.4.2.1 Data Organization

2.4.2.1.1 Block Size

NITF panchromatic image subheader block size fields shall be set to match the nominal JPEG 2000 tile size (NPPBH (number of pixels per block horizontal) = XTsiz = 1024; NPPBV (number of pixels per block horizontal) = YTsiz = 1024). The JPEG 2000 tile size is defined by the fields XTsiz and YTsiz and described in *BPJ2K01.00*, Table7-6.

2.4.2.1.2 Partial Tiles

In instances where there are not enough image data to fill boundary tiles at the maximum line and maximum sample edges of each panchromatic image segment, partial JPEG 2000 tiles can be used. However, it is preferred that partial tiles be avoided wherever possible.

2.4.2.2 Segmentation

Panchromatic image segmentation shall be as described in Section 2.2.3.

2.4.3 Multispectral Image Segment Data Field

2.4.3.1 Data Organization

2.4.3.1.1 Block Size

The multispectral image subheader block size fields shall be set to match the nominal JPEG 2000 tile size (NPPBH = XTsiz = 1024; NPPBV = YTsiz = 1024). The JPEG 2000 tile size is defined by the fields XTsiz and YTsiz and described in *BPJ2K01.00*, Table 7-6.

2.4.3.1.2 Partial Tiles

In instances where there are not enough image data to fill boundary tiles at the maximum line and maximum sample edges of each multispectral image segment, partial JPEG 2000 tiles can be used. However, it is preferred that partial tiles be avoided wherever possible.

2.4.3.2 Segmentation

Multispectral image segmentation shall be as described in Section 2.2.3.

2.5 Commercial Source Dataset Tagged Record Extensions

2.5.1 CSCCGA

The Cloud Cover Grid Data TRE (CSCCGA) provides support data that identifies which image segment and sensors were used to create the cloud grid. CSCCGA also geometrically registers the cloud grid to the pixel grid of one of the image segments.

1. The format and content of the CSCCGA TRE shall be as detailed in Table 3.1-1.
2. When cloud cover information is included in the dataset (see Section 2.1.4.2 for an exception) both the CSCCGA TRE and the Cloud Cover Shapefile DES (Section 2.6.2) shall be included in each dataset even though they both express similar information.

2.5.2 CSCRNA

The Corner Footprint TRE (CSCRNA) provides the geodetic latitude, longitude, and ground elevation at the four-corners of the sensor (sub-image) footprint (or MBR, if the footprint is of irregular shape).

1. If the data for a given sensor (sub-image) spans multiple image segments, the CSCRNA TRE shall be identical in each of the image segments and shall represent the

extent of the entire sub-image.

2. The format and content of the CSCRNA TRE shall be as detailed in Table 3.2-1.
3. The CSCRNA TRE is a required TRE that resides in image segment subheaders.

2.5.3 CSDIDA

The Dataset Identification TRE (CSDIDA) provides basic information describing the data contained in the NITF file.

1. The format and content of the CSDIDA TRE shall be as detailed in Table 3.3-1.
2. The CSDIDA TRE is required in the NITF file header of every dataset.

2.5.4 CSEPHA

The Ephemeris Data TRE (CSEPHA) provides detailed space vehicle ephemeris information. The CSEPHA TRE provides global information for the entire NITF dataset. The CSEPHA can be repeated as necessary if the number of ephemeris vectors exceeds 999 in order to contain all ephemeris data.

The minimum number of ephemeris vectors is 7, 3 during the pre-imaging interval, and 3 during the post-imaging interval. When the number of ephemeris vectors exceeds 999 the remaining vectors are recorded across multiple instances of the CSEPHA TRE in time-sequence order, and shall be treated as a set for the imaging interval. If multiple CSEPHA TREs are required, there could exist a case where only one ephemeris vector is present in the last CSEPHA TRE. Therefore the range for NUM_EPHEM must be 001 to 999.

1. The format and content of the CSEPHA TRE shall be as detailed in Table 3.4-1.
2. The CSEPHA TRE is a required TRE for certain product types (see Table 2.1-4) that resides in the TRE_OVERFLOW DES for each sensor.

2.5.5 CSEXRA

The Exploitation Reference Data TRE (CSEXRA) provides exploitation support data -- acquisition, environment, and performance parameters. This TRE contains data about pre-processed imagery.

1. The format and content of the CSEXRA TRE shall be as detailed in Table 3.5-1.
2. The CSEXRA TRE is required and resides in image segment subheaders.
3. If the data for a given sensor (sub-image) spans multiple image segments, the CSEXRA TRE shall be identical in each of the image segments and shall represent information for the entire sub-image.

2.5.6 CSPROA

The Processing Information TRE (CSPROA) identifies processing options that were applied during image formation.

1. The format and content of the CSPROA TRE shall be as detailed in Table 3.6-1.
2. The CSPROA TRE is a required TRE that resides in image segment subheaders.
3. If the data for a given sensor (sub-image) spans multiple image segments, the CSPROA TRE shall be identical in each of the image segments and shall represent information for the entire sub-image.

2.5.7 CSSFAA

The Sensor Field Alignment Data TRE (CSSFAA) provides information on detectors, sensor type, and field alignment including fields for the focal length and principal point offset components. This TRE provides global information for the entire NITF dataset.

1. The format, description and implementation for fields defined for the CSSFAA TRE are detailed in Table 3.7-1.
2. The CSSFAA TRE is a required TRE for certain product types (see Table 2.1-4) that resides in the TRE_OVERFLOW DES for each sensor.
3. When the CSSFAA TRE is included in a dataset, the TRE shall provide field alignment data for each band (panchromatic, multispectral band 1, etc.) represented in the wideband data of the dataset.

2.5.8 GEOLOB

For rectified data, the Local Geographic Coordinate System TRE (GEOLOB) describes the link between the local coordinate system (rows and columns) and the absolute geographic coordinate system (longitude and latitude) defined in the GEOPSB TRE.

1. The format, description, and implementation of the GEOLOB TRE shall be as described in Section D1.2.7.4 of the *DIGEST* Annex D, and is not included in Section 3.
2. The GEOLOB TRE is a required TRE for geographic coordinate systems for rectified datasets and resides in image segment subheaders.
3. If data for a given sensor (sub-image) spans multiple image segments, the TRE shall be identical in each of the image segments and shall represent information for the entire sub-image.

2.5.9 GEOPSB

For rectified data, the Geo-Positioning Information TRE (GEOPSB) describes the absolute coordinate system to which the data is referenced. This absolute coordinate system may be a geographic coordinate system or a cartographic (grid) coordinate system.

1. The format, description, and implementation of the GEOPSB TRE shall be as described in Section D1.2.7.1 of the *DIGEST* Annex D, and is not included in Section 33.
2. The GEOPSB TRE is a required TRE for rectified datasets and resides in the XHD portion of the NITF file header (single instance for the entire file).

2.5.10 HISTOA

The Softcopy History Tagged Record Extension (HISTOA) TRE provides a history of softcopy processing functions that have been applied to a dataset. As creator of an imagery dataset, the CDP will populate event number one. The Softcopy History TRE is defined in *STDI-0002* Table L-1 and Table L-2.

1. The HISTOA TRE format and content shall be as detailed in Table 3.8-1. It should be noted that many of flagfields within an EVENT loop are used to indicate whether or not processing has taken place, in most cases a “0” indicates that the data user did not apply processing to the product and a “1’ indicates that the data user did apply processing to the product. However, this is not the case for all flag fields and the data producer must be aware of the appropriate setting for each field when producing source products. with flags appear to be Boolean (0 or 1) but the only allowed field value is 0. This is due to 0 being the only possible value for event number one. Event flag fields will be populated IAW STDI-0002 HISTOA value definitions and constraints. Downstream applications may provide additional processing that would require changes in those fields to reflect that activity.
2. The HISTOA TRE is required in each image segment subheader.
3. If the data for a given sensor (sub-image) spans multiple image segments, the HISTOA TRE shall be identical in each of the image segments and shall represent information for the entire sub-image.

