NOT MEASUREMENT SENSITIVE

MIL-STD-2500B
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12 October 1994

DEPARTMENT OF DEFENSE
INTERFACE STANDARD

NATIONAL IMAGERY TRANSMISSION FORMAT VERSION 2.1

FOR THE
NATIONAL IMAGERY TRANSMISSION FORMAT STANDARD

AMSC N/A **AREA INST**

FOREWORD

1. This standard is approved for use by all departments and agencies of the Department of Defense (DOD).

2. The National Imagery Transmission Format Standard (NITFS) is the suite of standards for formatting digital imagery and imagery-related products and exchanging them among members of the Intelligence Community (IC) as defined by the Executive Order 12333, the DOD, and other United States Government departments and agencies.

3. The NITFS Technical Board (NTB) developed this standard based upon currently available technical information.

4. The DOD and other IC members are committed to the interoperability of systems used for formatting, transmitting, receiving, and processing imagery and imagery-related information. This standard describes the National Imagery Transmission Format (NITF) file format and establishes its application within the NITFS.

5. Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed the National Imagery and Mapping Agency (NIMA), 4600 Sangamore Road, Bethesda, MD 10816-5003 by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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1. SCOPE

1.1 Scope. This standard establishes the requirements for the file format component of the National Imagery Transmission Format Standard (NITFS). The file format described in this document is called the National Imagery Transmission Format (NITF). The NITFS is a collection of related standards and specifications developed to provide a foundation for interoperability in the dissemination of imagery and imagery associated data among different computer systems. An overview of the component documents of the NITFS can be found in MIL-HDBK-1300A.

1.2 Purpose. This document, NITF 2.1, provides a detailed description of the standard file format structure. It specifies the valid data content and format for all fields defined within a NITF file. For this document, NITF refers to NITF Version 2.1. Several NITF implementation issues are addressed in the appendices. Issues pertinent to the use of NITF as the file format for tactical imagery transmission are described in the NITFS transmission protocol component, MIL-STD-2045-44500. An example of NITF as the basis for file formation in tactical communications is provided in Section 6. Certifiable implementation of the NITF for support of interoperability is subject to constraints not specified in this standard. Pertinent compliance requirements are defined in CJCSI 62-12.01A.

1.3 Applicability. This standard is applicable to the Intelligence Community (IC) and the DOD. It is mandatory for all Secondary Imagery Dissemination Systems (SIDS) in accordance with the Assistant Secretary of Defense for Command, Control, Communications, and Intelligence (ASD(C^3I)) memorandum, Subject: National Imagery Transmission Format Standard (NITFS), 12 August 1991, and is applicable also to all types of primary imagery systems such as Unmanned Aerial Vehicles (UAVs), archives, and libraries. MIL-STD-2500B shall be implemented in accordance with NIMA-NNPP-97, and MIL-HDBK-1300A. New equipment and systems, those undergoing major modification, or those capable of rehabilitation, shall conform to this standard.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3, 4, and 5 of this standard. At the time of publication, the editions indicated were valid. All documents are subject to revision and users of this standard should investigate recent editions and change notices of the documents listed below. This section does not include documents cited in other sections of this standard or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements documents cited in sections 3, 4, and 5 of this standard, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issue of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation.

FEDERAL INFORMATION PROCESSING STANDARDS

FIPS PUB 10-4	-	Countries, Dependencies, Areas of Special Sovereignty, and Their Principal Administrative Divisions, April 1995

(Copies of Federal Information Processing Standards (FIPS) are available to Department of Defense activities from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094. Others must request copies of FIPS from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161-2171.)

STANDARDIZATION AGREEMENT

STANAG 7074	-	Digital Geographic Information Exchange Standard (DIGEST) - AGeoP-3A, edition 1, 19 October 1994

(Copies of Standardization Agreements (STANAGS) can be obtained from the Central US Registry, 3072 Army Pentagon, Room 1B889, Washington, DC 20310-3072)

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-2500A	-	National Imagery Transmission Format (Version 2.0) for the National Imagery Transmission Format Standard, 12 October 1994 through NOTICE 1
MIL-STD-188-198A	-	Joint Photographic Experts Group (JPEG) Image Compression for the National Imagery Transmission Format Standard, 15 December 1993 through NOTICE 2
MIL-STD-188-199	-	Vector Quantization Decompression for the National Imagery Transmission Format Standard, 27 June 1994 through NOTICE 1
MIL-STD-2045-44500	-	Tactical Communications Protocol 2 (TACO2) for the National Imagery Transmission Format Standard, 18 June 1993 through NOTICE 2
MIL-STD-2301	-	Computer Graphics Metafile (CGM) for the National Imagery Transmission Format Standard, 18 June 1993 through NOTICE 1
MIL-STD-6040	-	United States Message Text Formatting Program, January 1997

DEPARTMENT OF DEFENSE HANDBOOKS

MIL-HDBK-1300A	-	National Imagery Transmission Format Standard (NITFS), 12 October 1994

(Unless otherwise indicated, copies of the above specifications, standards, and handbooks are available from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.2.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

EXECUTIVE ORDER

EO 12958	-	Classified National Security Information, 17 April 1995

DEPARTMENT OF DEFENSE REGULATION

DOD 5200.1-R	-	Department of Defense Information Security Program Regulation, 1996

CHAIRMAN JOINT CHIEF OF STAFF INSTRUCTION

CJCSI 62-12.01A	-	Compatibility, Interoperability, and Integration of Command, Control, Communications, Computers, and Intelligence Systems, 30 June 1995

DEFENSE INTELLIGENCE AGENCY MANUAL

DIAM 65-19	-	Standard Security Markings, July 1984 through change 89-14

NATIONAL IMAGERY AND MAPPING AGENCY PUBLICATIONS

DMA TR 8350.2	-	World Geodetic System 1984, 2d addition
NIMA N0105-97	-	National Imagery Transmission Format Standard (NITFS) Standards Compliance and Interoperability Test and Evaluation Program Plan (supersedes JIEO Circular 9008)
NIMA NNPP-97	-	The National Imagery Transmission Format Standard Program Plan
NIMA N0106-97	-	National Imagery Transmission Format Standard Bandwidth Compression Standards and Guidelines Document

(Copies of NIMA documents can be obtained from the web at http://www.nima.mil and http://www-ismc.itsi.disa.mil.)

2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues or documents not listed in the DODISS are the issues or the documents cited in the solicitation.

INTERNATIONAL TELECOMMUNICATION UNION

ITU-R BT.601-5	-	Studio encoding parameters of digital television for standard 4:3 and wide-screen 16:9 aspect ratios, 10/95
ITU-T T.4	-	Standardization of group 3 facsimile apparatus for document transmission, AMD2 08/95

INTERNATIONAL ORGANIZATION FOR STANDARDS

ISO 646	-	Information technology **-** ISO 7-bit coded character set for information interchange, 1991
ISO 1000	-	SI units and recommendations for the use of their multiples and of certain other units, 1992
ISO 4873	-	Information technology - ISO 8-bit code for information interchange - Structure and rules for implementation, 1991
ISO/IEC 7498-1	-	Information technology - Open systems interconnection; Basic reference model - Part 1: The basic model, 1994
ISO/IEC 8632-1	-	Information technology - Computer graphics - Metafile for the storage and transfer of picture description information: Functional specification, 1992
ISO/IEC 8632-1 AMD1	-	Rules for profiles, 1994
ISO/IEC 8632-1 AMD2	-	Application structuring extensions, 1995
ISO 10646-1	-	Information technology - Universal multiple - octet coded character set (UCS) - Part 1: Architecture and basic multilingual plane, 1993

ISO/IEC 10918-1 - Information technology - Digital compression and coding of continuous-tone still images - Part 1: Requirements and guidelines; 1994

ISO/IEC DIS 12087-5 - Information technology - Computer graphics and image processing - Image processing and interchange (IPI) - Functional specification~~:~~ - Part 5: Basic image interchange format (BIIF)

(Applications for copies should be addressed to the American National Standards Institute, 13th Floor, 11 West 42nd Street, New York, NY 10036.)

INSTITUTE OF ELECTRONIC AND ELECTRICAL ENGINEERS STANDARD

IEEE 754 - IEEE Standard for binary floating point arithmetic

(Copies of IEEE documents can be ordered from Customer Service, 445 Hose Lane, PO box 1331, Piscataway, NJ 08855-1331.)

2.4 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. DEFINITIONS

3.1 Acronyms used in this standard. The acronyms used in this standard are defined as follows:

a. AL - Attachment Level

b. ASD(C^3I) - Assistant Secretary of Defense for Command, Control, Communications, and Intelligence

c. ASCII - American Standard Code for Information Interchange

d. BCS - Basic Character Set

e. BCS-A - Basic Character Set - Alphanumeric

f. BCS-N - Basic Character Set - Numeric

g. BE - Basic Encyclopedia

h. BIIF - Basic Image Interchange Format. (see ISO/IEC DIS 12087-5.)

i. BMP - Basic Multilingual Plane

j. C - Conditional

k. CAT Scan - Computerized Axial Tomography Scan

l. CCS - Common Coordinate System

m. CE - Controlled Extension

n. CETAG - Controlled Extension Unique Extension Type Identifier

o. CGM	-	Computer Graphics Metafile
p. CRT	-	Cathode Ray Tube
q. C^3I	-	Command, Control, Communications, and Intelligence
r. DES	-	Data Extension Segment
s. DESTAG	-	Data Extension Segment unique DES type identifier
t. DIAM	-	Defense Intelligence Agency Manual
u. DIGEST	-	Digital Geographic information Exchange STandard
v. DLVL	-	Display Level
w. DOD	-	Department of Defense
x. EEI	-	Essential Elements of Information
y. ES	-	Extension Segment
z. FIPS	-	Federal Information Processing Standard
aa. HTML	-	Hypertext Mark-up Language
ab. IC	-	(1) Intelligence Community (2) Image Compression
ac. ICAT	-	Image Category
ad. JIEO	-	Joint Interoperability and Engineering Organization
ae. IEC	-	International Electrotechnical Commission
af. IEEE	-	Institute of Electronic and Electrical Engineers
ag. ILOC	-	Image Location
ah. IMODE	-	Image Mode
ai. IREP	-	Image Representation
aj. ISMC	-	Imagery Standards Management Committee
ak. ISO	-	International Organization for Standardization
al. ITU	-	International Telecommunication Union
am. JITC	-	Joint Interoperability Test Command
an. JPEG	-	Joint Photographic Experts Group
ao. LSB	-	Least Significant Bit

ap. LUT	-	Look-Up Table
aq. MGRS	-	Military Grid Referencing System
ar. MSB	-	Most Significant Bit
as. NBPC	-	Number of Blocks Per Column
at. NBPR	-	Number of Blocks Per Row
au. NIMA	-	National Imagery and Mapping Agency
av. NITF	-	National Imagery Transmission Format
aw. NITFS	-	National Imagery Transmission Format Standard
ax. NPPBH	-	Number of Pixels Per Block Horizontal
ay. NPPBV	-	Number of Pixels Per Block Vertical
az. NTB	-	National Imagery Transmission Format Standard Technical Board
ba. PVTYPE	-	Pixel Value Type
bb. R	-	Required
bc. RE	-	Registered Extension
bd. RES	-	Reserved Extension Segment
be. RESTAG	-	Reserved Extension Segment unique RES type identifier
bf. RETAG	-	Registered Extension Identifier
bg. RGB	-	Components from video standardization: R for Red, G for Green, B for Blue
bh. RTF	-	Rich Text Format
bi. SDE	-	Support Data Extension
bj. SGML	-	Standardized Graphic Mark-up Language
bk. SID	-	Secondary Imagery Dissemination
bl. SIDS	-	Secondary Imagery Dissemination System
bm. STANAG	-	Standardization Agreement
bn. SLOC	-	Graphic Location
bo. TACO2	-	Tactical Communications Protocol 2
bp. TBD	-	To Be Determined

bq. TFS - Transportable File Structure . (see ISO/IEC DIS 12087-5.)

br. TRE - Tagged Record Extension

bs. UAV - Unmanned Aerial Vehicle

bt UCS - Universal Multiple Octet Coded Character Set

bu. UDHD - User Defined Header Data

bv. UDID - User Defined Image Data

bw. UN - United Nations

bx. UPS - Universal Polar Stereographic

by. USMTF - United States Message Text Format

bz. UTC - Coordinated Universal Time

ca. UTM - Universal Transverse Mercator

cb. VQ - Vector Quantization

cc. YCbCr601 - Y = Brightness of signal, Cb = Chrominance (blue), Cr = Chrominance (red) (see ITU-R BT.601-5.)

3.2 Terms and Definitions. The following terms and definitions are used for the purpose of this standard. All used concepts (file, field, segment, etc.) exclusively refer to the NITF standard. For concepts for which this is not correct a corresponding firm intention has been chosen (for example: system field, BIIF file, etc.).

3.2.1 Associated Data. That related data required for completeness of the standard.

3.2.2 Attachment Level (ALVL). A way to associate images and graphics to the same level during movement, rotation, or display.

3.2.3 Band. A well defined range of wavelengths, frequencies or energies of optical, electric, or acoustic radiation. At the pixel level, a band is represented as one of the vector values of the pixel.

3.2.4 Bandwidth. 1. The difference between the limiting frequencies within which performance of a device, in respect to some characteristic, falls within specified limits. 2. The difference between the limiting frequencies of a continuous frequency band.

3.2.5 Base Image. A base image is the principle image of interest or focus for which other data may be inset or overlaid. The NITF file can have none, one, or multiple base images. For multiple base images in a single NITF file, the relative location of each base image is defined in the image location (ILOC) field in each image subheader. This location will be the offset within the Common Coordinate System (CCS).

3.2.6 Basic Character Set (BCS). A subset of the Basic Multilingual Plane (BMP). The Basic Character Set consists of the characters defined in the first row (row 0x00) of the BMP A-zone. For this reason the first octet normally used to define character positions in the BMP will be omitted when expressing BCS character codes. Valid BCS character codes, therefore, shall range from 0x00 through 0xFF.

3.2.7 Basic Character Set-Alphanumeric (BCS-A). A subset of the Basic Character Set. The range of allowable characters consists of space through tilde, (codes 0x20 through 0x7E) and line feed, form feed, carriage return, (0x0A, 0x0C, and 0x0D).

3.2.8 Basic Character Set-Numeric (BCS-N). A subset of the Basic Character Set-Alphanumeric. The range of allowable characters consists of minus through the number "9", BCS codes 0x2D through 0x39, and plus, code 0x2B.

3.2.9 Basic Multilingual Plane (BMP). The BMP is the first plane of the first group of the Universal Multiple-Octet Coded Character Set as defined by ISO/IEC 10646-1. The BMP is a matrix consisting of 256 rows each containing 256 cells. Individual cells are indexed using a pair of octets expressed in hexadecimal format. The first octet indicates the row containing the cell and the second octet indicates the position of the cell in the specified row. Rows within the BMP are grouped into four zones: A-zone (rows 0x00 through 0x4D), I-zone (rows 0x4E through 0x9F), O-zone (rows 0xA0 through 0xDF), and R-zone (rows 0xE0 through 0xFF). The A-zone is used for alphabetic and syllabic scripts together with various symbols. The I-zone is used for unified East Asianideographs. The O-zone is reserved for future standardization. The R-zone is restricted for graphic characters that are used in ways not explicitly constrained by ISO/IEC 10646-1.

3.2.10 BCS Space. BCS code 0x20.

3.2.11 Block. A block is a rectangular array of pixels. (Synonymous with tile.)

3.2.12 Block Image. A blocked image is comprised of the union of one or more non-overlapping blocks. (Synonymous with tiled image.)