2.5.11 J2KLRA

The JPEG 2000 Layers TRE (J2KLRA) provides support information for JPEG 2000 compressed files. The primary information that is conveyed is the number of layers and the target bit rates associated with each layer in a JPEG 2000 compressed code stream.

1. The format, description and population of fields of the J2KLRA shall be as detailed in *BPJ2K01.00* Table 9-3.
2. J2KLRA TRE is required in each image segment subheader for compressed segments

only.

3. For image data requiring more than one NITF image segment, the J2KLRA TRE shall be exactly replicated in each image segment subheader (i.e., the field values shall be the same for all segments).
4. The support data in J2KLRA shall be applicable to the image as a whole and not just to the portion in a given NITF image segment.

2.5.12 MAPLOB

For rectified data (rows and columns are aligned with the coordinate system axis) MAPLOB provides the description of the link between the local coordinate system (rows and columns) and the absolute cartographic coordinate system (Easting and Northing) defined by GEOPS and PRJPS.

1. The format and content of the MAPLOB TRE shall be in accordance with Table D1-7 of the the *DIGEST*, Part 2 – Annex D, paragraph D1.2.7.5.
2. The MAPLOB TRE must be used if the absolute coordinate system is a cartographic coordinate system.
3. A single MAPLOB TRE is placed in the Image Subheader.

2.5.13 PIAIMC

The Imagery Access Imagery Support Extension (PIAIMC) TRE provides an area to place fields not currently carried in NITF but which are contained in the Standards Profile for Imagery Access (SPIA).

1. The format and content of the PIAIMC TRE shall be in accordance with *STDI-0002*, Table C-1 and Table C-2.
2. The PIAIMC TRE is required and resides in image segment subheaders.
3. If the data for a given sensor (sub-image) spans multiple image segments, the PIAIMC TRE shall be identical in each of the image segments and shall represent information for the entire sub-image.
4. The standard default value for alphanumeric fields and numeric fields is defined in MIL-*STD-2500C*, paragraph 5.1.7c. The default value for a numeric field is defined as Zero and for an alphanumeric the default is defined as spaces. For a few fields, a specific default may be indicated in the field description. In this case, the field description shall take precedence. All NITF Header and Subheader Fields contained in a NITF file shall contain either valid data (that is, data in accordance with the restrictions specified for the contents of the field) or the specified default value.

2.5.14 PRJPSB

The PRJPSB extension contains the projection parameters of the absolute coordinate system when it's a cartographic (grid) coordinate system.

1. The format and content of the PRJPSB TRE shall be in accordance with Table D1-4 of the the *DIGEST*, Part 2 – Annex D, paragraph D1.2.7.2.
2. PRJPSB is necessarily associated with a single GEOPSB extension and shall be placed in the NITF file Header accompanying the GEOPSB TRE.
3. The PRJPSB extension is required when the absolute coordinate system is a cartographic coordinate system.
4. <Deleted>

2.5.15 RPC00B

The Rapid Positioning Coordinates TRE (RPC00B) contains rational function polynomial coefficients and normalization parameters that define the physical relationship between image coordinates and ground coordinates.

1. The format and content of the RPC00B TRE shall be in accordance with *STDI-0002*, Table E-22. A discussion of the polynomial functions is contained in *STDI-0002*, Appendix E.2.4.
2. The RPC00B TRE is a required TRE when a precise relationship between image coordinates and ground coordinates is desired (see Table 2.1-4) and resides in image segment subheaders.
3. If the data for a given sensor (sub-image) spans multiple image segments, the RPC00B TRE shall be identical in each of the image segments and shall represent information for the entire sub-image (that is, the rational polynomial is the same across the entire sub-image). The row/column count used to exploit the TRE is zero-based from the first row and column of the first image segment of the sub-image.

2.5.16 STDIDC

The Standard ID TRE (STDIDC) contains image identification data that supplements the Image Subheader.

1. The format and content of the STDIDC TRE shall be in accordance with *STDI-0002*, Table D-1.
2. The STDIDC TRE is required and resides in image segment subheaders.

2.5.17 STREOB

The Stereo Information Extension TRE (STREOB) provides links between several images that form a stereo set to allow exploitation of elevation information.

The format and content of the STREOB TRE shall be in accordance with *STDI-0002*, Table E-25. The use of the STREOB TRE is required for stereo image datasets only. If the data for a given sensor (sub-image) spans multiple image segments, the STREOB TRE shall be identical in each of the image segments and shall represent information for the entire sub-image.

2.5.18 USE00A

The Exploitation Usability TRE (USE00A) allows a user program to determine if the image is usable for the exploitation problem currently being performed, and also contains some catalogue metadata.

1. The format and content of the USE00A TRE shall be in accordance with *STDI-0002*, Table D-2; see Note 1 of Table 3.5-1 of this document for exception.
2. The USE00A TRE is required and resides in image segment subheaders.
3. If the data for a given sensor (sub-image) spans multiple image segments, the USE00A TRE shall be identical in each of the image segments and shall represent information for the entire sub-image.

2.5.19 ICHIPB

The ICHIPB controlled TRE provides the data needed to mensurate and calculate geopositions of features on chips. This TRE provides the output product row and column data for the image, as well as those data points referenced back to values for the original full image.

1. The format and descriptions for the user-defined fields of the ICHIPB extension is defined in *STDI-0002*, Tables-B1, B-2, and B-3.
2. This extension is only used when imagery is chipped or tiled.

2.6 Commercial Source Data Extension Segments

2.6.1 CSATTA

The Attitude Data DES (CSATTA) provides sensor attitude information needed to run the rigorous math model to perform geolocation and mensuration. This DES provides global information for the entire NITF dataset. The Attitude Data DES (CSATTA) can be repeated as necessary if the number of attitude reference points exceeds 9999 in order to contain all attitude data.

1. The format and content of the Attitude extension shall be as detailed in Table 4.1-1.
2. One CSATTA DES is required for each dataset for certain product types (see Table 2.1-4).

2.6.2 CSSHPA

The Shapefile DES (CSSHPA) is a general wrapper structure for an ESRI Shapefile

1. The DES shall include a DES subheader (compliant with *MIL-STD-2500C* Section

5.8.2 and Appendix A-8) and user-defined data.

2. The format and content of this DES shall be as detailed in Table 4.2-1.
3. User-defined data shall consist of an ESRI Shapefile complying with the ESRI Shapefile Technical Description.
4. Nodes of shapes described in a Shapefile DES shall be expressed as latitude and longitude coordinates referenced to the WGS-84 datum only. It is acceptable to use the WGS-84 datum for shapefiles even if the imagery data files are expressed in a different datum as provided in the GEOPSB TRE.
5. Shapes within a Shapefile shall be composed of a minimum of three nodes (four is preferable) and a maximum of 1000 nodes.
6. A Shapefile within an instance of a CSSHPA DES shall contain a maximum of 1000 polygons.
7. The datasets shall contain two instances of the CSSHPA DES, as described below. The exception will be those datasets where there will be no Cloud Cover Image Segment (see Section 2.1.4.2) and the CSSHPA DES for cloud cover will not be included in the dataset. The SHAPE_TYPE field of the user-defined DES subheader fields distinguishes the instances.

2.6.2.1 Image Shape Description

One CSSHPA DES instance in a dataset represents the shape of the delivered image data. The CSSHPA DES provides global information for the entire NITF dataset.

1. The Shapefile included as user-defined data in this instance shall include one Polygon shape type construct for each sensor (sub-image) included in the dataset.
2. The polygons shall be in the order in which the sub-images appear.

2.6.2.2 Cloud Shape Description

One CSSHPA DES instance in a dataset represents the shapes of all clouds within the image. The CSSHPA DES provides global information for the entire NITF dataset.