3.2.13 Blocked Image Mask. A structure which identifies the blocks in a blocked (tiled) image which contain no valid data, and which are not included in the file. The structure allows the receiver to recognize the offset for each recorded/transmitted block. For example, a 2x2 blocked image file which contained no valid data in the second block (block 1) would be recorded in the order: block 0, block 2, block 3. The blocked image mask would identify block 1 as a non-existing block, and would allow the receiving application to construct the image in the correct order.

3.2.14 Brightness. An attribute of visual perception, in accordance with which a source appears to emit more or less light. A pixel with a higher value is brighter than a pixel with a lower value.

3.2.15 Byte. A sequence of 8 adjacent binary digits.

3.2.16 Character. 1. A letter, digit, or other graphic that is used as part of the organization, control, or representation of data. 2. One of the units of an alphabet.

3.2.17 Common Coordinate System (CCS). The virtual two dimensional Cartesian-like coordinate space which shall be common for determining the placement and orientation of displayable data.

3.2.18 Complexity Level (CLEVEL). A code used in the file header which signals the degree of complexity an interpret implementation needs to support to adequately interpret the files. Items that differentiate complexity include: number of image segments, number of symbol segments, number of text segments, size of the common coordinate system, size of image data etc.

3.2.19 Conditional. A state applied to a NITF header or subheader data field whose existence and content is dependent on the existence and/or content of another field.

3.2.20 Controlled Extension (CE). Those tagged record extensions which are submitted for approval by the NTB and are then maintained under formal configuration management control. Both the extension type identifier (six character CETAG field) and the user-defined data (CEDATA field) structure is under configuration management control.

3.2.21 Coordinated Universal Time (UTC). The time scale maintained by the Bureau International de l'Heure (International Time Bureau) that forms the basis of a coordinated dissemination of standard frequencies and time signals.

3.2.22. Data. Information in digital format.

3.2.23 Data Communication. The transfer of information between functional units by means of data transmission according to a protocol.

3.3.24 Data Extension Segment (DES). A type of extension segment with sub-header and data fields structured similarly to the standard data types in the NITF (e.g. image, label, symbol, text). The extension type identifier (25 character DESTAG field), the version (two character DESVER field), and the full underlying structure is under configuration management control as registered with the NTB.

3.2.25 Date Time Group. A composite representation of date and time.

3.2.26 Digraph. A two letter reference code.

3.2.27 Field. Elementary set of meaningful data.

3.2.28 Graphic. Graphic data is used in the NITF to store two-dimensional information represented as a Computer Graphics Metafile (CGM). Each graphic segment consists of a symbol subheader and data. A graphic may be black and white, grey scale, or color. Examples of graphics are circles, ellipses, rectangles, arrows, lines, triangles, logos, unit designators, object designators (ships, aircraft), text, special characters, or combination thereof. A graphic is stored as a distinct unit in the NITF file allowing it to be manipulated and displayed nondestructively relative to the images, and other graphics in the file. This standard does not preclude the use of n-dimensional graphics when future standards are developed.

3.2.29 Grey scale. An optical pattern consisting of discrete steps or shades of grey between black and white.

3.2.30 Image. A two-dimensional rectangular array of pixels indexed by row and column.

3.2.31 Image codes. For a vector quantized image file, values in the image data section that are used to retrieve the v x h kernels from the image code book.

3.2.32 Imagery. Collectively, the representations of objects reproduced electronically or by optical means on film, electronic display devices, or other media.

3.2.33 Imagery Associated Data. Data which is needed to properly interpret and render pixels; data which is used to annotate imagery such as text, graphics, etc.; data which describes the imagery such as textual reports; and data which support the exploitation of imagery.

3.2.34 Interface. 1. A concept involving the definition of the interconnection between two equipment items or systems. The definition includes the type, quantity, and function of the interconnecting circuits and the type, form, and content of signals to be interchanged via those circuits. Mechanical details of plugs, sockets, and pin numbers, etc., can be included within the context of the definition. 2. A shared boundary, e.g., the boundary between two subsystems or two devices. 3. A boundary or point common to two or more similar or dissimilar command and control systems, subsystems, or other entities against which or at which necessary information flow takes place. 4. A boundary or point common to two or more systems or other entities across which useful information flow takes place. (It is implied that useful information flow requires the definition of the interconnection of the systems which enables them to interoperate.) 5. The process of interrelating two or more dissimilar circuits or systems 6. The point of interconnection between user terminal equipment and commercial communication-service facilities.

3.2.35 Interoperability. The ability of systems, units, or forces to provide services to and accept services from other systems, units, or forces and to use the services so exchanged to enable them to operate effectively together.

3.2.36 Kernel. For a vector quantized image file, a rectangular group of pixels used in the organization of quantizing image data.

3.2.37 Look-Up Table (LUT). A collection of values used for translating image samples from one value to another. The current sample value is used as an index into the look-up table(s); therefore, the number of entries in each look-up table for a binary image would contain two entries, and each look-up table for an 8-bit image would contain 256 entries. Multiple look-up tables allow for the translation of a 1-vector pixel value to an n-vector pixel value.

3.2.38 Magnification. The multiplication factor which causes an apparent change in linear distance between two points in an image. Thus a magnification of 2 is a change which doubles the apparent distance between two points (multiplying area by 4), while a magnification of 0.5 is a change which halves the apparent distance.

3.2.39 Military Grid Referencing System (MGRS). A means of expressing Universal Transverse Mercator (UTM) or Universal Polar Stereographic (UPS). coordinates as a character string, with the 100-kilometer components replaced by special letters (which depend on the UTM or UPS zone and ellipsoid).

3.2.40 Network. 1. An interconnection of three or more communicating entities and (usually) one or more nodes. 2. A combination of passive or active electronic components that serves a given purpose.

3.2.41 Non-blank. Non-blank indicates that the field cannot be filled by the character space (0x20) but may contain the character space when included with other characters. (embedded blanks)

3.2.42 Null. The field is filled entirely with spaces (0x20).

3.2.43 Pack Capable System. A system which is capable of generating a NITF file.

3.2.44 Pad Pixel. A pixel with sample values that have no significant meaning to the image. Pad pixels are used with block images when either the number of pixel rows in an image is not an integer multiple of the desired number of vertical image blocks, or when the number of pixel columns in an image is not an integer multiple of the desired number of horizontal image blocks. In all cases, the sample values for pad pixels shall not appear within the bounds of significant sample values for pixels which comprise the original image.

3.2.45 Pad Pixel Mask. A data structure which identifies recorded/transmitted image blocks which contain pad pixels. The pad pixel mask allows applications to identify image blocks which require special interpretation due to pad pixel content.

3.2.46 Parity. In binary-coded systems, the oddness or evenness of the number of ones in a finite binary stream. It is often used as a simple error-detection check and will detect (but not correct) the occurrences of any single bit error in the field.

3.2.47 Pixel. A pixel is represented by an n-vector of sample values, where n corresponds to the number of bands comprising the image.

3.2.48 Primary Imagery. Unexploited, original imagery data that has been derived directly from a sensor. Elementary processing may have been applied at the sensor, and the data stream may include auxiliary data.

3.2.49 Processed Imagery. Imagery that has been formatted into image pixel format, enhanced to remove detected anomalies, and converted to a format appropriate for subsequent disposition.

3.2.50 Protocol. 1. [In general], A set of semantic and syntactic rules that determines the behavior of functional units in achieving communication. For example, a data link protocol is the specification of methods whereby data communication over a data link is performed in terms of the particular transmission mode, control procedures, and recovery procedures. 2. In layered communication system architecture, a formal set of procedures that are adopted to facilitate functional interoperation within the layered hierarchy. Note: Protocols may govern portions of a network, types of service, or administrative procedures.

3.2.51 Pseudocolor. A user-defined mapping of N bits into arbitrary colors.

3.2.52 Reconstruction. For a vector quantized image file, the process of transforming an image from a quantized form into a displayable and exploitable form.

3.2.53 Registered Extension (RE). Those tagged record extensions for which the extension type identifier (six character RETAG field) and the user-defined data (REDATA field) structure is registered with the NTB. The user-defined data (REDATA field) structure is not controlled by the NTB.

3.2.54 Reserved Extension Segment (RES). A type of extension segment with sub-header and data fields structured similarly to the standard data types in the NITF (e.g. image, label, symbol, text). The extension type identifier (25 character RESTAG field), the version (two character RESVER field), and the full underlying structure is under configuration management control as registered with the NTB. The RES construct provides the same mechanism as the DES construct for adding a variety of new data types for inclusion in NITF files. However, the RES is reserved for data types that need to be placed at or near the end of the file. For example, a digital signature that covered the whole file could be defined for placement in a RES to verify the bit level integrity of the NITF file.

3.2.55 Required. A NITF header or subheader field that must be present and filled with valid data.

3.2.56 Resolution. 1. The minimum difference between two discrete values that can be distinguished by a measuring device. 2. The degree of precision to which a quantity can be measured or determined. 3. A measurement of the smallest detail that can be distinguished by a sensor system under specific conditions. Note: High resolution does not necessarily imply high accuracy.

3.2.57 Sample. The atomic element of an image pixel having a discrete value. One sample from the same location in each band comprising an image will combine to form a pixel.

3.2.58 Secondary Imagery. Secondary Imagery is digital imagery and/or digital imagery products derived from primary imagery or from the further processing of secondary imagery.

3.2.59 Secondary Imagery Dissemination (SID). The process of dispersing or distributing digital secondary imagery.

3.2.60 Secondary Imagery Dissemination System (SIDS). The equipment and procedures used in secondary imagery dissemination.

3.2.61. Segment. A header and data fields.

3.2.62. Tagged Record Extension (TRE). A set of fields to support user defined data.

3.2.63 Text. Information conveyed as characters.

3.2.64 Tile. Synonymous with Block

3.2.65 Transparent Pixel. A pixel whose sample values must be interpreted for display such that the pixel does not obscure the display of any underlying pixel.

3.2.66 Trigraph. A three letter reference code.

3.2.67 Universal Multiple Octet Coded Character Set (UCS). The Universal Multiple Octet Coded Character Set is used for expressing text that must be human readable, potentially in any language of the world. It is defined in ISO/IEC 10646-1.

3.2.68 Universal Polar Stereographic (UPS). A pair of grids, one used north of 84^{o} north and one used south of 80^{o} south. Each grid is based on the polar stereographic projection. The actual grid depends on the choice of the geodetic datum.

3.2.69 Universal Transverse Mercator (UTM). A system of grids for global use between latitudes 84 degrees North and 80 degrees South. The range of longitudes 180 degrees West to 180 degrees East is divided into 60 zones, each of which is a grid based on the Transverse Mercator projection. The actual grid depends on the choice of geodetic datum as well as the zone.

3.2.70 Unpack Capable System. A system which is capable of receiving/processing a NITF file.

3.2.71 Vector Quantization (VQ). A compression technique in which many groups of pixels in an image are replaced by a smaller number of image codes. A clustering technique is used to develop a code book of "best fit" pixel groups to be represented by the codes. Compression is achieved because the image codes can be recorded using fewer bits than the original groups of pixels they represent.

3.2.72 vsize. For a vector quantized image file, the size of the kernel in pixels.

3.2.73 v x h kernel. For a vector quantized image file, a rectangular group of pixels (kernels) with v-rows and h-columns.

4. GENERAL REQUIREMENTS

4.1 Background. The DOD and the IC use many types of systems for the reception, transmission, storage, and processing of images, graphics, text, and other associated data. Without special efforts, the file format used in systems of one service or agency are likely to be incompatible with the format of another system. Since each system may use a unique, internal data representation, a common format for exchange of information across systems is needed for interoperability of systems within and among DOD and IC organizations. As the need for imagery-related systems grows, their diversity is anticipated to increase. The need to exchange data is also anticipated to increase, even though systems of each organization must retain their own individual characteristics and capabilities. This document defines the NITF, the standard file format for imagery and imagery-related products to be used by the DOD and IC. The NITF provides a common basis for storage and interchange of images and associated data among existing and future systems. The NITF can be used to support interoperability by providing a data format for shared access applications, while also serving as a standard file format for dissemination of images, graphics, text, and associated data.

4.2. NITF operations concept. The NITF shall be used as an interoperability format for transmission and storage of electronic imagery within and among DOD and IC organizations. The NITF has direct application to the dissemination of imagery to requesters of imagery derived intelligence. Multimedia intelligence reports will be composed and packaged into a single file which answer the Essential Elements of Information (EEIs) of a particular requester. Intelligence reports may be composed of textual reports along with images, annotated images, graphics, and maps. Intelligence reports are generated after an interpreter exploits primary images or further exploits secondary images pulled out of an archive. The NITF is suitable for archiving imagery required to support the collection process in the reconnaissance cycle. Figure 1 illustrates the elements used in the exploitation process of the reconnaissance cycle.

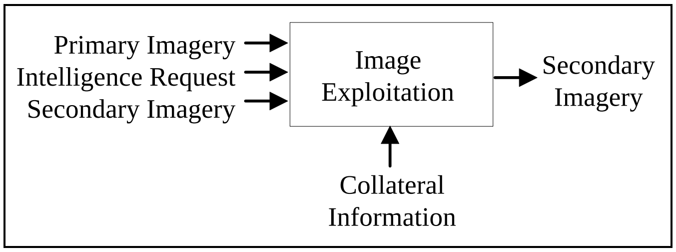


FIGURE 1. NITF operational concept.

In the NITF concept, imagery data interchange between systems is organized in “Files” and is enabled by a potential cross-translation process. When systems use other than NITF as an internal imagery format, each system will have to translate between the system's internal representation for files, and the NITF file format. A system from which imagery data is to be transferred is envisioned to have a translation module that accepts information, structured according to the system's internal representation for images, graphics, text,, and other associated data, and assembles this information into one file in the standard NITF file format. Then the file will be exchanged with one or more recipients. The receiving systems will reformat the file, converting it into one or more files structured as required by the internal representation of the receiving station. The functional architecture of this cross-translation process is shown on figure 2. In the diagram, the terms "Native$_1$ File Format" and "Native$_2$ File Format" refer to files represented in a way potentially unique to the sending or receiving system. Using the NITF, each system must be compliant with only one external file format that will be used for interchange with all other participating systems. The standard format allows a system to send data to several other systems since each receiving system converts the file into its own native file format. Each receiving system can translate selectively and permanently store only those portions of data in the received file that are of interest. This allows a system to transmit all of its data in one file, even though some of the receiving systems may be unable to process certain elements of the data usefully. NITF can also serve as the internal native file format so any translation would be eliminated.

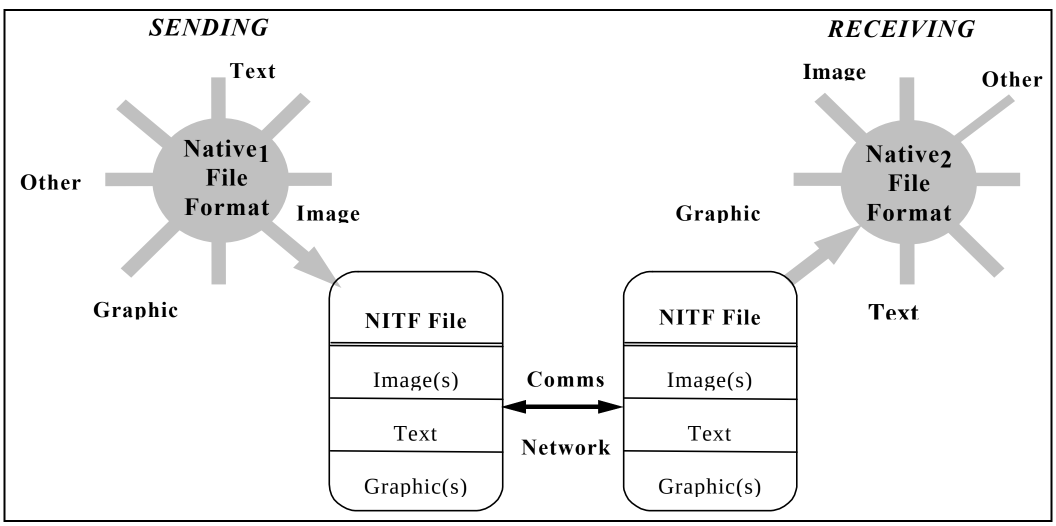


FIGURE 2. NITF functional architecture.