1. The single cloud Shapefile included as user-defined data in this instance shall include one Polygon shape type construct for each cloud.
2. If necessary to comply with the allowable maximum polygon count (see Section 2.6.2) clouds may be aggregated.
3. Clouds shall be identified using a CDP-selected algorithm, which uses data from the sensors identified in the CC_SOURCE field of the DES.

3 DETAILED COMMERCIAL SOURCES TAGGER RECORD EXTENSION DESCRIPTIONS

3.1 CSCCGA

Table 3.1-1 - CSCCGA Description

(Type "R" = Required)

Field	Name/Description	Size	Format	Units	Value Range	Accuracy	Type
TAG Information							
CETAG	Unique Extension Type Identifier Unique TRE identifier	6	BCS-A	N/A	CSCCGA	N/A	R
CEL	Length of User-Defined Data Length in bytes of data contained in subsequent fields. (TRE's length is 11 plus the value given in the CEL field)	5	BCS-N	Bytes	00060	N/A	R
Parameters							
CCG_SOURCE	Source of Grid Concatenation of all sensors used to create cloud cover grid separated by commas	18	BCS-A	N/A	PAN or MS or PAN, MS	N/A	R
REG_SENSOR	Image Segment Sensor to which Cloud Cover Grid is registered (CCG is always registered to the synthetic array)	6	BCS-A	N/A	PAN or MS	N/A	R
ORIGIN_LINE	Cloud Cover Grid Origin – Line (Corresponding line in registered image segment)	7	BCS-N	Lines	0000001	Absolute	R
ORIGIN_SAMPLE	Cloud Cover Grid Origin – Sample (Corresponding sample in registered image segment)	5	BCS-N	Samples	00001	Absolute	R
AS_CELL_SIZE	Along Scan Cell Size – Lines (Cloud Cover Grid spacing in registered image segment lines)	7	BCS-N	Lines	0000001 to 9999999	Absolute	R
CS_CELL_SIZE	Cross Scan Cell Size – Samples (Cloud Cover Grid spacing in registered image segment samples)	5	BCS-N	Samples	00001 to 99999	Absolute	R
CCG_MAX_LINE	Number of Rows in CC Grid (Number of Cells in "lines" direction)	7	BCS-N	Cells in row direction	0000001 to 9999999	Absolute	R
CCG_MAX_SAMPLE	Number of Columns in CC Grid (Number of Cells in "sample" direction)	5	BCS-N	Cells in column direction	00001 to 99999	Absolute	R

3.2 CSCRNA

Table 3.2-1 - CSCRNA Description
(Type "R" = Required)

Field	Name/Description	Size	Format	Units	Value Range	Accuracy	Type
TAG Information							
CETAG	Unique Extension Type Identifier Unique TRE identifier	6	BCS-A	N/A	CSCRNA	N/A	R
CEL	Length of User-Defined Data Length in bytes of data contained in subsequent fields. (TRE's length is 11 plus the value given in the CEL field)	5	BCS-N	Bytes	00109	N/A	R
Footprint							
PREDICT_CORNERS	Predicted Corners Flag Indicator of whether the corner coordinates are predicted or are based on actual measurements. Y = Predicted N = Actual	1	BCS-A	N/A	Y or N	N/A	R
ULCNR_LAT	Image Corner Latitude Upper Left Corner of Image The latitude of the upper left corner of the image. Corner line and sample pair (i.e. corner pixel) is projected from the image plane to the reference ellipsoid (i.e., WGS-84) along the corner pixel's Earth Centered Earth Fixed (ECEF)[1] vector and then converted to Geodetic latitude. ±dd.ddddd dd.ddddd = decimal degrees '+' = northern hemisphere '-' = southern hemisphere	9	BCS-N	Degrees	-90.00000 to +90.00000	Predicted	R
Note 1: Z_{-axis} points along Earth's spin axis, the X-axis is perpendicular to Z and lies in the Greenwich Meridian (0^0 longitude) and Y competes the right hand system.							
ULCNR_LONG	Image Corner Longitude Upper Left Corner of Image The longitude of the upper left corner of the image. Corner line and sample pair (i.e. corner pixel) is projected from the image plane to the reference ellipsoid (i.e., WGS-84) along the corner pixel's ECEF vector and then converted to Geodetic longitude. ±ddd.ddddd ddd.ddddd = decimal degrees	10	BCS-N	Degrees	-179.99999 to +180.00000	Predicted	R

Field	Name/Description	Size	Format	Units	Value Range	Accuracy	Type
	'+' = eastern hemisphere '-' = western hemisphere						
ULCNR_HT	Image Corner Height at Upper Left Corner of Image The height of the upper left corner of the image, referenced to the reference ellipsoid (i.e., WGS-84)	8	BCS-N	Meters	-00610.0 to +10668.0	Predicted	R
URCNR_LAT	Image Corner Latitude Upper Right Corner of Image The latitude of the upper right corner of the image. Corner line and sample pair (i.e. corner pixel) is projected from the image plane to the reference ellipsoid (i.e., WGS-84) along the corner pixel's ECEF vector and then converted to Geodetic latitude. ±dd.ddddd dd.ddddd = decimal degrees '+' = northern hemisphere '-' = southern hemisphere	9	BCS-N	Degrees	-90.00000 to +90.00000	Predicted	R
URCNR_LONG	Image Corner Longitude Upper Right Corner of Image The longitude of the upper right corner of the image. Corner line and sample pair (i.e., corner pixel) is projected from the image plane to the reference ellipsoid (i.e., WGS-84) along the corner pixel's ECEF vector and then converted to Geodetic longitude. ±ddd.ddddd ddd.ddddd = decimal degrees '+' = eastern hemisphere '-' = western hemisphere	10	BCS-N	Degrees	-179.99999 to +180.0000	Predicted	R
URCNR_HT	Image Corner Height at Upper Right Corner of Image The height of the upper right corner of the image referenced to the reference ellipsoid (i.e., WGS-84)	8	BCS-N	Meters	-00610.0 to +10668.0	Predicted	R
LRCNR_LAT	Image Corner Latitude Lower Right Corner of Image The latitude of the lower right corner of the image. Corner line and sample pair (i.e. corner pixel) is projected from the image plane to the reference ellipsoid (i.e., WGS-84) along the corner pixel's ECEF vector and then converted to Geodetic latitude. ±dd.ddddd dd.ddddd = decimal degrees '+' = northern hemisphere '-' = southern hemisphere	9	BCS-N	Degrees	-90.00000 to +90.00000	Predicted	R
LRCNR_LONG	Image Corner Longitude Lower Right Corner of Image	10	BCS-N	Degrees	-179.99999 to	Predicted	R

Field	Name/Description	Size	Format	Units	Value Range	Accuracy	Type
	The longitude of the lower right corner of the image. Corner line and sample pair (i.e. corner pixel) is projected from the image plane to the reference ellipsoid (i.e., WGS-84) along the corner pixel's ECEF vector and then converted to Geodetic longitude. ±ddd.ddddd ddd.ddddd = decimal degrees '+' = eastern hemisphere '-' = western hemisphere				+180.00000		
LRCNR_HT	Image Corner Height at Lower Right Corner of Image The height of the lower right corner of the image referenced to the reference ellipsoid (i.e., WGS-84).	8	BCS-N	Meters	-00610.0 to +10668.0	Predicted	R
LLCNR_LAT	Image Corner Latitude Lower Left Corner of Image The latitude of the lower left corner of the image. Corner line and sample pair (i.e. corner pixel) is projected from the image plane to the reference ellipsoid (i.e., WGS-84) along the corner pixel's ECEF vector and then converted to Geodetic latitude. ±dd.ddddd dd.ddddd = decimal degrees '+' = northern hemisphere '-' = southern hemisphere	9	BCS-N	Degrees	-90.00000 to +90.00000	Predicted	R
LLCNR_LONG	Image Corner Longitude Lower Left Corner of Image The longitude of the lower left corner of the image. Corner line and sample pair (i.e., corner pixel) is projected from the image plane to the reference ellipsoid (i.e., WGS-84) along the corner pixel's ECEF vector and then converted to Geodetic longitude. ±ddd.ddddd ddd.ddddd = decimal degrees '+' = eastern hemisphere '-' = western hemisphere	10	BCS-N	Degrees	-179.99999 to +180.00000	Predicted	R
LLCNR_HT	Image Corner Height at Lower Left Corner of Image The height of the lower left corner of the standard image referenced to the reference ellipsoid (i.e., WGS-84).	8	BCS-N	Meters	-00610.0 to +10668.0	Predicted	R
"Predicted" (in Accuracy column) means the value was computed prior to image collection.							

3.3 CSDIDA

Table 3.3-1 - CSDIDA Description
(Type "R" = Required)

Field	Name/Description	Size	Format	Units	Value Range	Accuracy	Type
TAG Information							
CETAG	<u>Unique Extension Type Identifier</u> Unique TRE identifier	6	BCS-A	N/A	CSDIDA	N/A	R
CEL	<u>Length of User-Defined Data</u> Length in bytes of data contained in subsequent fields. (TRE's length is 11 plus the value given in the CEL field)	5	BCS-N	Bytes	00070	N/A	R
Dataset ID Information							
DAY	<u>Day of Dataset Collection</u> Day of start of Dataset Collection (Image Start Time). For any datasets containing imagery collected at different times, this will be the day of the earliest image included.	2	BCS-N	Day (UTC)	01 to 31	Absolute	R
MONTH	<u>Month of Dataset Collection</u> Month of start of Dataset Collection (Image Start Time). For any datasets containing imagery collected at different times, this will be the month of the earliest image included.	3	BCS-A	Month (UTC)	JAN to DEC, inclusive	Absolute	R
YEAR	<u>Year of Dataset Collection</u> Four-digit year of start of Dataset Collection (Image Start Time). For any datasets containing imagery collect at different times, this will be the year of the earliest image included.	4	BCS-N	Year (UTC)	0000 to 9999	Absolute	R
PLATFORM CODE	<u>Platform Identification</u> Source satellite platform code.	2	BCS-A	N/A	QB, IK, OV, WV	N/A	R
VEHICLE ID	<u>Vehicle Number</u> Vehicle number of the source satellite.	2	BCS-N	N/A	00 to 99	N/A	R
PASS	<u>Pass Number</u>	2	BCS-N	N/A	01 to 99 (supplier-selected)	N/A	R
OPERATION	<u>Operation Number</u>	3	BCS-N	N/A	001 to 999 (supplier-selected) May be set to 000 if supplier does not use operation counts	N/A	R

Field	Name/Description	Size	Format	Units	Value Range	Accuracy	Type
SENSOR_ID	Sensor ID Identifies the type of payload data collection.	2	BCS-A	N/A	AA = panchromatic only GA = multispectral and pan-sharpened only NA = panchromatic & multispectral together	N/A	R
PRODUCT_ID	Product ID Identifies the broad class of commercial products.	2	BCS-A	N/A	Refer to Table 2.1-7 for Image Product Types	N/A	R
Reserved	Fill	4	BCS-A	N/A	0000	N/A	R
TIME See Note 1 of Table 3.5-1 for an exception.	Image Start Time Note, same time as defined in NITF Image Segment Subheader, IDATIM field. YYYY = four digit year (0000 to 9999) MM = month (01 to 12) DD = day (01 to 31) hh = hour (00 to 23) mm = minute (00 to 59) ss = second (00 to 59) For any datasets containing imagery collected at different times, this will be the time of the earliest image included.	14	BCS-N	UTC	YYYYMMDDhhmmss (note: corresponds to ACQUISITION_DATE in *STDI-0002* STDIDC Appendix D.1)	± 1 second	R
PROCESS_ TIME	Process Completion Time Defines the time of NITF file creation. Note, same time as defined in the NITF File Header, FDT field. YYYY = four digit year (0000 to 9999) MM = month (01 to 12) DD = day (01 to 31) hh = hour (00 to 23) mm = minute (00 to 59) ss = second (00 to 59)	14	BCS-N	UTC	YYYYMMDDhhmmss	± 1 second	R
Reserved	Fill	2	BCS-N	N/A	00	N/A	R
Reserved	Fill	2	BCS-N	N/A	01	N/A	R
Reserved	Fill	1	BCS-A	N/A	N	N/A	R
Reserved	Fill	1	BCS-A	N/A	N	N/A	R
Dataset Processing History							

Field	Name/Description	Size	Format	Units	Value Range	Accuracy	Type
SOFTWARE_ VERSION_ NUMBER	Software version used	10	BCS-A	N/A	Vendor defined	N/A	R

3.4 CSEPHA

Table 3.4-1 - CSEPHA Description
(Type "R" = Required)

Field	Name/Description	Size	Format	Units	Value Range	Accuracy	Type
TAG Information							
CETAG	Unique Extension Type Identifier Unique TRE identifier	6	BCS-A	N/A	CSEPHA	N/A	R
CEL	Length of User-Defined Data Length in bytes of data contained in subsequent fields. (TREs length is 11 plus the value given in the CEL field)	5	BCS-N	N/A	00257 to 36005	N/A	R
Ephemeris - Orbit determination data for the S/V							
EPHEM_FLAG	Ephemeris Flag Flag used to indicate the source of orbit determination ephemeris data used for this dataset PREDICTED = predicted ephemeris COLLECT-TIME = actual real time ephemeris REFINED = refined real time ephemeris	12	BCS-A	N/A	COLLECT-TIME, PREDICTED, REFINED	N/A	R
DT_EPHEM See Note 1 of Table 3.5-1 for an exception.	Time interval between ephemeris vectors	5	BCS-N	Seconds	000.1 to 999.9	Absolute	R
DATE_EPHEM	Day of First ephemeris vector Day at first ephemeris vector. Format of field is YYYYMMDD: YYYY = Year, MM = Month, DD = Day	8	BCS-N	(UTC)	2000 to 9999, 01 to 12, 01 to 31	Absolute	R

Field	Name/Description	Size	Format	Units	Value Range	Accuracy	Type
T0_EPHEM See Note 1 of Table 3.5-1 for an exception.	UTC of First Ephemeris Vector Time of first Ephemeris Vector. Format of field is HHMMSS.mmmmmm: HH = Hours, MM = Minutes, SS = Secs, mmmmmm = microsecs	13	BCS-N	(UTC)	00 to 23, 00 to 59, 00.000000 to 59.999999	Absolute	R
NUM_EPHEM	Number of Ephemeris vectors Note: Minimum of 7 to include minimum of 3 during the pre-imaging interval, and 3 during the post-imaging interval ephemeris. If the number of ephemeris vectors exceeds 999, the TRE can be repeated to include the remaining ephemeris vectors.	3	BCS-N	N/A	001 to 999	N/A	R
Begin repeat for each Ephemeris Vector							
EPHEM_X See Note 1 of Table 3.5-1 for an exception.	X Coordinate of Ephemeris Vector X Coordinate of Ephemeris Vector in ECEF coordinates.	12	BCS-N	Meters	±99999999.99	Absolute	R
EPHEM_Y See Note 1 of Table 3.5-1 for an exception.	Y Coordinate of Ephemeris Vector Y Coordinate of Ephemeris Vector in ECEF coordinates.	12	BCS-N	Meters	±99999999.99	Absolute	R
EPHEM_Z See Note 1 of Table 3.5-1 for an exception.	Z Coordinate of Ephemeris Vector Z Coordinate of Ephemeris Vector in ECEF coordinates	12	BCS-N	Meters	±99999999.99	Absolute	R
End repeat Group for Each Ephemeris Vector							