4.3 NITF design objectives. The design objectives of the NITF are as follows:

a. To provide a means whereby diverse systems can share imagery and associated data.

b. To allow a system to send comprehensive information within one file to users with diverse needs or capabilities, allowing each user to select only those portions of data that correspond to their needs and capabilities.

c. To minimize the cost and schedule required to achieve such capability.

4.4 NITF general requirements. The NITF is specified to satisfy several general requirements in response to the role it plays in the NITF functional architecture. These requirements are:

a. To be comprehensive in the kinds of data permitted in the file within the image-related objectives of the format, including geo-located imagery or image related products**.**

b. To be implementable across a wide range of computer systems without reduction of available features.

c. To provide extensibility to accommodate data types and functional requirements not foreseen.

d. To provide useful capability with limited formatting overhead.

4.5 NITF characteristics. To serve a varied group of users exchanging multiple types of imagery and associated data who are using differing hardware and software systems, the NITF strives to possess the following characteristics:

a. Completeness - allows exchange of all needed imagery and associated data.

b. Simplicity - requires minimal preprocessing and post processing of transmitted data.

c. Minimal overhead - minimized formatting overhead, particularly for those users transmitting only a small amount of data and for bandwidth-limited users.

d. Universality - provides universal features and functions without requiring commonality of hardware or software.

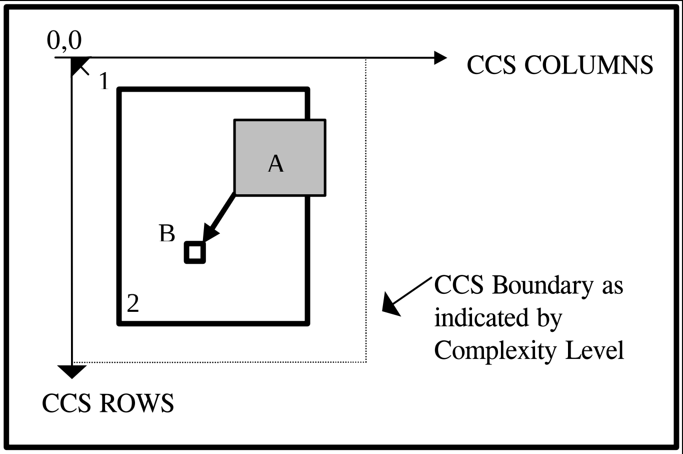
4.6 NITF file structure. The NITF file consists of the NITF file header and one or more segment(s). A segment consists of a subheader and ~~a~~ data field**s** as shown in figure 3.

<table>
<tr><td colspan="7">NITF File</td></tr>
<tr><td rowspan="2">NITF
File Header</td><td colspan="2">Segment</td><td colspan="2">. . .</td><td colspan="2">Segment</td></tr>
<tr><td>Sub-
Header</td><td>Data
Fields</td><td>. . .</td><td>. . .</td><td>Sub-
Header</td><td>Data
Fields</td></tr>
</table>

FIGURE 3. NITF file structure.

4.7 Common coordinate system. The Common Coordinate System (CCS) is the virtual two dimensional Cartesian-like coordinate space which shall be common for determining the placement and orientation of displayable data within a specific NITF file and among correlated NITF files which comprise an integrated product.

4.7.1 CCS structure. The virtual CCS structure can be conceived of as a two dimensional drawing space with a coordinate system similar in structure to the lower right quadrant of the Cartesian coordinate system. The CCS has two perpendicular coordinate axes, the horizontal column axis and the vertical row axis as depicted in figure 4. The positive directions of the axes are based on the predominate scan (column) and line (row) directions used by the digital imagery community. The intersection of the axes is designated as the origin point with the coordinates (0, 0). Given the orientation of the axes in figure 4, the positive direction for the column axis is from (0, 0) and to the right; the positive direction for the row axis is from (0, 0) downward. The quadrant represented by the positive column and positive row axes is the only coordinate space in which NITF displayable data may be located.



1. Common Coordinate System Origin (0,0 - 2048,2048)
2. Image
A. Inset Image
B. Inset Graphic (Box & Arrow)

FIGURE 4. Common coordinate system example.

4.7.2 Row and column coordinates. Displayable data shall be placed in the CCS according to the row and column coordinates placed in subheader location fields (for example, Image Location (ILOC), Graphic Location (SLOC)). The location coordinates of a specific "data item" (as shown in figure 4.) represent row and column offsets from either the CCS origin point (when 'unattached'), or the location point in the CCS of the data item to which the item is attached. Other means used to locate displayable data shall be directly correlated to row and column coordinates. (For example, displayable tagged extension data might have geo-location data correlated with row and column indices.) When location coordinates are relative to the CCS origin, they shall always have a positive value. When location coordinates are relative to the location coordinates of an item to which they are attached, both positive and negative offset values are possible. In all cases, the location coordinates selected for any data item shall ensure that none of the displayable item extends outside of the quadrant defined by the axes of the CCS.

4.7.3 Complexity level constraints. The upper and left boundaries of the CCS are explicitly constrained in the specification. When complexity level constraints are specified, one of the key attributes for specification shall be to identify the lower and right boundary drawing space constraints for a given complexity level. Complexity level constraints are defined in NIMA-N0105-97, NITFS Compliance and Interoperability Test and Evaluation Program Plan.

5. DETAILED REQUIREMENTS

5.1 Format description.

5.1.1 Header, segments, and fields. The format contains file header and segments. A segment contains a subheader~~,~~ and data fields. The NITF file header and subheader fields are byte aligned. A file header carries information about the identification, classification, structure, content, size of the file as a whole, and the number and size of the major segments within the file. For each type of data segment, as shown in figure 5, supported by the format, there is an associated subheader and data fields. A subheader contains information that describes characteristics of data fields that contain the actual data.

5.1.2 Extensions. Flexibility to add support for the data and data characteristics not explicitly defined in this standard is provided within the format. This is accomplished by providing for one or two fields in each header/subheader containing "tagged records" and by use of Data Extension Segments (DESs) and Reserved Extension Segments (RESs). The tagged record extensions in the headers/subheaders may contain additional characteristics about the corresponding data segment, while the extension segments are intended primarily to provide a vehicle for adding support for new kinds of data. The identifier (tag name) for the tagged records, and extension segment identifiers, will be coordinated centrally to avoid conflicting use. A current listing of the tagged record extensions that have been registered with NIMA is provided in the Tag Registry maintained by the Joint Interoperability Test Command (JITC). All implementations of NITF should handle the receipt of unknown extensions by at least recognizing that they are unknown extension types and ignoring them. This can be accomplished using the byte count, extension identifier, and data length field. Using these lengths offsets, the unknown extension can be ignored and the user can be informed that extension data has been skipped.

5.1.3 Supported data types. A NITF file supports the inclusion of three standard types of segments in a single file: image, graphic, and text segments. Additional types of data may be included in a NITF file by use of Extension Segments (ES) (see paragraph 5.7). Information of a standard data type is called a standard data segment. Information of a type defined in an ES is called an extension segment. The order of these major file components is illustrated on figure 5.

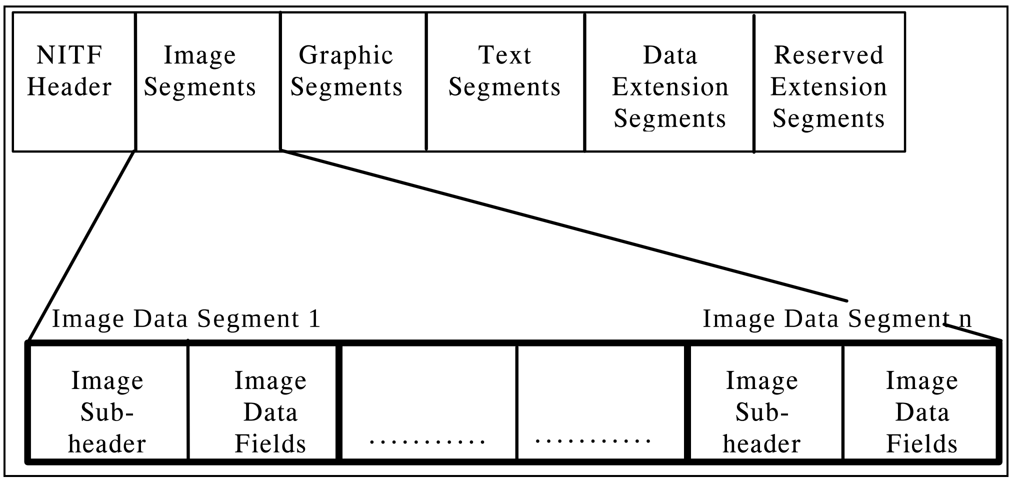


Figure 5. NITF file structure.

5.1.4 Standard data segment order. The NITF file supports inclusion of standard data segments of information in a single file: image, graphic, and text. It is possible to include zero, one, or multiples of each standard data segment in a single file (for example: several images, but no graphics). Standard data segments shall be placed in the file in the following order: all image segments, followed by all graphic segments, followed by all text segments.

5.1.5 Standard data segment subheaders. Each individual, standard data segment included in a NITF file, such as an image or a graphic segment, shall be preceded by a "subheader" corresponding to that data segment. This subheader shall contain details of that particular data segment. If no segments of a given type are included in the file, a subheader for that information type shall not be included in the file. All segments and associated subheaders of a single type shall precede the first segment for the next data type. The ordering of multiple segments of one type is arbitrary. A diagram of the overall NITF file structure is shown on figure 5.

5.1.6 Header/subheader field specification. The specification of the fields in the various headers/subheaders found within a NITF file is provided in a series of tables in appendix A. Each table includes a mnemonic identifier for each FIELD within a header/subheader, the field's NAME, a description of the valid contents of the field, and constraints on the field's use, the field SIZE, the VALUE RANGE it may contain, and an indication of its TYPE (see paragraph 5.1.8). The NITF file header fields are specified in table A-1. The standard data type segment subheader fields are specified in tables A-3, A-3(A), A-5, and A-6. The tagged record extension subheaders (see paragraphs 5.7.1 and 5.7.1.1) are defined in table A-7. Finally, the data extension segment subheader fields (see paragraph 5.7.2.1) and RES are defined in table A-7 and A-9. Except for where specifically stated, the data that appears in all header/subheader fields specified in the tables, including numbers, shall be represented using the printable Basic Character Set (BCS) (defined in table B-1 of appendix B) with eight bits (one byte) per character. Representing numbers in character form avoids many of the problems associated with differences in word length and internal representation among different machines. Representing the header and subheader fields in BCS also makes them more easily read by humans. All field size specifications given for the header and subheader fields specify a number of bytes. Fields that may contain any printable BCS characters (including punctuation marks) are indicated as “BCS-Alphanumeric (BCS-A)” in the VALUE RANGE specification.

5.1.7 Field structure and default values. The NITF uses character counts to delimit header fields, as opposed to special end-of-field characters or codes or direct addressing. These counts are provided in the tables detailing the NITF header and subheader field specifications. All data in fields designated BCS-A shall be left justified and padded to the right boundary with BCS spaces. All data in numeric fields (BCS-Numeric (BCS-N)) shall be right justified and padded to the left boundary with leading zeros. The standard default value shall be spaces for alphanumeric fields and zero for numeric fields. For a few fields, a specific default may be indicated in the field description. In this case, the field description shall take precedence. All header and subheader fields contained in a NITF file shall contain either meaningful data (that is, data in accordance with the restrictions specified for the contents of the field in this document) or the specified default value.

5.1.7.1 NITF BCS. NITF BCS is a special format to provide a common character format for all NITF implementations. The BCS code shall be represented as depicted in tables B-1. This is the BCS code represented in ISO 646. The BCS codes shall be seven bits, a1 through a7 with an eighth bit added. The eighth bit, a8, shall be set to 0. The Most Significant Bit shall be a8 and the Least Significant Bit (LSB) shall be a1 . It is intended to provide for simple communications among NITF stations. The NITF BCS format is comprised of the following BCS characters (all numbers are decimal): Line Feed (10), Form Feed (12), Carriage Return (13), and space (32) through tilde (126). This set includes all the alphanumeric characters as well as all commonly used punctuation characters. For NITF headers and subheaders, BCS codes are further restrained.

5.1.7.1.1 BCS-N. The range of allowable characters for BCS-N consists of the numbers ‘0’ through ‘9’ from the Basic Multilingual Plane (BMP) block named ‘BASIC LATIN,’ (codes 30 through 39) and the following:

Slant bar (code2F)
Plus (code2B)
Minus (code2D)
Decimal point (code2E)

5.1.7.1.2 BCS-A. The range of allowable characters for BCS-A consists of the following:

Space through Tilde codes (20 through 7E) (BMP block ‘BASIC LATIN’)

5.1.8 Field types. The NITF file header and various subheaders have two types of fields: required and conditional. A required field shall be present and shall contain valid data or the specified default value. A conditional field may or may not be present depending on the value of one or more preceding (required) fields. If a conditional field is present, it shall contain valid data. When a field is conditional, its description identifies what conditions and which preceding field or fields are used to determine whether or not to include it in the file. For example, in the NITF header, if the Number of Images (NUMI) field contains the value of 2, the fields LISH001, LI001, LISH002, and LI002 will be present and must be filled with valid data. However, if the NUMI field contains a zero, the subheader length and image length fields are omitted.

5.1.9 Logical recording formats.

5.1.9.1 Bit and byte order.

a. The method of recording numeric data on interchange media shall adhere to the “big endian” convention. In big endian format, the most significant byte in each numeric field shall be recorded and read first, and successive byte recorded and read in order of decreasing significance. That is, if an n-byte field F is stored in memory beginning at address A, then the most significant byte of F shall be stored at A, the next at A+1, and so on. The least significant byte shall be stored at address A+n-1.

b. BCS character strings shall be recorded in the order in which the data is generated.

c. The most significant bit in each byte of every field, regardless of data type, shall be recorded and read first, and successive bits shall be recorded and read in order of decreasing significance.

d. Pixel arrays shall be recorded in the order specified in the Image Mode (IMODE) field and as discussed in paragraph 5.4.3.3. Pixel arrays shall be recorded from left to right starting at the top, and non-interlaced raster scanning downward. The top left pixel shall be recorded first, and the bottom right pixel shall be recorded last.

5.1.9.2. Row column relationship. NITF imagery is displayed by mapping each image pixel to a specific row “r” and column “c” within the bottom right quadrant shown on Figure 6. Rows are represented on the vertical (y-axis) and columns are represented on the horizontal (x-axis). Moving from location 0,0 down and to the right is considered moving in a positive direction. If the first pixel of an image is placed at r0,c0, it would be followed by pixels r0,c1; r0,c2 and so on until the end of the row. The first pixel of the second row of image pixels would be located at r1,c0.

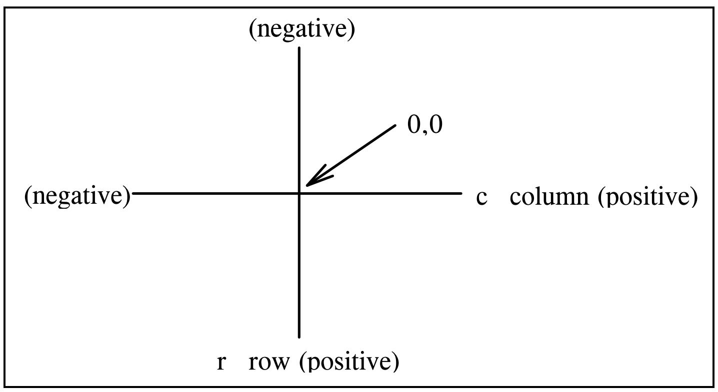


Figure 6. Row column relationship.

5.2 The NITF file header. Each NITF file shall begin with, the file header, whose fields contain identification and origination information, file-level security information, and the number and size of segments of each type, such as image segment(s), graphics segments(s), and text segment(s), contained in the file. Figure 7 depicts the NITF file header. It depicts the types of information contained in the header and shows the header’s organization as a sequence of groups of related fields. The expansion of the "Image Group" illustrates how the header's overall length and content may expand or contract depending on the number of data segments of each type included in the file. The NITF header is detailed in table A-1.

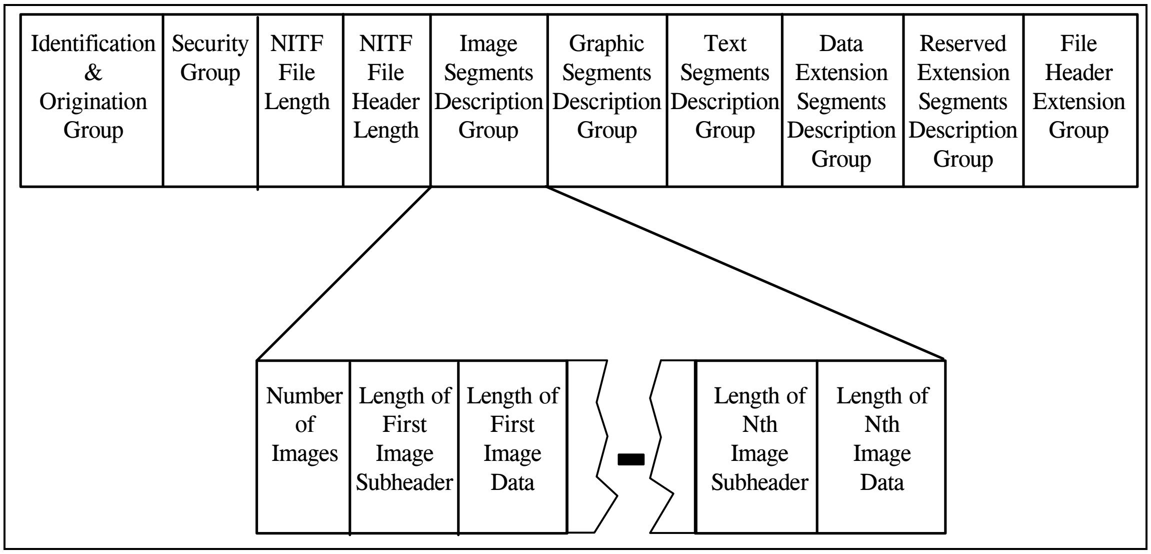


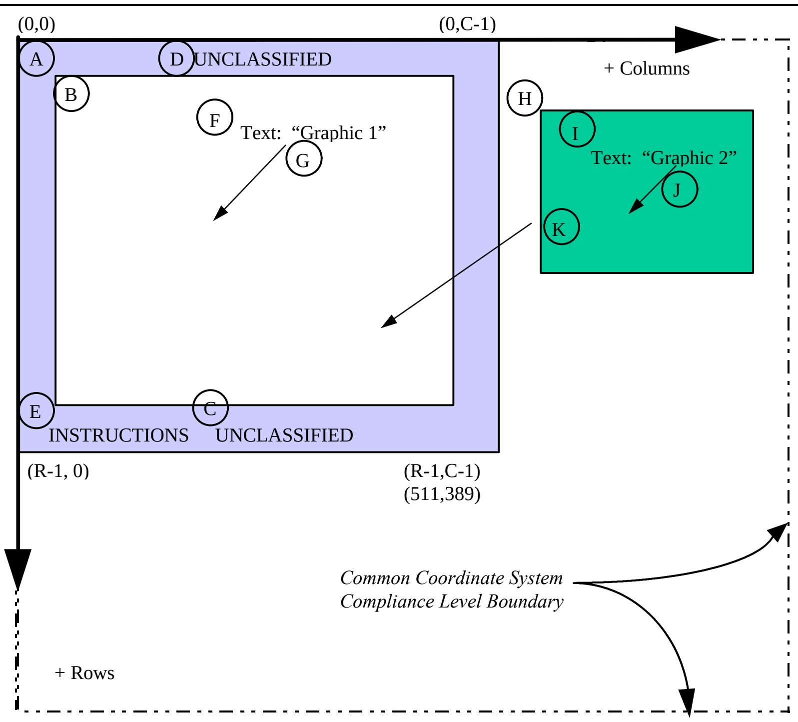
FIGURE 7. NITF file header structure.

5.3 NITF product and overlay concept. The following subsections describe the non-destructive nature of NITF and the relationships anticipated to exist among the segments in a NITF file and how these relationships are represented in the file. An image product may conceivably consist of a correlated set of multiple NITF files; a single NITF file with multiple images, each with their own overlays and associated data; a NITF file with no image; and/or a single NITF file with a single image and its overlays and associated data. To facilitate description of the NITF overlay concept, only the latter case will be addressed in the context of this subsection. See paragraph 6.2 for applying the overlay concept to the other two cases.

5.3.1 Image overlay relationships. Each single file image product is comprised of one or more NITF standard data segments plus associated data. The association and portrayal of displayable segments is accomplished through the use of location indices, display levels (DLVLs), and attachment levels (ALVLs). The placement of displayable data segments in the common coordinate system (see paragraph 4.7) is recorded in the location field of the segment's subheader. The relative visibility, when displayed, of the various displayable segments in the file is recorded in the file by use of the display level (the "DLVL" field in the standard information type subheaders, specifically IDLVL for images and SDLVL for graphics). Groupings of related segments may be formed by use of the attachment level (the "ALVL" field in the standard information type subheaders, specifically IALVL for images and SALVL for graphics). For example, when a base image segment is present, it may form the basis for using the other data contained in the product. Images other than the base image may be associated with the base image via the use of the ILOC, IDLVL, and IALVL fields of their image subheaders. All images and graphics associated with the base image define overlays to the base image in the sense that, when displayed, they will overwrite the underlying portion (if any) of the base image. Images and graphics associated (attached to) with the base image may be positioned such that they are completely on the base image, are partially on the base image, or completely off (adjacent to) the base image.

5.3.2 Overlays and DLVL. The order in which images and graphics are "stacked" visually when displayed is determined by their display level (the DLVL field in the standard information type subheaders, specifically IDLVL for images and SDLVL for graphics), not by their relative position within the NITF file. The display level is a positive integer less than 1000. Every image and graphic segment in a NITF file shall have a unique display level. That is, no two segments may have the same display level. This requirement allows display appearance to be independent of data processing or file sequence order.

5.3.3 DLVL interpretation. The display level determines the display precedence of images and graphics within a NITF file when they are output to a display device. That is, at any pixel location shared by more than one image or graphic, the value displayed there is that determined from the segment with the highest numbered display level. Figure 8 illustrates a sample "output presentation" from a NITF file that illustrates the effects of display level assignment. The DLVL of each segment shown on figure 8 is indicated in the list of items on figure 8. In the case shown, the segment with display level one is not an image but rather an opaque CGM rectangle (graphic data, not image data). Because the Computer Graphics Metafile (CGM) rectangle is larger than the base image (which, in this case, serves as the first overlay because its display level is two), it provides a border to the image. Following increasing DLVL value, the border is overlaid by the image which, in turn, is overlaid by arrow one, which is, in turn, overlaid by the image inset, etc. The ALVL values in figure 8 refer to "Attachment Levels."

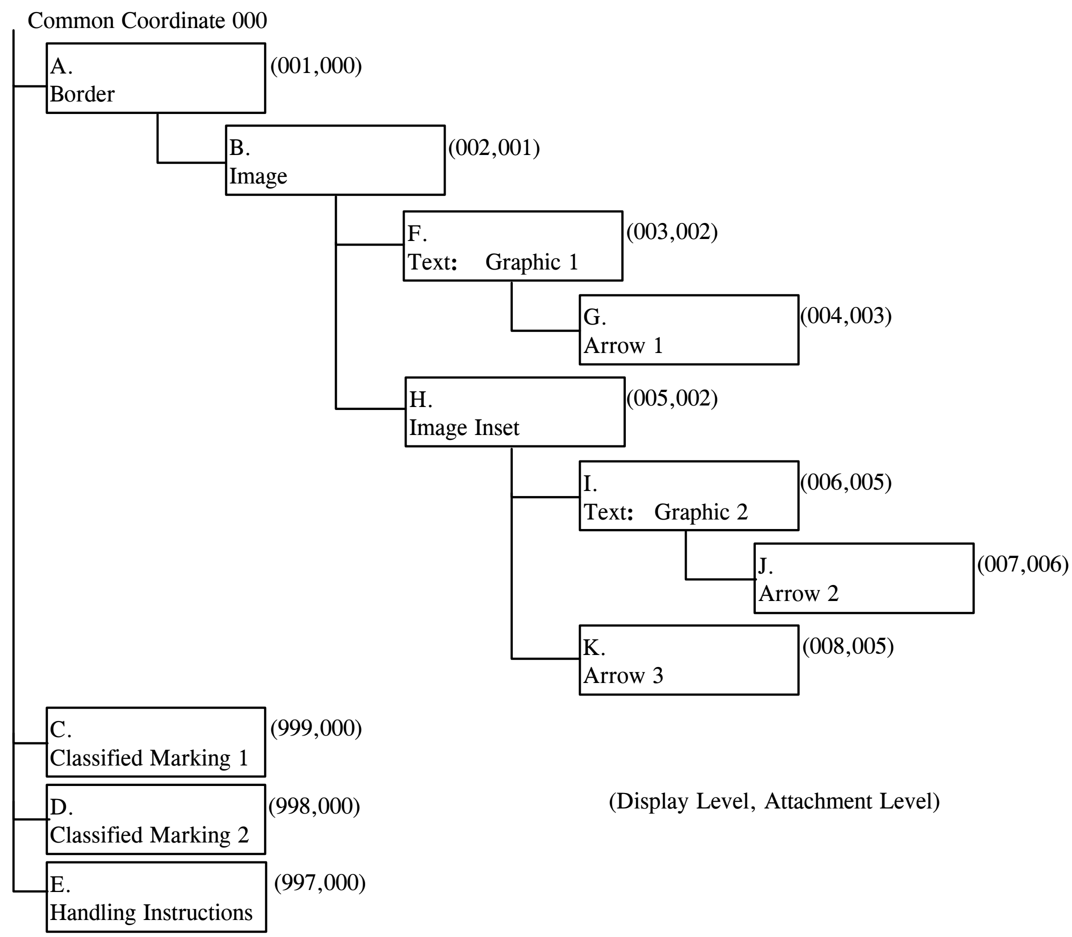


	DLVL	ALVL	Location Offsets Row	Column
A. Border (Opaque Box)	001	000	00000	00000
B. Image	002	001	00025	00025
C. Classified Marking 1	999	000	00370	00256
D. Classified Marking 2	998	000	00015	00256
E. Handling Instructions	997	000	00370	00040
F. Text: “Graphic 1	003	002	00060	00240
G. Arrow 1	004	003	00010	00040
H. Image Inset	005	002	00045	00525
I. Text: Graphic 2	006	005	00020	00050
J. Arrow 2	007	006	00010	00050
K. Arrow 3	008	005	00070	-0005

FIGURE 8. NITF display level illustration†.

† This example uses a CGM rectangle as a border for the NITF composition. This method may be incompatible with some printers. These printers do not allow for transparent pixels in imagery. If a NITF composition uses CGM elements under images with NITF image padding (transparent pixels) the CGM will not be visible in any areas under the pad pixels. (For work arounds see paragraph B.4.11.)

5.3.4 ALVL. ALVL provides a way to associate displayable segments (images and graphics) with one another so they may be treated together for certain operations such as moving them, rotating them, or displaying them as a group. The attachment level of a displayable segment shall be equal to the display level of the segment to which it is "attached." This value is stored in the "ALVL" field (specifically IALVL for images, SALVL for graphics) of the segment's subheader. An attachment level of zero shall be interpreted as "unattached." The segment having minimum display level shall have attachment level zero. Any other segment may also have ALVL zero, i.e., unattached. An overlay's display level shall always be numerically greater than its attachment level (that is, an overlay must be attached to something previously displayed or it is unattached). Figure 9 shows the attachment relationships of the overlays on figure 8. A segment with DLVL 1 (DLVL 001)(the minimum DLVL in this example), must have an ALVL of zero. When an overlay or base is edited (moved, deleted, rotated), all overlays attached to it, directly or indirectly, may be affected by the same operation. For example, on figure 9, if the image (DLVL 002, ALVL 001) were moved one centimeter to the left, the Text Graphic 1 (DLVL 003, ALVL 002) with its associated Arrow 1 (DLVL 004, ALVL 003), and the image inset (DLVL 005, ALVL 002) with its associated Arrow 3, (DLVL 008, ALVL 005), and the Text “Graphic 2” (DLVL 006, ALVL 005) with its associated Arrow 2 (DLVL 007, ALVL 006) all would also be moved one centimeter to the left. If the Image Inset were deleted, so would be its associated Arrow 3 and “Text Graphic 2” with Arrow 2. Although the ALVL provides the means to group or associate display items, the provision of user operations (such as moving, rotating, etc.) to act on or use ALVL information is an implementor’s choice.



A is a parent object with a single child B with 6 offspring, F, G, H, I, J, and K.
B is a parent object with 2 children F and H with 4 offspring, ~~F~~, G, I, J, and K.
C is childless
D is childless
E is childless
F is a parent object and has a single child G.
G is childless
H is a parent object and has 2 children I and K
I is a parent object and has a single child J
J is childless
K is childless

Figure 9. Attachment level relationships.

5.4 Image data.

5.4.1 General. For the NITF, the image data encompasses multispectral imagery and images intended to be displayed as monochrome (shades of grey), color-mapped, (pseudocolor), or true color and may include grid or matrix data intended to provide additional geographic or geo-referencing information.

5.4.1.1 Image category (ICAT). The specific category of an image segment reveals its intended use or the nature of its collector. The possible use of standard Support Data Extension (SDE) to provide geo-referencing data depends on both the intended use of the transmitted data and on its nature as described in table A-2.

5.4.1.2 Image representation (IREP). An image may include multiple data bands and color look-up tables (LUTs), the latter within its header fields. True color images (three band) may be specified to be interpreted using either the RGB (Red, Green, Blue) or the YCbCr601 (Y = Brightness of signal, Cb = Chrominance (blue), Cr = Chrominance (red)) color system. Grids or matrix data may include one, two or several bands of attribute values intended to provide additional geographic or geo-referencing information. The image representation must be consistent with the image category as shown in table A-2.

5.4.2 Image model. For the NITF, an image is a two-dimensional rectangular array of pixels indexed by row and column. A pixel is represented by an n-vector of sample values; where n corresponds to the number of bands comprising the image. The i^{th} entry of the pixel (vector) is the pixel value for the i^{th} band sample of the image. Therefore, the i^{th} band of the image is the rectangular array of i^{th} sample values from the pixel vectors. For an image I with R rows and C columns, the coordinates of the image pixel located in the c^{th} column of the r^{th} row shall be denoted by an ordered pair (r,c), $0 \le r < R, 0 \le c < C$, where the first number, r, indicates the row and the second number, c, indicates the column in the image array. This notation is standard for addressing arrays and matrices. The pixel located at (r,c) is denoted by I(r,c). For example, a typical 24-bit RGB image is an array of R rows and C columns, where each set of indices (r,c), $0 \le r < R, 0 \le c < C$, identifies a pixel I(r,c) consisting of three single byte values (a three-vector) corresponding to the red, green, and blue samples. The image has three bands, each consisting of a R-by-C array of single byte sample values. One band comprises the red, one band comprises the green, and the third band comprises the blue pixel sample values. Specifically, the value at position r,c in the green band, for example, contains the green byte from the pixel I(r,c) three-vector at position r,c in the image.