3.5 CSEXRA

Table 3.5-1 - CSEXRA Description
(Type "R" = Required)

Field	Name/Description	Size	Format	Units	Value Range	Accuracy	Type
TAG Information							
CETAG	Unique Extension Type Identifier Unique TRE identifier	6	BCS-A	N/A	CSEXRA	N/A	R
CEL	Length of User-Defined Data Length in bytes of data contained in subsequent fields. (TRE's length is 11 plus the value given in the CEL field)	5	BCS-N	Bytes	00132	N/A	R
Acquisition Parameters							
SENSOR	Sensor Sensor associated with this instance of the TRE.	6	BCS-A	N/A	PAN MS	N/A	R
TIME_FIRST_LINE_IMAGE See Note 1 of Table 3.5-1 for an exception.	Time of the First Line of Image (Synthetic Array) Time in seconds from midnight for the first line, synthetic array, of the Dataset collection	12	BCS-N	Seconds (UTC)	00000.000000 to 86400.000000	±10 microseconds (Predicted)	R
TIME_IMAGE_DURATION	Image Duration Time Time Difference in seconds between the first line, synthetic array, and the last line, synthetic array. A preceding hyphen/minus (0x2D) flag applied to the time duration value indicates a reverse chronological ordering of the attitude, ephemeris and image data. See Note 1.	12	BCS-N	Seconds	-9999.999999 to 86400.000000	±10 micro seconds (Predicted)	R
MAX_GSD	Maximum Mean Ground Sample Distance (GSD) The predicted Maximum Mean Ground Sample Distance (GSD) for the Primary Target	5	BCS-N	Inches	000.0 to 999.9	±0.1 inches (Predicted)	R

Field	Name/Description	Size	Format	Units	Value Range	Accuracy	Type
ALONG_SCAN_GSD	Along Scan GSD The Measured Along Scan Ground Sample Distance for the Primary Target. Note: N/A = means data is not available at dataset creation time.	5	BCS-A	Inches	000.0 to 999.9 or N/A	±0.1 inches	R
CROSS_SCAN_GSD	Cross-Scan GSD The Measured Cross Scan Ground Sample Distance for the Primary Target. Note: N/A = means data is not available at dataset creation time.	5	BCS-A	Inches	000.0 to 999.9 or N/A	±0.1 inches	R
GEO_MEAN_GSD	Geometric Mean GSD The Measured Geometric Mean Ground Sample Distance for the Primary Target Note: N/A = means data is not available at dataset creation time.	5	BCS-A	Inches	000.0 to 999.9 or N/A	±0.1 inches	R
A_S_VERT_GSD	Along Scan Vertical GSD The Measured Along Scan Vertical Ground Sample Distance for the Primary Target. Note: N/A = means data is not available at dataset creation time.	5	BCS-A	Inches	000.0 to 999.9 or N/A	±0.1 inches	R
C_S_VERT_GSD	Cross-Scan Vertical GSD The Measured Cross Scan Vertical Ground Sample Distance for the Primary Target. Note: N/A = means data is not available at dataset creation time.	5	BCS-A	Inches	000.0 to 999.9 or N/A	±0.1 inches	R
GEO_MEAN_VERT_GSD	Geometric Mean Vertical GSD The Measured Geometric Mean Vertical Ground Sample Distance for the Primary Target Note: N/A = means data is not available at dataset creation time.	5	BCS-A	Inches	000.0 to 999.9 or N/A	±0.1 inches	R
GSD_BETA_ANGLE	GSD Beta Angle Angle on Ground (Earth Tangent Plane) between Along Scan and Cross Scan directions. Note: N/A = means data is not available at dataset creation time.	5	BCS-A	Degrees	00.0 to 180.0 or N/A	±0.1 degrees	R

Field	Name/Description	Size	Format	Units	Value Range	Accuracy	Type
DYNAMIC_RANGE	Dynamic range of pixels in image Dynamic range extent of pixel values in the image	5	BCS-N	N/A	00000 to 02047 for PAN 00000 to 02047 for MS	Absolute	R
NUM_LINES	Number of Lines The number of lines in the dataset (standard array) for the output product.	7	BCS-N	Lines	0000101 to 9999999	Absolute	R
NUM_SAMPLES	Number of Samples The number of samples per line in the dataset for the output product.	5	BCS-N	Samples	00101 to 99999	Absolute	R
ANGLE_TO_NORTH See Note 1 of Table 3.5-1 for an exception.	Nominal Angle to True North The angle in degrees, measured clockwise, from the first row of the image to True North at Image Start Time.	7	BCS-N	Degree	000.000 to 360.000	+0.1 degree (Predicted)	R
OBLIQUITY_ANGLE	Nominal Obliquity angle Obliquity angle measure from target local vertical. I.e., the angle between the local North-Earth-Down (NED) horizontal and the optical axis of the image at Time of Closest Approach.	6	BCS-N	Degrees	00.000 to 90.000	+0.1 degree (Predicted)	R
AZ_OF_OBLIQUITY	Azimuth of Obliquity Azimuth of the target-SV line-of-sight vector projected in the target local horizontal plane, measured clockwise from True North, computed at Image Start Time. The Velocity Control Point on the focal plane is projected to this azimuth projection in the target local horizontal plane.	7	BCS-N	Degrees	000.000 to 360.000	+0.1 degree (Predicted)	R
Environment							
GRD_COVER	Ground Cover Snow or no snow	1	BCS-N	N/A	1 = Snow 0 = No Snow 9 = Not Available	N/A	R

Field	Name/Description	Size	Format	Units	Value Range	Accuracy	Type
SNOW_DEPTH_CAT	Snow Depth Category Provides the weighted average of the snow depth values for all of the grids that overlap the tasked image area	1	BCS-N	N/A	0 = 0 inches 1 = 1-8 inches or ice 2 = 9-17 inches 3 = greater than 17 inches 9 = Not Available	N/A	R
SUN_AZIMUTH	Sun Azimuth Angle Azimuth of the target-sun line-of-sight vector projected in the target local horizontal plane, measured clockwise from True North, calculated at Image Start Time.	7	BCS-N	Degrees	000.000 to 360.000	±0.1 degree (Predicted)	R
SUN_ELEVATION	Sun Elevation Angle The sun elevation angle from the local target plane to the sun calculated at Image_Start_Time, where the local target plane is referenced by the Target Centered - Earth Fixed, ST coordinate frame.	7	BCS-N	Degrees	-90.000 to +90.000	±0.1 degree (Predicted)	R
Performance (NIIRS, CE, LE)							
PREDICTED_NIIRS	Predicted NIIRS Imagery NIIRS value.	3	BCS-A	.1 NIIRS	0.0 to 9.0 or N/A	N/A	R
CIRCL_ ERR	Circular Error Predicted CE/90 in the geolocation in the scene	3	BCS-N	Feet	000 to 999	Predicted	R
LINEAR _ ERR	Linear Error Predicted LE/90 in the geolocation in the scene	3	BCS-N	Feet	000 to 999	Predicted	R

Note 1: The following exceptions to the metadata fields should be noted when a preceding hyphen/minus (0x2D) exists in the TIME_IMAGE_DURATION field.

a. CSDIDA: TIME – The value represents the time of the first image line (top) which is actually the last scan line (imaging end time) in the chronological order.
b. CSEPHA: DT_EPHEM – A positive value is always provided.
c. CSEPHA: T0_EPHEM – The value represents the time of the ephemeris vector listed first which is the last vector in the chronological order.
d. CSEPHA: EPHEM_X, EPHEM_Y, EPHEM_Z – The ephemeris vectors are listed in the reverse chronological order.
e. CSEXRA: TIME_FIRST_LINE_IMAGE – The value represents the time of the first image line (top) which is actually the last scan line in the chronological order.
f. CSEXRA: ANGLE_TO_NORTH – The value represents the angle to north when the image was collected and is in the opposite direction (180 degrees; reversed) of north in the image.