5.4.2.1 Display of NITF images. When an image with R rows and C columns is displayed, a mapping is accomplished from the stored image pixel value array I to a rectangular array S of physical picture elements, for example a Cathode Ray Tube (CRT) display. This mapping will be called the display mapping. Usually, the resulting display has an identified top, bottom, and left and right side. In a particular application, the display mapping may be defined explicitly. However, lacking this, an image stored in a NITF file shall be interpreted so that pixel I(0,0) is at the upper left corner, and pixel I(R-1,C-1) is at the lower right corner. The r^{th} row of the image array I shall form the r^{th} row of the display, counting from the top, $0 \le r < R$. Within the r^{th} row, the pixels shall appear beginning on the left with I(r,0) and proceeding from left to right with I(r,1), I(r,2), and so on, ending with I(r, C-1). Figure 10 illustrates the display mapping just described. This mapping of pixel values to physical picture elements is typical of non-interleaved raster pattern of picture elements. The relationship of the pixels I(r,c) in the array to up, down, left and right implicit in this diagram is used freely in later descriptions to simplify exposition.

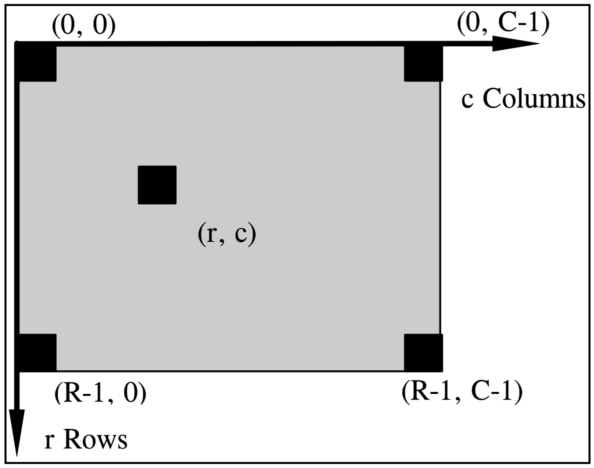


FIGURE 10. Image coordinate system.

5.4.2.2 Blocked images. The concept of blocked images extends the image model for NITF presented above to support the representation of an image in terms of an orderly set of subimages (or subarrays) called blocks For large images (e.g., those having more horizontal and vertical pixel values than typical display devices), the performance of an imagery implementation can be potentially improved by "blocking" the image; that is, ordering the pixel values in the NITF file as a series of concatenated pixel arrays.

a. The idea behind a blocked image is analogous to a rectangular tiled floor. Regard the overall floor cover as the image and each individual tile as a block. To make this more precise, let I be an image of R rows and C columns, and let the Number of Pixels Per Block Horizontal (NPPBH), (that is, the number of columns of each block) and the Number of Pixels Per Block Vertical (NPPBV), (that is, the number of rows in each block) be positive integers that satisfy NPPBH$\leq$C and NPPBV$\leq$R. If R is an integer multiple of NPPBV and C is an integer multiple of NPPBH, then I may be viewed as an array B of sub arrays each having NPPBV rows and NPPBH columns. These sub arrays $B_{r,c}$ are called blocks. The block $B_{r,c}$ is in the r^{th} row of blocks and the c^{th} column of blocks. The number of columns of blocks (Number of Blocks Per Row~~,~~ (NBPR)) is the integer [C/NPPBH]+1 and [C/NPPBH] if [C/NPPBH]=C/NPPBH, and the number of rows of blocks (Number of Blocks Per Column, (NBPC)) is the integer [R/NPPBV]+1 and [R/NPPBV], if [R/NPPBV]=R/NPPBV ([r]:=largest integer$\leq$r).

b. For recording purposes, the image blocks are ordered and indexed sequentially by rows, i.e. B(1,1) ... B(1,NBPR); B(2,1) ... B(2,NBPR); B(NBPC,1) ... B(NBPC,NBPR). The relation of image blocks to image rows and columns is depicted on figure 11 using the NITF display convention described in paragraph 5.4.2.1. Although the pixel values are placed in the file as a series of arrays (blocks), the coordinate used to reference any specific pixel remains the same as if the image were not blocked. For example, if R=C=2048 and NPPBV=NPPBH=1024, there will be four blocks in the image I. The second pixel value in B(1,2) has the coordinate I (0,1025) vice the internal index (0,1) of the subarray.

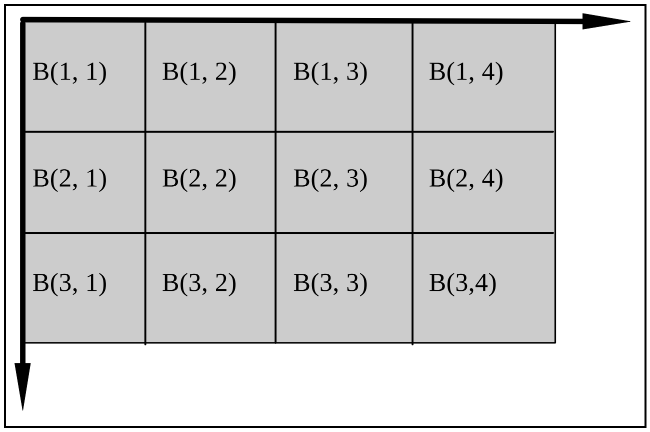


FIGURE 11. A blocked image.

c. If the number of rows in an image is not initially an integer multiple of NPPBV, or if the number of columns is not an integer multiple of NPPBH, an application that creates the blocked image construct in NITF shall "pad" the image to an appropriate number of rows and columns so the divisibility condition is met by adding rows to the bottom and/or columns to the right side of the image, as viewed. The result is that a blocked image may have a block(s) (subarray(s)) comprised of pixel values from the original image, and "pad" pixels inserted to meet block boundary conditions. See figure 12.

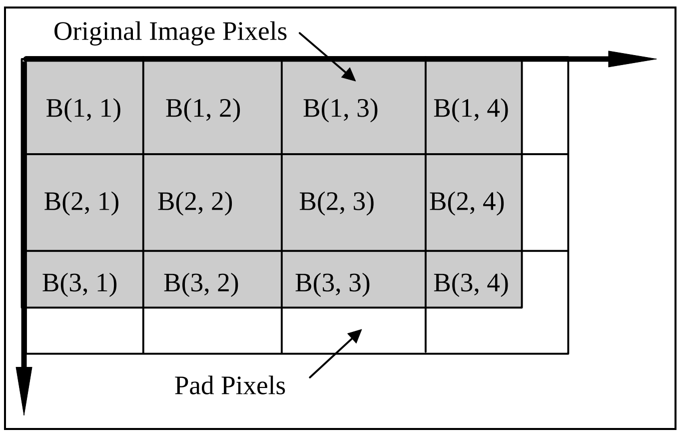


FIGURE 12. A blocked, padded image.

5.4.2.3 Blocked image masking. In some instances, a blocked image may have a considerable number of empty blocks (blocks without meaningful pixel values). This might occur when a rectangular image is not north aligned when scanned or otherwise sampled, but has been rotated to a north up orientation (see figure 13) resulting in the need to insert "pad" pixels to maintain the rectangular raster pattern of the pixel array. In this case, it is sometimes useful to not record or transmit empty blocks within a NITF file. However, if empty blocks are not recorded/transmitted, the image loses its logical structure as an image with n x m blocks. In order to retain logical structure, and to allow the exclusion of empty blocks, an image data mask table (see table A-3(A), field BMRnBNDm) identifies the location of non-empty blocks so that the using application can reconstruct the image correctly. In figure 13, the recording order would be B(1,1); B(1,2); B(1,3); B(2,1); B(2,2); B(2,3); B(2,4); B(3,1); B(3,2); B(3,3); B(3,4); B(4,2); B(4,3); B(4,4). Blocks B(1,4) and B(4,1) would not be recorded in the file. The blocked image mask would identify the locations of the recorded image blocks. If the image is band sequential (IMODE=S), there will be multiple blocked image masks (one for each image band), with each mask containing Number of Blocks Per Row (NBPR) x Number of Blocks Per Column (NBPC) records. Blocked image masks can be used in conjunction with a pad pixel mask (see table A-3(A), field TMRnBNDm), as described below. A blocked image mask may also be used to provide an index for random access within the blocked image data for large images even if all blocks are recorded in the file.

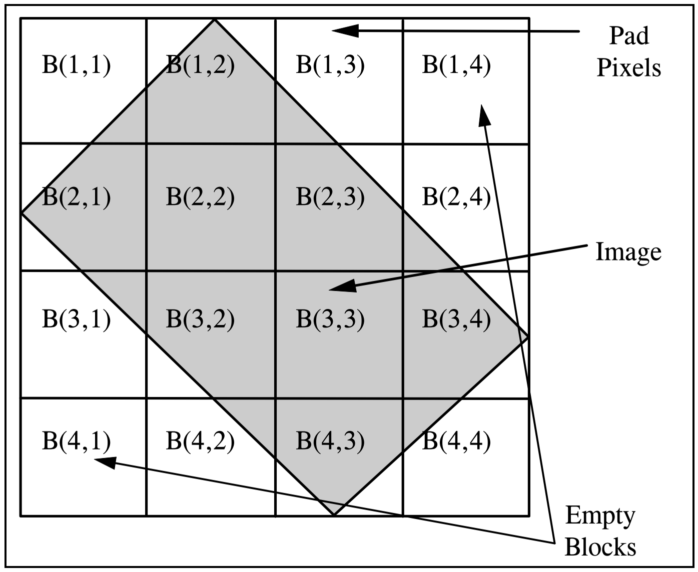


FIGURE 13. A blocked, padded image with empty blocks.

5.4.2.4 Pad pixel masking. In addition to empty image blocks, figure 13 also demonstrates that a significant number of pad pixels may be needed to "fill" an image to the nearest block boundary.

a. In the example in figure 12, the locations of B(1,1); B(1,2); B(1,3); B(2,1); B(2,3); B(2,4); B(3,1); B(3,2); B(3,4); B(4,2); B(4,3); and B(4,4) would be recorded indicating that those blocks have pad pixels. B(1,4); B(2,2); B(3,3), and B(4,1) do not have pad pixels because B(1,4) and B(4,1) are empty and B(2,2) and B(3,3) are full image blocks.

b. If the image is band sequential (IMODE=S), there will be pixel masks that will be arranged in the same order as the image bands, with each mask containing NBPR x NBPC records.

c. The output pixel code which represents pad pixels is identified within the image data mask by the Pad Output Pixel Code field (TPXCD). The length in bits of this code is identified in the Transparent Output Pixel Code Length field (TPXCDLNTH). Although this length is given in bits, the actual TPXCD value is stored in an integral number of bytes. When the number of bits used by the code is less than the number available in the TPXCD field (for example, a 12 bit code stored in two bytes), then the code will be justified in accordance with the PJUST field in the Image Subheader.

d. When an application identifies pad pixel values, it may replace them with a user defined value (for example, a light blue background) at the time of presentation except when the value of TPXCD is zero (0). When the TPXCD value is zero, the pad pixel will be treated as “Transparent” for presentation. The application may choose to ignore pad pixels in histogram generation. In any case, pad pixels are not valid data, and should not be used for interpretation or exploitation. Consequently, the value used for pad pixels shall not appear within the bounds of significant pixels of the image.

5.4.3 NITF image information. In the NITF, the information describing an image is represented in a series of adjacent fields grouped into the image subheader followed by the image data. The field containing the image data is called the image data field. The image data field shall follow immediately the last field of the corresponding image subheader with no intervening special characters to designate the beginning of the image data field. Similarly, the image subheader of the first image shall follow immediately the last byte of data of the last field in the NITF file header, and the image subheader of successive images shall follow immediately the last byte of the image data field of the preceding image.

5.4.3.1 Image subheader. The data in the image subheader fields are BCS character data (except for LUTs). They provide information about the image source, its identification, and characteristics needed to display and interpret it properly. The image subheader field definitions are detailed in table A-3.

5.4.3.2 Image data mask. The image data mask table is a conditional data structure included in the image data stream for masked images when so indicated by the Image Compression field value (IC values NM, M1, M3, M4 and M5). The image data mask table is not recorded for non-masked images (IC values NC, C1, C3, C4 and C5). The image data field of a masked image is identical to that of non-masked images except for the following: the first byte of the image data is offset from the beginning of the image data field by the length of the image data mask table(s); and empty image blocks are not recorded/transmitted in the image data area. If the image is band sequential (IMODE=S), there will be multiple blocked image and/or pad pixel masks (one for each band). All blocked image masks will be recorded first, followed by all pad pixel masks. Since the image data mask tables are in the image data area, the data recorded/transmitted there are binary. The structure of the image data mask table is defined in detail in table A-3(A).

5.4.3.3 Image data format. Image data may be stored in a NITF file in either uncompressed or compressed form.

5.4.3.3.1 Uncompressed image data format. The order in which pixel values of a single band image are stored is fixed. When an image has more than one band, several options are available for the order in which pixel values are stored. The option used is indicated by the IMODE field in the image subheader. The following subparagraphs describe the possibilities within this format. In describing the encoding of image data, the NITF display convention is invoked freely for ease of expression. Let the image to be encoded be denoted by I, and assume I has R rows and C columns. Let I have n bands; that is, each pixel is an n-vector, the i^{th} value of which is the value for that pixel location of the i^{th} band of the image. Let N denote the number of bits-per-pixel-per-band. Thus, there are n*N bits-per-pixel. Let I be blocked with H blocks per row and V blocks per column. Note that special cases such as single band images and single blocked images are included in this general image by setting n=1, and H=V=1, respectively.

5.4.3.3.1.1 Single band image uncompressed data format. For single band images, n=1, and there is only one order for storing pixels. The field IMODE in the image subheader shall be set to B for this case. The blocks (one or more) shall be stored, one after the other starting with the upper left block and proceeding first left to right across rows of blocks, one row of blocks after the other, top to bottom. Image data within each block shall be encoded as one continuous bit stream, one pixel value after another, beginning with the N bits of the upper left corner pixel, I(0,0), followed by the N bits of I(0,1) and so on until all pixels from the first row in the block are encoded. These shall be followed immediately by the N bits of data for pixel I(1,0) continuing from left to right along each row, one row after another from the top of the block to the bottom. The last byte of each block's data is zero-filled to the next byte boundary, but all other byte boundaries within the block are ignored. See the field PVTYPE description in table A-3 for the specification of the bit representation of pixel values.

5.4.3.3.1.2 Multiple band image uncompressed data format. For multiple band images, there are four orders for storing pixels.

5.4.3.3.1.2.1 Band sequential. The first case is "band sequential", in which each band is stored contiguously, starting with the first band, one after the other, until the last band is stored. Within each band the data shall be encoded as if it were a single band image with one or more blocks (see paragraph 5.4.3.3.1.1). The field IMODE in the image subheader shall be set to S for this case. This case is only valid for images with multiple blocks and multiple bands. (For single blocked images, this case collapses to the “band interleaved by block” case where IMODE is set to B.)

5.4.3.3.1.2.2 Band interleaved by pixel. The ordering mechanism for this case stores the pixels in a block sequential order in which each block is stored contiguously, starting with the upper left block and proceeding first left to right across rows of blocks, one row of blocks after the other, top to bottom. For "band interleaved by pixel" the n*N bits of the entire pixel vector are stored pixel-by-pixel in the same left to right, top to bottom pixel order as described in paragraph 5.4.3.3.1.1. The n*N bits for a single pixel are stored successively in this order: the N bits of the first band followed by the N bits of the second band and, so forth, ending with the N bits of the last band. Each block shall be zero-filled to the byte boundary. The field IMODE in the image subheader shall be set to P for this storage option. See the field PVTYPE description in table A-3 for the specification of the bit representation of pixel values for each band.

5.4.3.3.1.2.3 Band interleaved by block. The ordering mechanism for this case stores the pixels in a block sequential order where each block is stored contiguously, starting with upper left block and proceeding first left to right across rows of blocks, one row of blocks after the other, top to bottom. For "band interleaved by block" the data from each block is stored starting with the first band, one after the other until the last band is stored. Each block shall be zero-filled to the next byte boundary. The field IMODE in the image subheader shall be set to B for this storage option. See the field PVTYPE description in table A-3 for the specification of the bit representation of pixel values for each band.

5.4.3.3.1.2.4 Band interleaved by row. The ordering mechanism for this case stores the pixel values of each band in row sequential order. Within each block, all pixel values of the first row of the first band are followed by pixel value of the first row of the second band continuing until all values of the first row are stored. The remaining rows are stored in a similar fashion until the last row of values has been stored. The field IMODE shall be set to R for this option.

5.4.3.3.2 Compressed image data format. The format of the image data after compression is provided with the description of the NITFS image compression algorithms in ITU-T T.4 (1993.03), AMD2 08/95, ISO/IEC 10918-1, and NIMA-N0106-97, NITFS Bandwidth Compression Standards and Guidelines Document. Also found in these references are the conditions the data must meet before a given compression method can be applied meaningfully.

5.4.3.4 Grey scale look-up tables (LUT). The grey scale to be used in displaying each pixel of a grey scale image is determined using the image's LUT, if present. A LUT for a grey scale image when present, shall comprise a one byte entry for each integer (the entry's index) in the range 0 to NELUTnn-1. The bytes of the LUT shall appear in the file one after the other without separation. The entries shall occur in the index order, the first entry corresponding to index 0, the second to index 1 and so on, the last corresponding to index NELUTnn-1. The display shade for a pixel in the image shall be determined by using the image pixel value as an index into the LUT. The LUT value shall correspond to the display grey shade in a way specific to the display device. NELUTnn shall be equal to or greater than the maximum pixel value in the image to ensure that all image pixels are mapped to the display device.

5.4.3.5 Color look-up tables (LUT). Color images are represented using the RGB color system notation. For color images, each LUT entry shall be composed of the output color components red, green, and blue, appearing in the file in that order. There shall be a LUT entry for each pixel value in a particular band of a NITF image (the entries index of the LUT will range from 0 to NELUTnn-1). The LUT entries shall appear in the file in increasing index order beginning with index 0. The display color of an image pixel shall be determined by using the pixel value as an index into each LUT (red, green, blue). The corresponding values for red, green, and blue shall determine the displayed color in a manner specific to the display device. The color component values may be any of the 256 pixel values associated with the band. The presence of color LUTs is optional for 24 bit per pixel (true color) images. Pseudo-color (e.g. 8-bit per pixel color images) shall contain a LUT to correlate each pixel value with a designated true color value.

5.5 Graphic data. Graphic data is used in the NITF to store ~~a~~ two-dimensional information represented as a CGM. Each graphic segment consists of a graphic subheader and data field**s**. A graphic may be black and white, grey scale, or color. Examples of graphics are circles, ellipses, rectangles, arrows, lines, triangles, logos, unit designators, object designators (ships, aircraft), text, and special characters. A graphic is stored as a distinct unit in the NITF file allowing it to be manipulated and displayed nondestructively relative to the images, and other graphics in the file. This standard does not preclude the use of n-dimensional graphics when future standards are developed.

5.5.1 Graphic subheader. The graphic subheader is used to identify and supply the information necessary to display the graphic data as intended by the file builder. The format for a graphic subheader is detailed in table A-5.

5.5.2 Graphic data format. The graphic format is CGM as described in ISO/IEC 8632-1: Information Technology - Computer Graphics Metafile for Storage and Transfer of Picture Description, 1992. The precise tailoring of the CGM standard to NITF is found in MIL-STD-2301.

5.5.2.1 CGM graphic bounding box. CGM graphic placement is defined by the SLOC (graphic location) field and the CGM graphic extent is given by the SBND1 (graphic bound 1) and SBND2 (graphic bound 2) fields. SLOC defines the origin for the CGM coordinate system. The area covered by the CGM graphic is defined by a bounding box. The bounding box is the smallest rectangle that could be placed around the entire CGM graphic. The first bounding box coordinate (SBND1) is the upper left corner of the rectangle. The second bounding box coordinate (SBND2) is the lower right corner of the rectangle. SBND1 and SBND2 are values in the coordinate system defined by the attachment level. For attachment level 0, this would be the common coordinate system. The SBND1 and SBND2 values are calculated by adding SLOC to the coordinate values for the bounding box (upper left and lower right) corners as given in the CGM graphic coordinate system.

5.6 Text data. The text data segment is used to store unformatted text.

5.6.1 Representation of textual information. The NITF uses two different categories of textual character representations, BCS and Universal Multiple-Octet Coded Character Set (UCS), which constrain the use of characters in the data field of the text segment.

5.6.1.1 BCS. Specified in paragraph 5.1.7.1.

5.6.1.2 UCS. The UCS is used for expressing text in many languages of the world as defined by ISO 10646-1.

5.6.2 TXTFMT field use. The TXTFMT field contains a three character code which indicates the type or format of text data contained in the text data segment. The allowable field values are STA, MTF, UC2, or UT1.

5.6.2.1 Standard (STA). STA designates BCS character codes. Any BCS code may be used in the text data segment when STA is indicated in the TXTFMT field. All lines within a NITF ASCII file shall be separated by carriage return/line feed pairs. A carriage return followed by a line feed shall be used to delimit lines in the text where the first character from the next line immediately follows the ASCII line feed character.

5.6.2.2 Message Text Format (MTF). MTF indicates that the text data segment contains BCS characters formatted according to MIL-STD-6040.

5.6.2.3 UC2. As described in ISO 10646-1, UC2 indicates 2-octet coded UCS characters that are sometimes called unicode.

5.6.2.4 UT1. As described in ISO 4873, UT1 indicates 1-octet coded UCS characters, Basic Latin and Latin Supplement 1.

5.7 Future expansion. Future expansion of the NITF is supported in two ways: (1) built-in mechanisms and procedures to allow inclusion of user-determined and user-defined data characteristics and types of data without changing this standard, (but configuration managed through a central “registry”), and (2) a collection of data fields called Data Extension Segments and Reserved Extension Segments providing space within the file structure for adding entirely unspecified future capabilities to this standard. Addition of further data characteristics beyond those specified in this standard is accomplished using the User Defined Data (UDHD and UDID), Extended Header Data (XHD), and Extended Subheader Data (IXSHD, SXSHD, and TXSHD) fields. Use of these fields is described in paragraph 5.7.2.1. Addition of new types of data items is accomplished using Data Extension Segments defined in paragraph 5.7.1.4. Extensions of all types may be incorporated into the file while maintaining backward compatibility since the byte count mechanisms provided allow applications developed prior to the addition of newly defined data to skip over extension fields they are not designed to interpret.

5.7.1 Tagged record extensions (TRE). There are two varieties of TREs: registered extensions and controlled extensions (CEs). Figure 14 illustrates the concepts and formatting descriptions in paragraphs 5.7.1.1 and 5.7.1.2. A current listing of the tagged record extensions that have been registered with NIMA is provided in the Tag Registry maintained by the JITC.

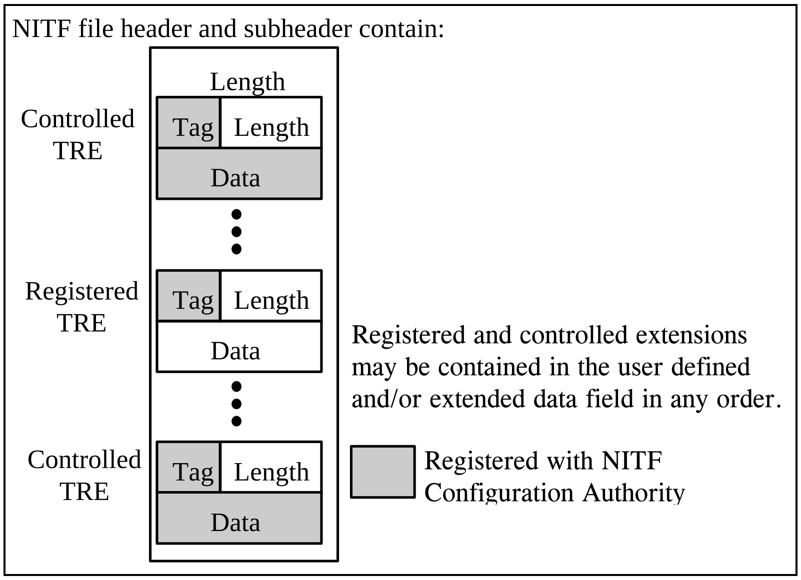


FIGURE 14. Data extension format.

5.7.1.1 Registered extensions. Each registered tagged record extension consists of three required fields. These fields are defined in table A-7. These extensions are user-defined. The six character RETAG field and the purpose and name of the tag shall be registered with the NIMA. The purpose of registering the tags is to avoid having two users use the same tag to represent different extensions.

5.7.1.2 Controlled extensions. These extensions are defined and submitted to the NIMA for approval by the ISMC and, once accepted are subject to configuration management by the NTB. They are documented in a series of documents maintained by the JITC. The tagged record format for controlled extensions is identical to that for registered extensions (detailed in table A-7) except that the first two letters of each field identifier change from "RE" to "CE." The six character CETAG field and the structure of the CEDATA data field shall be registered and configuration controlled.

5.7.1.3 Placement of extensions. A sequence of registered and/or controlled TREs may appear in either (or both) of the User Defined Header Data and Extended Header Data (EHD) fields (UDHD and/or XHD) of the NITF file header. TREs may also appear in either (or both) of the User Defined Subheader and Extended Subheader Data fields (UDID, IXSHD, SHSHD, TXSHD) for any standard data segment in the file. When the TRE carries data that is associated with the file as a whole, it shall appear in the file header. If the TRE carries data associated with a standard data segment in the file, it shall appear in the subheader of that specific data segment.

5.7.1.4 Extension overflow. TREs may appear in a “TRE_OVERFLOW” DES (see paragraph 5.7.2.2) when sufficient space is not available in the appropriate header or subheader fields. Where ever an individual TRE is placed, it must be placed in its entirety. When a TRE is too large to fit within the remaining field length of the associated header or subheader, the entire TRE shall be placed in the “TRE_OVERFLOW” DES associated with the header or subheader to which the TRE applies. A TRE shall not be split between placement locations.

5.7.2 DES structure. The NITF header accommodates up to 999 DESs. Each DES shall consist of a DES Subheader and DES data fields (similar to the way a standard data segment has a subheader and an adjacent associated data field). Within the Data Extension Segment group in the NITF Header are found the number of DES in the file, the length (size) of each DES subheader, and the length (size) of the DES data field. The field size specifications in the NITF File Header allow each DES to be just less than one gigabyte in length. The DES Subheader is detailed in table A-8. The structure provided in the DES by the fields DESSHL, DESSHF, and DESDATA is intended to encourage the formation of a DES along the lines of the standard information types in the NITF, in which a group of BCS fields describing the data is followed by the data itself. Figure 15 shows the DES format.

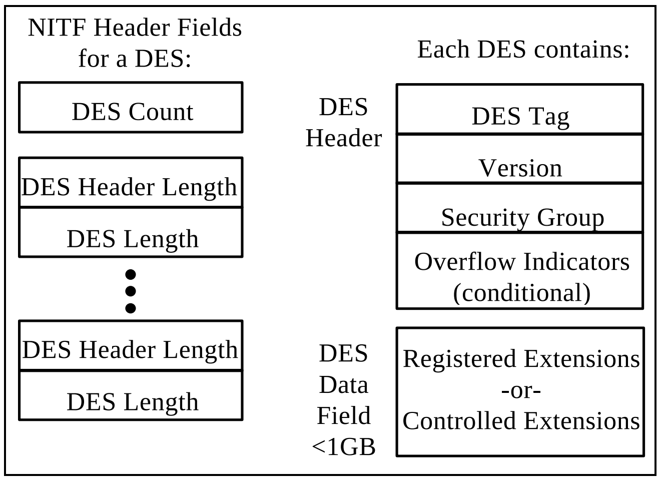


FIGURE 15. Data extension segment format.

5.7.2.1 Use of DESs. TREs allow the incorporation of data products in a NITF file to be disseminated along with an image. For example, Digital Terrain Elevation Data (DTED), Digital Feature Analysis Data (DFAD), or other geo-referenced products could be distributed along with an image product to support analysis and interpretation of the image. Audio and video segments are additional examples of data that may be added to the NITF through the use of Data Extension Segments.

5.7.2.2 Overflow DES. The DES type identifier "TRE_OVERFLOW" (without quotes) shall be used to identify a DES used to contain a series of TREs which "overflow" from the NITF file header or one of the subheaders. The specific header or subheader overflowed is designated by the DESOFLW and DESITEM field contents.

5.7.3 RESs. Structure is provided in the NITF file header to support up to 999 distinct reserved extension segments to support up to 9999999 bytes plus a corresponding subheader of up to 9999 bytes for each subheader extension. The combination of each subheader and corresponding data field is called a Reserved Extension Segment. These fields are reserved and configuration managed in the same manner as registered and controlled tagged record extensions, reference paragraph 5.7.1. Upon receipt of a file that contains a RES(s) an NITF compliant implementation shall at least ignore the RES(s) and properly interpret the other legal components of the NITF file. See the definition of the field NUMRES, and the fields that follow it (LRESHmnn and LREnn) in table A-1. The RES subheader is detailed in table A-9.

6. NOTES

(This section contains information of a general or explanatory nature which may be helpful, but is not mandatory.)

6.1 Example NITF file.

6.1.1 Use of NITF. Though the NITF was conceived initially to support the transmission of a file composed of a single base image, image insets (subimage overlays), graphic overlays, and text, its current form makes it suitable for a wide variety of file exchange needs. One of the flexible features of the NITF is that it allows several items of each data type to be included in one file, yet any of the data types may be omitted. Thus, for example, the NITF may equally well be used for the storage of a single portion of text, a single image or a complex composition of several images, graphics, and text. The following section discusses an example NITF file of moderate complexity.

6.1.2 Example file. Table IV shows the contents of the fields in the header of an example NITF file composed of two base image segments (one base image, one inset image), five graphic overlays segments, and five text segments. Figure 16 shows part of the sample file as a composite image with its overlay graphics. In an NITF file, the data for each data item is preceded by the item's subheader. The subheader for a data type is omitted if no items of that type are included in the file. Subheader field contents for items in the sample file are shown in tables I through IX.