Field	Name/Description	Size	Format	Units	Value Range	Accuracy	Type

g. CSATTA: DT_ATT – A positive value is always provided.
h. CSATTA: T0_ATT – The value represents the time of the attitude reference point listed first which is the last attitude reference point in the chronological order.
i. CSATTA: ATT_Q1, ATT_2, ATT_3, ATT_4 – The attitude reference points are listed in the reverse chronological order.
j. USE00A: ANGLE_TO_NORTH – The value represents the angle to north when the image was collected and is in the opposite direction (180 degrees; reversed) of north in the image.

"Predicted" (in Accuracy column) means the value was computed prior to image collection

3.6 CSPROA

Table 3.6-1 - CSPROA Description
(Type "R" = Required)

Field	Name/Description	Size	Format	Units	Value Range	Accuracy	Type
TAG Information							
CETAG	Unique Extension Type Identifier Unique TRE identifier	6	BCS-A	N/A	CSPROA	N/A	R
CEL	Length of User-Defined Data Length in bytes of data contained in subsequent fields. (TRE's length is 11 plus the value given in the CEL field)	5	BCS-N	N/A	00120	N/A	R
Reserved	Fill	12	BCS-A	N/A	LATESTCAL	N/A	R
Reserved	Fill	12	BCS-A	N/A	All spaces	N/A	R
Reserved	Fill	12	BCS-A	N/A	All spaces	N/A	R
Reserved	Fill	12	BCS-A	N/A	MARKANDFIX	N/A	R
Reserved	Fill	12	BCS-A	N/A	Space character filled	N/A	R
Reserved	Fill	12	BCS-A	N/A	CORR for MS All spaces for Pan	N/A	R
Reserved	Fill	12	BCS-A	N/A	SKIPAGM	N/A	R
Reserved	Fill	12	BCS-A	N/A	INTERP	N/A	R
Reserved	Fill	12	BCS-A	N/A	Space character filled	N/A	R
BWC	Bandwidth Compression VISUAL = JPEG 2000 visually lossless NUMERICAL = JPEG 2000 numerically lossless UNCOMPRESSED = no compression	12	BCS-A	N/A	VISUAL, NUMERICAL, UNCOMPRESSED	N/A	R

3.7 CSSFAA

Table 3.7-1 - CSSFAA Description
(Type "R" = Required)

Field	Name/Description	Size	Format	Units	Value Range	Accuracy	Type
Tag Information							
CETAG	Unique Extension Type Identifier Unique TRE identifier	6	BCS-A	N/A	CSSFAA	N/A	R
CEL	Length	5	BCS-N (positive integer)	Bytes	00107 to 00955	N/A	R
Number of bands in segment							
NUM_BANDS	Number of Bands	1	BCS-N (positive integer)	N/A	1 to number of bands supplied by CDP	Absolute	R
Begin repeat for each NUM_BANDS in segment							
BAND_TYPE	Category of band for which data is being supplied	1	BCS-A	N/A	PAN = M MS = R, G, B, N, or space	N/A	R
BAND_ID	Band center of wavelength	6	BCS-A	Nanometers	Populate with a value identical to those used for ISUBCATn as specified in Table 2.1-3.	Absolute	R
FOC_LENGTH	Focal Length	11	BCS-N (positive float)	Millimeters	00000.00001-99999.99999	Absolute	R
NUM_DAP	Number of linear arrays (pairs) for a band for a Basic product only	8	BCS-N (positive integer)	N/A	00000001	Absolute	R
NUM_FIR	First sample number	8	BCS-N (positive integer)	N/A	00000001	Absolute	R
DELTA	The number of detector elements in a linear array	7	BCS-N (positive integer)	N/A	1-9999999	Absolute	R
OPPOFF_X	Principal point offset x	7	BCS-N (signed float)	Meters	-100.00 to +100.00	Absolute	R
OPPOFF_Y	Principal point offset y	7	BCS-N (signed float)	Meters	-100.00 to +100.00	Absolute	R
OPPOFF_Z	Principal point offset z	7	BCS-N (signed float)	Meters	-100.00 to +100.00	Absolute	R

Field	Name/Description	Size	Format	Units	Value Range	Accuracy	Type
START_X	Detector mounting of the first pixel in the pair – x	11	BCS-N (signed float)	Millimeters	-99999.9999 to +99999.9999		R
START_Y	Detector mounting of the first pixel in the pair – y	11	BCS-N (signed float)	Millimeters	-99999.9999 to +99999.9999		R
FINISH_X	Detector mounting of the last pixel in the pair – x	11	BCS-N (signed float)	Millimeters	-99999.9999 to +99999.9999		R
FINISH_Y	Detector mounting of the last pixel in the pair – y	11	BCS-N (signed float)	Millimeters	-99999.9999 to +99999.9999		R
End repeat for each NUM_BANDS in segment							

3.8 HISTOA

Table 3.8-1 - HISTOA Description
(Type "R" = Required)

Field	Name/Description	Size	Format	Units	Value Range	Accuracy	Type
TAG Information							
CETAG	Unique Extension Type Identifier Unique TRE identifier	6	BCS-A	N/A	HISTOA	N/A	R
CEL	Length of User-Defined Data Length in bytes of data contained in subsequent fields. (TRE's length is 11 plus the value given in the CEL field)	5	BCS-N	Bytes	00115	N/A	R
Softcopy Processing Information							
SYSTYPE	System Type Name of sensor from which original image was collected	20	BCS-A	N/A	Equivalent to platform code concatenated with vehicle ID concatenated with SENSOR_ID (see Table 3.3-1)	N/A	R
PC	Prior Compression Indication of type of bandwidth compression/ expansion applied to image prior to NITF image creation	12	BCS-A	N/A	Generated by CDP	N/A	R
PE	Prior Enhancements Indication of enhancements applied to image prior to NITF image creation	4	BCS-A	N/A	NONE for product type Px (see Table 2.1.7) GEOR for product type Gx ORTH for product type Rx	N/A	R
REMAP_FLAG	System Specific Remap Indication of whether a system specific remap has been applied to the image. Field = space to indicate that this field does not apply	1	BCS-A	N/A	Generated by CDP	N/A	R
LUTID	Data Mapping ID	2	BCS-N	N/A	As defined in Table L-2 of *STDI-0002*	N/A	R
NEVENTS	Number of Processing Events Indicates number of processing events associated with the image.	2	BCS-N	N/A	01	N/A	R
EVENT01 – PDATE	Processing Date and Time Date and time of image creation	14	BCS-N	UTC	YYYYMMDDhhmmss	±1 sec	R

Field	Name/Description	Size	Format	Units	Value Range	Accuracy	Type
EVENT01 – PSITE	Processing Site Name of site or segment that performed the processing event.	10	BCS-A	N/A	Generated by CDP	N/A	R
EVENT01 – PAS	Softcopy Processing Application Indicates the processing application software used to perform the processing steps cited in the processing event	10	BCS-A	N/A	'NZZZMMDDYY' where ZZZ is the NCDRD revision (right justified no periods), and MMDDYY is the CDP's software release month, day, and year, respectively	N/A	R
EVENT01 – NIPCOM	Number of Image Processing Comments The valid number of free text image processing comments. Field = 0, if no comments used.	1	BCS-N	N/A	0	N/A	R
EVENT01 – IBPP	Input Bit Depth The number of significant bits for each pixel before the processing functions cited in the processing event have been performed and before compression. This description is consistent with the ABPP field in the NITF image segment subheader.	2	BCS-N	Bits	Generated by CDP	Absolute	R
EVENT01 – IPVTYPE	Input Pixel Value Type Indicates type of computer representation used for the value of each pixel before the processing functions denoted in the processing event have been performed and before compression. INT = integer	3	BCS-A	N/A	Generated by CDP	N/A	R
EVENT01 – INBWC	Input Bandwidth Compression Type of bandwidth compression or expansion that has been applied to the image prior to the tonal enhancements denoted in the processing event.	10	BCS-A	N/A	Generated by CDP	N/A	R
EVENT01 – DISP_FLAG	Display-Ready Flag space (0x20) indicates the field is N/A	1	BCS-N	N/A	Generated by CDP	N/A	R
EVENT01 – ROT_FLAG	Image Rotation Flag Indicates whether image has been rotated. Field = 0 image is not rotated.	1	BCS-N	N/A	Generated by CDP	N/A	R

Field	Name/Description	Size	Format	Units	Value Range	Accuracy	Type
EVENT01 – ASYM_FLAG	Asymmetric Correction Flag Indicates whether asymmetric correction has been applied to the image. Field = space (0x20) means image did not need any correction	1	BCS-N	N/A	Generated by CDP	N/A	R
EVENT01 – PROJ_FLAG	Image Projection Flag Indicates if image has been projected from the collection geometry into geometry more suitable for display. Field = 0 means no projection applied.	1	BCS-N	N/A	Generated by CDP	N/A	R
EVENT01 – SHARP_FLAG	Sharpening Flag Indicates if image has been passed through a sharpening operation. Field = 0 means no sharpening applied.	1	BCS-N	N/A	Generated by CDP	N/A	R
EVENT01 – MAG_FLAG	Symmetrical Magnification Flag Indicates if image has been symmetrically (same amount in each direction) magnified during this processing step. Field = 0 means image not magnified.	1	BCS-N	N/A	Generated by CDP	N/A	R
EVENT01 – DRA_FLAG	Dynamic Range Adjustment Flag Indicates if a dynamic range adjustment (DRA) has been applied to the image. Field = 0 means no DRA has been applied.	1	BCS-N	N/A	Generated by CDP	N/A	R
EVENT01 – TTC_FLAG	Tonal Transfer Curve Flag Indicates if a tonal transfer curve (TTC) has been applied to the image. Field = 0 means no TTC applied.	1	BCS-N	N/A	Generated by CDP	N/A	R
EVENT01 – DEVLUT_FLAG	Device LUT Flag Indicates if device compensation LUT has been applied to the image. Field = 0 means no device LUT applied to image.	1	BCS-N	N/A	Generated by CDP	N/A	R
EVENT01 – OBPP	Output Pixel Depth (actual) The number of significant bits for each pixel after the processing functions denoted in the processing event have been performed, but prior to any output compression.	2	BCS-N	Bits	Generated by CDP (may differ for different sensor types)	Absolute	R

Field	Name/Description	Size	Format	Units	Value Range	Accuracy	Type
EVENT01 – OPVTYPE	Output Pixel Value Type Indicates the type of computer representation used for the value of each pixel after the processing functions denoted in the processing event have been performed, but prior to any compression. INT = integer	3	BCS-A	N/A	Generated by CDP	N/A	R
EVENT01 – OUTBWC	Output Bandwidth Compression Indicates type of bandwidth compression applied to the image after the tonal enhancements denoted in the processing event have been applied.	10	BCS-A	N/A	JPEG 2000 Numerically Lossless = J2NLC00000 JPEG 2000 Visually Lossless = J2VLC00000 Uncompressed = NONE000000	N/A	R

4 DETAILED COMMERCIAL SOURCES DATA EXTENSION SEGMENT DESCRIPTIONS

4.1 CSATTA

Table 4.1-1 - CSATTA Description

(Type "R" = Required)

Field	Name/Description	Size	Format	Units	Value Range	Accuracy	Type
DE	File Part Type	2	BCS-A	N/A	DE	N/A	R
DESID	Unique DES Type Identifier	25	BCS-A	N/A	CSATTA DES	N/A	R
DESVER	Version of the Data Definition	2	BCS-N	N/A	01	N/A	R
DECLAS	Data Extension File Security Classification	1	BCS-A	N/A	U	N/A	R
DESCLSY	DES Security Classification System	2	BCS-A	N/A	US	N/A	R
DESCODE	DES Codewords	11	BCS-A	N/A	Space character filled	N/A	R
DESCTLH	DES Control and Handling	2	BCS-A	N/A	Space character filled	N/A	R
DESREL	DES Releasing Instructions	20	BCS-A	N/A	Space character filled	N/A	R
DESDCTP	DES Declassification Type	2	BCS-A	N/A	Space character filled	N/A	R
DESDCDT	DES Declassification Date	8	BCS-A	N/A	Space character filled	N/A	R
DESDCXM	DES Declassification Exemption	4	BCS-A	N/A	Space character filled	N/A	R
DESDG	DES Downgrade	1	BCS-A	N/A	Space character filled	N/A	R
DESDGDT	DES Downgrade Date	8	BCS-A	N/A	Space character filled	N/A	R
DESCLTX	DES Classification Text	43	BCS-A	N/A	Space character filled	N/A	R
DESCATP	DES Classification Authority Type	1	BCS-A	N/A	Space character filled	N/A	R
DESCAUT	DES Classification Authority	40	BCS-A	N/A	Space character filled	N/A	R
DESCRSN	DES Classification Reason	1	BCS-A	N/A	Space character filled	N/A	R
DESSRDT	DES Security Source Date	8	BCS-A	N/A	Space character filled	N/A	R
DESCTLN	DES Security Control Number	15	BCS-A	N/A	Space character filled	N/A	R
DESSHL	DES User-defined Subheader Length	4	BCS-N	N/A	0052	Absolute	R
DES User-defined Subheader Fields							
Focal Plane Array Bore sight Alignment Attitude –Attitude data as used in processing actual focal plane array							
ATT_TYPE	Type of attitude data being provided ORIGINAL = Original attitude data from the sensor REFINED = Smoothed attitude data based upon CDP processing	12	BCS_A	N/A	ORIGINAL REFINED	N/A	R

Field	Name/Description	Size	Format	Units	Value Range	Accuracy	Type
DT_ATT See Note 1 of Table 3.5-1 for an exception.	Time interval between attitude reference points	14	BCS-N	Seconds	000.0000000001 to 999.9999999999	Absolute	R
DATE_ATT	Day of First Attitude Reference Point Day at first attitude reference point. Format of field is YYYYMMDD: YYYY = Year, MM = Month, DD = Day	8	BCS-N	YYYYMMDD (UTC)	2000 to 9999, 01 to 12, 01 to 31	Absolute	R
T0_ATT See Note 1 of Table 3.5-1 for an exception.	UTC of First Attitude Reference Point Time of first attitude reference point. Format of field is HHMMSS.mmmmmm: HH = Hours, MM = Minutes, SS = Secs, mmmmmm = microsecs	13	BCS-N	HHMMSS.mmmmmm (UTC)	00 to 23, 00 to 59, 00.000000 to 59.999999	Absolute	R
NUM_ATT	Number of Attitude Reference Points Number of attitude reference points throughout the scan interval.	5	BCS-N	N/A	00000 to 09999	N/A	R
DES User-Defined Data							
Begin repeat for each Attitude Reference Point							
ATT_Q1 See Note 1 of Table 3.5-1 for an exception.	Quaternion Q1 of Attitude Reference Point Attitude quaternion Q1 in ECEF coordinate system	8	Note A	N/A	-1.00000000000000000000 to +1.00000000000000000000	Absolute	R
ATT_Q2 See Note 1 of Table 3.5-1 for an exception.	Quaternion Q2 of Attitude Reference Point Attitude quaternion Q2 in ECEF coordinate system	8	Note A	N/A	-1.00000000000000000000 to +1.00000000000000000000	Absolute	R
ATT_Q3 See Note 1 of Table 3.5-1 for an exception.	Quaternion Q3 of Attitude Reference Point Attitude quaternion Q3 in ECEF coordinate system	8	Note A	N/A	-1.00000000000000000000 to +1.00000000000000000000	Absolute	R
ATT_Q4 See Note 1 of Table 3.5-1 for an exception.	Quaternion Q4 of Attitude Reference Point Attitude quaternion Q4 in ECEF coordinate system	8	Note A	N/A	-1.00000000000000000000 to +1.00000000000000000000	Absolute	R
End repeat Group for Each Attitude Reference Point							
Notes: A – Binary Floating Point, IEEE Floating Point representation (64 bit)							