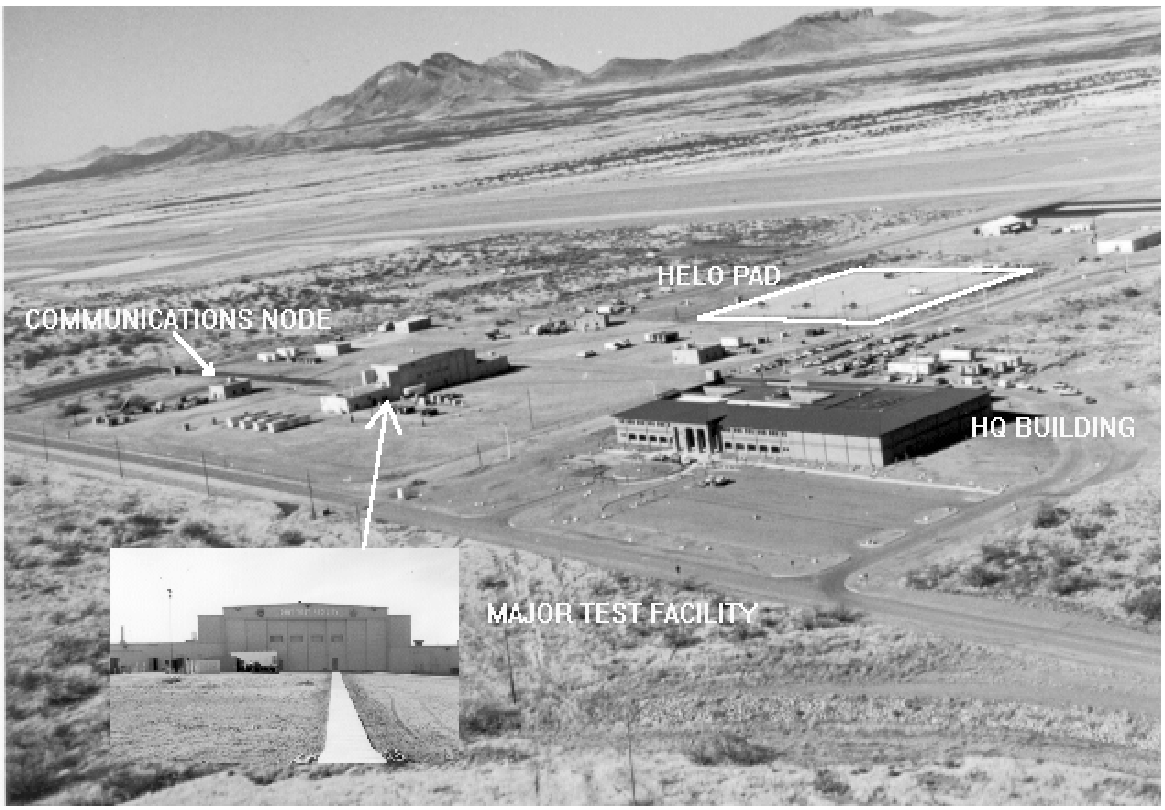


FIGURE 16. Sample file composite image.

TABLE I. Example NITF file header.

NITF HEADER FIELD	FORMAT	COMMENT
File Type & Version (FHDR)	NITF02.10	9 characters
Complexity Level (CLEVEL)	05	2 characters -- images less than or equal to 8k x 8k
System Type (STYPE)	BF01	4 characters
Originating Station ID (OSTAID)	U21SOO90	8 characters with 2 spaces
File Date & Time (FDT)	19960930224632	14 characters

TABLE I. Example NITF file header - Continued..

NITF HEADER FIELD	FORMAT	COMMENT
File Title (FTITLE)	MAJOR TEST FACILITY	19 characters followed by 61 spaces - 80 characters
File Security Classification (FSCLAS)	U	1 character
File Classification Security System (FSCLSY)		2 Spaces
File Codewords (FSCODE)		11 Spaces
File Control and Handling (FSCTLH)		2 Spaces
File Releasing Instructions (FSREL)		20 Spaces
File Declassification Type (FSDCTP)		2 Spaces
File Declassification Date (FSDCDT)		8 Spaces
File Declassification Exemption (FSDCXM)		4 Spaces
File Downgrade (FSDG)		1 Space
File Downgrade Date (FSDGDT)		8 Spaces
File Classification Text (FSCLTX)		43 Spaces
File Classification Authority Type (FSCLTP)		1 Space
File Classification Authority (FSCAUT)		40 Spaces
File Classification Reason (FSCRSN)		1 Space
File Security Source Date (FSSRDT)		8 Spaces
File Security Control Number (FSCTLN)		15 Spaces
File Copy Number (FSCOP)		5 digits
File Number of Copies (FSCPYS)		5 digits
Encryption (ENCRYP)	0	Required default no encryption
Originator's Name (ONAME)	D. Rajan	8 characters followed by 16 spaces - 24 characters
File Background Color (FBKGC)	0x000000	3 bytes
Originator's Phone Number (OPHONE)	44 1480 84 5611	15 characters followed by 3 spaces - 18 characters
File Length (FL)	000002905629	12 digits
NITF File Header Length (HL)	000515	6 digits
Number of Images (NUMI)	002	3 digits

TABLE I. Example NITF file header - Continued..

NITF HEADER FIELD	FORMAT	COMMENT
Length of 1st Image Subheader (LISH001)	000679	6 digits
Length of 1st Image (LI001)	0002730600	10 digits
Length of 2nd Image Subheader (LISH002)	000439	6 digits
Length of 2nd Image (LI002)	0000089600	10 digits
Number of Graphics (NUMS)	005	3 digits
Length of 1st Graphic Subheader (LSSH001)	0258	4 digits
Length of 1st Graphic (LS001)	000122	6 digits
Length of 2nd Graphic Subheader (LSSH002)	0258	4 digits
Length of 2nd Graphic (LS002)	000122	6 digits
Length of 3rd Graphic Subheader (LSSH003)	0258	4 digits
Length of 3rd Graphic (LS003)	000150	6 digits
Length of 4th Graphic Subheader (LSSH004)	0258	4 digits
Length of 4th Graphic (LS004)	000112	6 digits
Length of 5th Graphic Subheader (LSSH005)	0258	4 digits
Length of 5th Graphic (LS005)	000116	6 digits
Reserved for future use (NUMX)	000	3 digits
Number of Text Files (NUMT)	005	3 digits
Length of 1st Text Subheader (LTSH001)	0282	4 digits
Length of 1st Text File (LT001)	20000	5 digits
Length of 2nd Text Subheader (LTSH002)	0282	4 digits
Length of 2nd Text File (LT002)	20000	5 digits
Length of 3rd Text Subheader (LTSH003)	0282	4 digits
Length of 3rd Text File (LT003)	20000	5 digits
Length of 4th Text Subheader (LTSH004)	0282	4 digits
Length of 4th Text File (LT004)	20000	5 digits

TABLE I. Example NITF file header - Continued..

NITF HEADER FIELD	FORMAT	COMMENT
Length of 5th Text Subheader (LTSH005)	0282	4 digits
Length of 5th Text File (LT005)	20000	5 digits
Number of Data Extension Segments (NUMDES)	000	3 digits
Number of Reserved Data Extension Segments (NUMRES)	000	3 digits
User Defined Header Data Length(UDHDL)	00000	5 digits
Extended Header Data Header Length (XHDL)	00000	5 digits

6.1.2.1 Explanation of the file header. The File Type and Version, NITF02.10, is listed first. The next field contains the file's Complexity Level, in this case 04. A four character reserved field for the System Type, defaulted to blanks, appears next. An identification code containing ten characters for the station originating the primary information in the file is given next. The file origination date and time follow this and are given in Coordinated Universal Time (UTC) time format. This is followed by the File Title field containing up to 80 characters of free form text. The title of the sample file contains less than 80 characters, and therefore, the remainder of the field is padded with blanks. File Encryption follows and is given a "0" indicating that the file is not encrypted. After this a number of security-related fields occur. The File Security Classification security field is first, is mandatory, and contains one character. The remaining fields - File Security Classification System, File Codewords, File Control and Handling, File Releasing Instructions, File Declassification Type, File Declassification Date, File Declassification Exemption, File Downgrade, File Downgrade Date, File Classification Text, File Classification Authority Type, File Classification Reason, File Security Source Date, and File Security Control Number - shall be filled in if the file is classified in accordance with existing security directives. Which fields are actually populated will depend on the security system used and the security parameters which apply to the specific file. Some unclassified files may also require an entry in File Control and Handling (e.g. PROPIN, FOUO) In the example above, the file is unclassified and no handling caveats apply, so all following security-related fields are blank. The originator's name and phone number are given next. These fields may be left blank. Then the length in bytes of the entire file is given, including all headers, subheaders, and data. This is followed by the length in bytes of the NITF file header. The Number of Images field contains the characters 002 to indicate two images are included in the file. This is followed by six characters to specify the length of the first image subheader, then ten characters for the length of the first image. The length of the second image subheader and the length of the second image follow. The next item in the file header is the Number of Graphics, which contains 005 to indicate that five graphics are present in the file. The next ten characters contain the Length of Graphic Subheader and Length of Graphic (four and six characters respectively) for the first through fifth graphic, one after the other. The field, Number of Text Files, is given as 005 and is followed by four characters specifying the length of the text subheader and five characters specifying the number of characters in the text segment for each of the five text segments. The Number of Data Extension Segments and Number of Reserved Extension Segments fields are given as "000." This completes the "road map" for separating the data subheaders from the actual data to follow. The next two fields in the header are the User Defined Header Data Length and the User Defined Header Data. User defined data could be used to include registered tagged record extensions that provide additional information about the file. In this example, however, the length of the user defined header data is given as zero; therefore, the User Defined Header Data Field is omitted. The last field in the header are the Extended Header Data Length. The length of the extended header is given as zero; therefore, the Extended Header Data field is omitted, indicating that no controlled tagged record extensions are included in the file header.

6.1.2.2 Explanation of the image subheaders.

TABLE II. Example of the first image subheader.

NITF IMAGE SUBHEADER FIELD	FORMAT	COMMENT
File Part Type (IM)	IM	2 characters
Image ID (IID1)	0000000001	10 characters
Image Date & Time (IDATIM)	19960825203147	14 characters
Target ID (TGTID)		17 spaces
Image Title (IID2)	1996238CY02123456 78ABCD25AUG1995 2031~~bbb~~F	40 characters followed by 40 spaces - 80 characters total
Image Security Classification (ISCLAS)	U	1 character
Image Classification Security System (ISCLSY)		2 Spaces
Image Codewords (ISCODE)		11 Spaces
Image Control and Handling (ISCTLH)		2 Spaces
Image Releasing Instructions (ISREL)		20 Spaces
Image Declassification Type (ISDCTP)		2 Spaces
Image Declassification Date (ISDCDT)		8 Spaces
Image Declassification Exemption (ISDCXM)		4 Spaces
Image Downgrade (ISDG)		1 Space
Image Downgrade Date (ISDGDT)		8 Spaces
Image Classification Text (ISCLTX)		43 Spaces
Image Classification Authority Type (ISCLTP)		1 Space
Image Classification Authority (ISCAUT)		40 Spaces
Image Classification Reason (ISCRSN)		1 Space
Image Security Source Date (ISSRDT)		8 Spaces
Image Security Control Number (ISCTLN)		15 Spaces
Encryption (ENCRYP)	0	Required default
Image Source (ISORCE)	Hand-held digital camera model XYZ.	35 characters followed by 7 spaces - 42 total characters

TABLE II. Example of the first image subheader - Continued.

NITF IMAGE SUBHEADER FIELD	FORMAT	COMMENT
Number of Significant Rows in image (NROWS)	00001332	8 characters
Number of Significant Columns in image (NCOLS)	00002050	8 characters
Pixel Value Type (PVTYPE)	INT	3 characters - interpret pixel values as integers
Image Representation (IREP)	MONO	4 characters followed by 4 spaces - greyscale imagery
Image Category (ICAT)	VIS	3 characters followed by 5 spaces - visible imagery
Actual Bits-Per-Pixel Per Band (ABPP)	08	2 digits
Pixel Justification (PJUST)	R	1 character
Image Coordinate System (ICORDS)		Space - indicates no geo-location coordinates
Number of Image Comments (NICOM)	3	1 digit
† Image Comment 1 (ICOM1)	This is a comment on Major Test Facility base and associated inset. This file w	80 total characters
† Image Comment 2 (ICOM2)	as developed at Fort Huachuca, Arizona. It shows the Joint Interoperability Tes	80 total characters
† Image Comment 3 (ICOM3)	t Command Building and associated range areas.	46 characters followed by 34 spaces - 80 total characters
Image Compression (IC)	NC	2 characters - indicates no compression
Number of Bands (NBANDS)	1	1 digit
1st Band Representation (IREPBAND1)		2 spaces
1st Band Significance for Image Category (ISUBCAT1)		6 spaces
1st Band Image Filter Condition (IFC1)	N	1 character - required default value
1st Band Standard Image Filter Code (IMFLT1)		3 spaces - reserved
1st Band Number of LUTS (NLUTS1)	0	1 character

TABLE II. Example of the first image subheader - Continued.

NITF IMAGE SUBHEADER FIELD	FORMAT	COMMENT
Image Sync Code (ISYNC)	0	1 digit
Image Mode (IMODE)	B	1 character - B required for 1 band
Number of Blocks per Row (NBPR)	0001	4 digits
Number of Blocks per Column (NBPC)	0001	4 digits
Number of pixels Per Block Horizontal (NPPBH)	2050	4 digits
Number of pixels Per Block Vertical (NPPBV)	1332	4 digits
Number of Bits per Pixel (NBPP)	08	2 digits
Display Level (IDLVL)	001	3 characters - minimum value makes this base image
Attachment Level (IALVL)	000	Required 3 digit value since minimum display level.
Image Location (ILOC)	0000000000	10 characters upper left pixel located at origin of common coordinate system
Image magnification (IMAG)	1.0	3 character followed by a space - 4 characters total
User Defined Image Data Length (UDIDL)	00000	5 digits
Extended Subheader Data Length (IXSHDL)	00000	5 digits

† According to the standard - this should look like a single contiguous comment of up to 3 x 80 characters.

6.1.2.2.1 Explanation of the first image subheader. There are two images in this sample file. The first image has DVLV 001. Its subheader is shown in table IV. It is an unclassified, single band, single block, grey scale image with 8 bits per pixel and does not have an associated LUT. There are three associated comments. It is visible imagery, does not have geo-location data and is stored as an uncompressed image. It is located at the origin of the common coordinate system within which all the displayable file components are located. It is 1332 rows by 2050 columns. Figure 16 illustrates the image printed at approximately three hundred pixels per inch.

TABLE III. Example of the second image subheader.

NITF IMAGE SUBHEADER FIELD	FORMAT	COMMENT
File Part Type (IM)	IM	2 characters
Image ID (IID1)	Missing ID	10 characters
Image Date & Time (IDATIM)	19960927011729	14 characters
Target ID (TGTID)		17 spaces
Image Title (IID2)	1996271cy0212345678 ABCD27SEP19962056 ~~bbb~~F	40 characters followed by 40 spaces - 80 characters total
Image Security Classification (ISCLAS)	U	1 character
Image Classification Security System (ISCLSY)		2 Spaces
Image Codewords (ISCODE)		11 Spaces
Image Control and Handling (ISCTLH)		2 Spaces
Image Releasing Instructions (ISREL)		20 Spaces
Image Declassification Type (ISDCTP)		2 Spaces
Image Declassification Date (ISDCDT)		8 Spaces
Image Declassification Exemption (ISDCXM)		4 Spaces
Image Downgrade (ISDG)		1 Space
Image Downgrade Date (ISDGDT)		8 Spaces
Image Classification Text (ISCLTX)		43 Spaces
Image Classification Authority Type (ISCLTP)		1 Space
Image Classification Authority (ISCAUT)		40 Spaces
Image Classification Reason (ISCRSN)		1 Space
Image Security Source Date (ISSRDT)		8 Spaces
Image Security Control Number (ISCTLN)		15 Spaces
Encryption (ENCRYP)	0	Required default
Image Source (ISORCE)	Cut of original image.	22 characters followed by 20 spaces - 42 characters total
Number of Significant Rows in image (NROWS)	00000224	8 characters

TABLE III. Example of the second image subheader - Continued.