4.2 CSSHPA

Table 4.2-1 - CSSHPA Description
(Type "R" = Required, "C" = Conditional)

Field	Name/Description	Size	Format	Units	Value Range	Accuracy	Type
DE	File Part Type	2	BCS-A	N/A	DE	N/A	R
DESID	Unique DES Type Identifier	25	BCS-A	N/A	CSSHPA DES	N/A	R
DESVER	Version of the Data Definition	2	BCS-N	N/A	01	N/A	R
DECLAS	Data Extension File Security Classification	1	BCS-A	N/A	U	N/A	R
DESCLSY	DES Security Classification System	2	BCS-A	N/A	US	N/A	R
DESCODE	DES Codewords	11	BCS-A	N/A	Space character filled	N/A	R
DESCTLH	DES Control and Handling	2	BCS-A	N/A	Space character filled	N/A	R
DESREL	DES Releasing Instructions	20	BCS-A	N/A	Space character filled	N/A	R
DESDCTP	DES Declassification Type	2	BCS-A	N/A	Space character filled	N/A	R
DESDCDT	DES Declassification Date	8	BCS-A	N/A	Space character filled	N/A	R
DESDCXM	DES Declassification Exemption	4	BCS-A	N/A	Space character filled	N/A	R
DESDG	DES Downgrade	1	BCS-A	N/A	Space character filled	N/A	R
DESDGDT	DES Downgrade Date	8	BCS-A	N/A	Space character filled	N/A	R
DESCLTX	DES Classification Text	43	BCS-A	N/A	Space character filled	N/A	R
DESCATP	DES Classification Authority Type	1	BCS-A	N/A	Space character filled	N/A	R
DESCAUT	DES Classification Authority	40	BCS-A	N/A	Space character filled	N/A	R
DESCRSN	DES Classification Reason	1	BCS-A	N/A	Space character filled	N/A	R
DESSRDT	DES Security Source Date	8	BCS-A	N/A	Space character filled	N/A	R
DESCTLN	DES Security Control Number	15	BCS-A	N/A	Space character filled	N/A	R
DESSHL	DES User-defined Subheader Length	4	BCS-N	N/A	0062 or 0080	Absolute	R
DES User-defined Subheader Fields							
SHAPE_USE	Shapefile Use	25	BCS-A	N/A	IMAGE_SHAPE or CLOUD_SHAPES (each padded with space characters)	N/A	R
SHAPE_CLASS	Type of shapes contained within this Shapefile	10	BCS-A	N/A	POLYGON (padded with space characters)	N/A	R
CC_SOURCE	Source sensor(s) for determining cloud cover (appears only if SHAPE_USE is CLOUD_SHAPES)	18	BCS-A	N/A	PAN or MS or PAN, MS	N/A	C
SHAPE1_NAME	Name of first file in the Shapefile	3	BCS-A	N/A	SHP, SHX, DBF	N/A	R

Field	Name/Description	Size	Format	Units	Value Range	Accuracy	Type
SHAPE1_START	Start location in bytes of the first file, expressed as an offset in the DES User-Defined Data	6	BCS-N	N/A	Generated by CDP	N/A	R
SHAPE2_NAME	Name of second file in the Shapefile	3	BCS-A	N/A	SHP, SHX, DBF	N/A	R
SHAPE2_START	Start location in bytes of the second file, expressed as an offset in the DES User-Defined Data	6	BCS-N	N/A	Generated by CDP	N/A	R
SHAPE3_NAME	Name of third file in the Shapefile	3	BCS-A	N/A	SHP, SHX, DBF	N/A	R
SHAPE3_START	Start location in bytes of the third file, expressed as an offset in the DES User-Defined Data	6	BCS-N	N/A	Generated by CDP	N/A	R
DES User-Defined Data							
User-defined data shall consist of the three files which together comprise the description of an ESRI Shapefile (described in the ESRI Shapefile Technical Description)							

5 ACRONYMS

Acronym	Definition
BIIF	Basic Image Interchange Format
BPP	Bits Per Pixel
BPPPB	Bits Per Pixel Per Band
BWC	Bandwidth Compression
BWE	Bandwidth Expansion
CCG	Cloud Cover Grid
CDP	Commercial Data Provider
CE	Controlled Extension, Circular Error
COC	Coding Style Component
COD	Coding Style Default
COM	Comment Marker
COTS	Commercial Off The Shelf
CRG	Component Registration
CSATTA	Attitude Data DES
CSCCGA	Cloud Cover Grid Data TRE
CSCRNA	Corner Footprint TRE
CSDIDA	Dataset Identification TRE
CSEPHA	Ephemeris Data TRE
CSEXRA	Exploitation Reference Data TRE
CSPROA	Processing Information TRE
CSSFAA	Sensor Field Alignment Data TRE
CSSHPA	Shapefile DES
DES	Data Extension Segment
DG	Digital Globe Inc.
DIGEST	Digital Geographic Information Exchange Standard
ECEF	Earth Centered Earth Fixed
EOC	End of Codestream
GE	GeoEye
GEOLOB	Local Geographic Coordinate System TRE
GEOPSB	Geo-Positioning Information TRE
GSD	Ground Sample Distance
HISTOA	Softcopy History Description TRE

Acronym	Definition
IALVL	Image Attachment Level
ID	Identification
IDLVL	Image Display Level
IID	Image Identifier (also IID1 and IID2)
IIF	Image Interchange Format
IK	IKONOS (GeoEye satellite platform code) - usually combined with applicable vehicle ID (e.g., IK01)
ILOC	Image Location
IOC	Initial Operating Capability
J2KLRA	JPEG 2000 Layers TRE
JPEG 2000	Joint Photographic Experts Group 2000 Standard
LUT	Look-Up Table
MBR	Minimum Bounding Rectangle
MIL-STD	Military Standard
MSI	Multispectral Imagery
NCCB	NGA Configuration Control Board
NCDRD	NITF 2.1 Commercial Dataset Requirements Document
NGA	National Geospatial-Intelligence Agency
NIIRS	National Image Interpretability Rating Scale
NITF	National Imagery Transmission Format
NL	Numerically Lossless [compression]
NPJE	NSIF Preferred JPEG 2000 Encoding
NPPBH	Number of Pixels Per Block Horizontal
NPPBV	Number of Pixels Per Block Vertical
NSIF	NATO Secondary Imagery Format
OV	OrbView (GeoEye satellite platform code) - usually combined with applicable vehicle IDs (e.g., OV03, OV05)
PLT	Packet Length, in Tile part header
QB	QuickBird (Digital Globe satellite platform code) – usually combined with applicable vehicle IDs (e.g., QB02)
QCC	Quantization Component
QCD	Quantization Default
RPC00B	Rapid Positioning Coordinates TRE
SDE	Support Data Extension

Acronym	Definition
SIZ	Image and Tile Size
SOC	Start of Codestream
SOD	Start of Data
SOT	Start of Tile - part
STDIDC	Standard ID SDE
STREOB	Stereo Information Extension TRE
TBD	To Be Determined
TBR	To Be Resolved
TLM	Tile-part Lengths Marker
TRE	Tagged Record Extension
USE00A	Exploitation Usability SDE
USG	United States Government
UTC	Coordinated Universal Time
VL	Visually Lossless [compression]
WV	WorldView – usually combined with applicable Vehicle IDs (i.e., WorldView-1 (WV01); WorldView-2 (WV02))