NITF IMAGE SUBHEADER FIELD	FORMAT	COMMENT
Number of Significant Columns in image (NCOLS)	00000400	8 characters
Pixel value type (PVTYPE)	INT	3 characters - interpret pixel values as integers
Image Representation (IREP)	MONO	4 characters followed by 4 spaces - grey scale imagery
Image Category (ICAT)	VIS	3 characters followed by 5 spaces - visible imagery
Actual Bits-Per-Pixel Per Band (ABPP)	08	2 digits
Pixel Justification (PJUST)	R	1 character
Image Coordinate System (ICORDS)		Space - indicates no geo-location coordinates
Number of Image Comments (NICOM)	0	1 digit
Image Compression (IC)	NC	2 characters - indicates uncompressed
Number of Bands (NBANDS)	1	1 digit
1st Band Representation (IREPBAND1)		2 spaces
1st Band Significance (ISUBCAT1)		6 spaces
1st Band Image Filter Condition (IFC1)	N	1 character - required default value
1st Band Standard Image Filter Code (IMFLT1)		3 spaces - reserved
1st Band Number of LUTS (NLUTS1)	0	1 character
Image Sync Code (ISYNC)	0	1 digit
Image Mode (IMODE)	B	1 character - B required for 1 band
Number of Blocks per Row (NBPR)	0001	4 digits
Number of Blocks per Column (NBPC)	0001	4 digits
Number of pixels Per Block Horizontal (NPPBH)	0400	4 digits
Number of pixels Per Block Vertical (NPPBV)	0224	4 digits
Number Bits Per Pixel (NBPP)	08	2 digits
Display Level (IDLVL)	002	3 digits
Attachment Level (IALVL)	001	3 digits

TABLE III. Example of the second image subheader - Continued.

NITF IMAGE SUBHEADER FIELD	FORMAT	COMMENT
Image Location (ILOC)	0057800142	10 characters, located at row 578 column 142 of base image
Image Magnification (IMAG)	1.0	3 characters followed by a space - 4 characters total
User Defined Image Data Length (UDIDL)	00000	5 digits
Extended Subheader Data Length (IXSHDL)	00000	5 digits

6.1.2.2.2 Explanation of the second image subheader. This image is the second image in the file. As is the first image, this image is an 8 bit visible, grey scale image. It is much smaller (400 columns x 224 rows) and is not compressed. Also, unlike the first image, it has no associated comment fields, indicated by the fact NICOM = 0. Since it is attached to the base image (IALVL = 001), the ILOC field reveals that this image is located with its upper left corner positioned at Row 578, Column 142 with respect to the upper left corner of the base image. Since it has a display level greater than that of the base image, it will obscure part of the base image when they are both displayed.

6.1.2.3 Explanation of the-graphic subheaders.

TABLE IV. Graphic subheader for the first graphic.

NITF-GRAPHIC SUBHEADER FIELD	FORMAT	COMMENT
File Part Type (SY)	SY	2
Graphic ID (SID)	0000000001	10
Graphic Name (SNAME)	HELO PAD RECTANGLE	18 characters followed by 2 spaces - total 20 characters
Graphic Security Classification (SSCLAS)	U	1 character
Graphic Classification Security System (SSCLSY)		2 Spaces
Graphic Codewords (SSCODE)		11 Spaces
Graphic Control and Handling (SSCTLH)		2 Spaces
Graphic Releasing Instructions (SSREL)		20 Spaces
Graphic Declassification Type (SSDCTP)		2 Spaces
Graphic Declassification Date (SSDCDT)		8 Spaces

TABLE IV. Graphic subheader for the first graphic - Continued.

NITF-GRAPHIC SUBHEADER FIELD	FORMAT	COMMENT
Graphic Declassification Exemption (SSDCXM)		4 Spaces
Graphic Downgrade (SSDG)		1 Space
Graphic Downgrade Date (SSDGDT)		8 Spaces
Graphic Classification Text (SSCLTX)		43 Spaces
Graphic Classification Authority Type (SSCLTP)		1 Space
Graphic Classification Authority (SSCAUT)		40 Spaces
Graphic Classification Reason (SSCRSN)		1 Space
Graphic Security Source Date (SSSRDT)		8 Spaces
Graphic Security Control Number (SSCTLN)		15 Spaces
Encryption (ENCRYP)	0	Required default
Graphic Type (STYPE)	C	1 character - indicates CGM
(SRES1)		reserved 13 spaces
Display Level (SDLVL)	003	3 digits
Attachment Level (SALVL)	001	3 digits
Graphic Location (SLOC)	0039201110	10 characters
First Graphic Bound Location (SBND1)	0039201110	10 characters
Graphic Color (SCOLOR)	M	indicates CGM file contains no color components
Second Graphic Bound Location (SBND2)	0051001836	10 characters
(SRES2)		reserved 2 spaces
Extended Subheader Data Length (SXSHDL)	00000	5 digits

6.1.2.3.1 Explanation of the first graphic subheader. This graphic is a computer graphics metafile graphic (HELO PAD RECTANGLE). The graphic is attached to the base image, and its location is recorded in SLOC (row 392, column 1110) and is measured as an offset from the origin at the upper left corner of that image.

TABLE V. Graphic-subheader for the second graphic.

NITF GRAPHIC SUBHEADER FIELD	FORMAT	COMMENT
File Part Type (SY)	SY	2
Graphic ID (SID)	0000000002	10
Graphic Name (SNAME)	ARROW	5 characters followed by 15 spaces - total 20 characters
Graphic Security Classification (SSCLAS)	U	1 character
Graphic Classification Security System (SSCLSY)		2 Spaces
Graphic Codewords (SSCODE)		11 Spaces
Graphic Control and Handling (SSCTLH)		2 Spaces
Graphic Releasing Instructions (SSREL)		20 Spaces
Graphic Declassification Type (SSDCTP)		2 Spaces
Graphic Declassification Date (SSDCDT)		8 Spaces
Graphic Declassification Exemption (SSDCXM)		4 Spaces
Graphic Downgrade (SSDG)		1 Space
Graphic Downgrade Date (SSDGDT)		8 Spaces
Graphic Classification Text (SSCLTX)		43 Spaces
Graphic Classification Authority Type (SSCLTP)		1 Space
Graphic Classification Authority (SSCAUT)		40 Spaces
Graphic Classification Reason (SSCRSN)		1 Space
Graphic Security Source Date (SSSRDT)		8 Spaces
Graphic Security Control Number (SSCTLN)		15 Spaces
Encryption (ENCRYP)	0	Required default
Graphic Type (STYPE)	C	1 character - indicates CGM
(SRES1)	0000	Reserved 13 spaces
Display Level (SDLVL)	004	3 digits
Attachment Level (SALVL)	002	3 digits

TABLE V. Graphic-subheader for the second graphic - Continued.

NITF GRAPHIC SUBHEADER FIELD	FORMAT	COMMENT
Graphic Location (SLOC)	0000000285	10 characters relative to origin of second image
First Graphic Bound Location (SBND1)	-022500270	10 characters relative to origin of second image
Graphic Color (SCOLOR)	M	indicates CGM file contains no color components
Second Graphic Bound Location (SBND2)	0000000300	10 characters relative to origin of second image
(SRES2)		Reserved 2 spaces
Extended Subheader Data Length (SXSHDL)	00000	5 digits

6.1.2.3.2 Explanation of the second graphic subheader. The second graphic is also a CGM graphic. It is the arrow pointing to the test facility. It is attached to the subimage. Therefore, its location as recorded in SLOC is measured as an offset from the upper left corner of the subimage.

TABLE VI. Graphic subheader for the third graphic.

NITF GRAPHIC SUBHEADER FIELD	FORMAT	COMMENT
File Part Type (SY)	SY	2
Graphic ID (SID)	0000000003	10
Graphic Name (SNAME)	HQ BUILDING	11 characters followed by 9 spaces - total 20 characters
Graphic Security Classification (SSCLAS)	U	1 character
Graphic Classification Security System (SSCLSY)		2 Spaces
Graphic Codewords (SSCODE)		11 Spaces
Graphic Control and Handling (SSCTLH)		2 Spaces
Graphic Releasing Instructions (SSREL)		20 Spaces
Graphic Declassification Type (SSDCTP)		2 Spaces
Graphic Declassification Date (SSDCDT)		8 Spaces
Graphic Declassification Exemption (SSDCXM)		4 Spaces

TABLE VI. Graphic subheader for the third graphic - Continued.

NITF GRAPHIC SUBHEADER FIELD	FORMAT	COMMENT
Graphic Downgrade (SSDG)		1 Space
Graphic Downgrade Date (SSDGDT)		8 Spaces
Graphic Classification Text (SSCLTX)		43 Spaces
Graphic Classification Authority Type (SSCLTP)		1 Space
Graphic Classification Authority (SSCAUT)		40 Spaces
Graphic Classification Reason (SSCRSN)		1 Space
Graphic Security Source Date (SSSRDT)		8 Spaces
Graphic Security Control Number (SSCTLN)		15 Spaces
Encryption (ENCRYP)	0	Required default
Graphic Type (STYPE)	C	1 character - indicates CGM
(SRES1)		Reserved 13 spaces
Display Level (SDLVL)	005	3 digits
Attachment Level (SALVL)	001	3 digits
Graphic Location (SLOC)	0000000000	10 characters
First Graphic Bound Location (SBND1)	0062501710	10 characters
Graphic Color (SCOLOR)	M	indicates CGM file contains no color components
Second Graphic Bound Location (SBND2)	0070502010	10 characters
(SRES2)		Reserved 2 spaces
Extended Subheader Data Length (SXSHDL)	00000	5 digits

6.1.2.3.3 Explanation of the third graphic subheader. The third graphic is a CGM annotation (HQ Building). It is attached to the base image. Its location as recorded in SLOC is measured as an offset from the upper left corner of the base image, in this case SLOC is 0,0 and the offsetting for this graphic is actually done within the CGM construct itself.

TABLE VII. Graphic subheader for the fourth graphic.

NITF GRAPHIC SUBHEADER FIELD	FORMAT	COMMENT
File Part Type (SY)	SY	2
Graphic ID (SID)	0000000004	10
Graphic Name (SNAME)	MAJOR TEST FACILITY	19 characters followed by 1 spaces - total 20 characters
Graphic Security Classification (SSCLAS)	U	1 character
Graphic Classification Security System (SSCLSY)		2 Spaces
Graphic Codewords (SSCODE)		11 Spaces
Graphic Control and Handling (SSCTLH)		2 Spaces
Graphic Releasing Instructions (SSREL)		20 Spaces
Graphic Declassification Type (SSDCTP)		2 Spaces
Graphic Declassification Date (SSDCDT)		8 Spaces
Graphic Declassification Exemption (SSDCXM)		4 Spaces
Graphic Downgrade (SSDG)		1 Space
Graphic Downgrade Date (SSDGDT)		8 Spaces
Graphic Classification Text (SSCLTX)		43 Spaces
Graphic Classification Authority Type (SSCLTP)		1 Space
Graphic Classification Authority (SSCAUT)		40 Spaces
Graphic Classification Reason (SSCRSN)		1 Space
Graphic Security Source Date (SSSRDT)		8 Spaces
Graphic Security Control Number (SSCTLN)		15 Spaces
Encryption (ENCRYP)	0	Required default
Graphic Type (STYPE)	C	1 character - indicates CGM
(SRES1)		Reserved 13 spaces
Display Level (SDLVL)	006	3 digits
Attachment Level (SALVL)	002	3 digits

TABLE VII. Graphic subheader for the fourth graphic - Continued.

NITF GRAPHIC SUBHEADER FIELD	FORMAT	COMMENT
Graphic Location (SLOC)	0008500415	10 characters relative to origin of second image
First Graphic Bound Location (SBND1)	0008500415	10 characters relative to origin of second image
Graphic Color (SCOLOR)	M	indicates CGM file contains no color components
Second Graphic Bound Location (SBND2)	0011500755	10 characters relative to origin of second image
(SRES2)		Reserved 2 spaces
Extended Subheader Data Length (SXSHDL)	00000	5 digits

6.1.2.3.4 Explanation of the fourth graphic subheader. The fourth graphic is a CGM graphic. It is the MAJOR TEST FACILITY text. It is attached to the subimage. Therefore, its location as recorded in SLOC is measured as an offset from the upper left corner of the subimage.

TABLE VIII. Graphic subheader for the fifth graphic.

NITF GRAPHIC SUBHEADER FIELD	FORMAT	COMMENT
File Part Type (SY)	SY	2
Graphic ID (SID)	0000000005	10
Graphic Name (SNAME)	COMMUNICATION ARROW	19 characters followed by 1 spaces - total 20 characters
Graphic Security Classification (SSCLAS)	U	1 character
Graphic Classification Security System (SSCLSY)		2 Spaces
Graphic Codewords (SSCODE)		11 Spaces
Graphic Control and Handling (SSCTLH)		2 Spaces
Graphic Releasing Instructions (SSREL)		20 Spaces
Graphic Declassification Type (SSDCTP)		2 Spaces
Graphic Declassification Date (SSDCDT)		8 Spaces
Graphic Declassification Exemption (SSDCXM)		4 Spaces

TABLE VIII. Graphic subheader for the fifth graphic - Continued.

NITF GRAPHIC SUBHEADER FIELD	FORMAT	COMMENT
Graphic Downgrade (SSDG)		1 Space
Graphic Downgrade Date (SSDGDT)		8 Spaces
Graphic Classification Text (SSCLTX)		43 Spaces
Graphic Classification Authority Type (SSCLTP)		1 Space
Graphic Classification Authority (SSCAUT)		40 Spaces
Graphic Classification Reason (SSCRSN)		1 Space
Graphic Security Source Date (SSSRDT)		8 Spaces
Graphic Security Control Number (SSCTLN)		15 Spaces
Encryption (ENCRYP)	0	Required default
Graphic Type (STYPE)	C	1 character - indicates CGM
(SRES1)		Reserved 13 spaces
Display Level (SDLVL)	007	3 digits
Attachment Level (SALVL)	001	3 digits
Graphic Location (SLOC)	0047000040	10 characters
First Graphic Bound Location (SBND1)	0047000040	10 characters
Graphic Color (SCOLOR)	M	indicates CGM file contains no color components
Second Graphic Bound Location (SBND2)	0059000600	10 characters
(SRES2)		Reserved 2 spaces
Extended Subheader Data Length (SXSHDL)	00000	5 digits

6.1.2.3.5 Explanation of the fifth graphic subheader. The fifth graphic is a CGM graphic. It is the COMMUNICATIONS NODE annotation with associated arrow. It is attached to the base image. Therefore, its location as recorded in SLOC is measured as an offset from the upper left corner of the base image.

6.1.2.4 Explanation of the text subheaders. There are 5 text documents included in the file. Other than the text data they contain, text files 1 - 4 differ only in matters such as title, date-time of creation, and ID. Therefore, only the first is discussed, since the subheaders of the other three are essentially the same. Text file 5 is an USMTF file.

TABLE IX. Text subheader for the text document.

NITF TEXT SUBHEADER FIELD	FORMAT	COMMENT
File Part Type (TE)	TE	2 characters
Text ID (TEXTID)	0000000001	10 characters
Text Date & Time (TXTDT)	19960930224530	14 characters
Text Title (TXTITL)	First sample text file.	22 characters followed by 58 spaces - 80 total characters
Text Security Classification (TSCLAS)	U	1 character
Text Classification Security System (TSCLSY)		2 Spaces
Text Codewords (TSCODE)		11 Spaces
Text Control and Handling (TSCTLH)		2 Spaces
Text Releasing Instructions (TSREL)		20 Spaces
Text Declassification Type (TSDCTP)		2 Spaces
Text Declassification Date (TSDCDT)		8 Spaces
Text Declassification Exemption (TSDCXM)		4 Spaces
Text Downgrade (TSDG)		1 Space
Text Downgrade Date (TSDGDT)		8 Spaces
Text Classification Text (TSCLTX)		43 Spaces
Text Classification Authority Type (TSCLTP)		1 Space
Text Classification Authority (TSCAUT)		40 Spaces
Text Classification Reason (TSCRSN)		1 Space
Text Security Source Date (TSSRDT)		8 Spaces
Text Security Control Number (TSCTLN)		15 Spaces
Encryption (ENCRYP)	0	Required default
Text Format (TXTFMT)	STA	3 characters
Extended Subheader Data Length (TXSHDL)	00000	5 digits

6.1.2.4.1 Explanation of the first text subheader. The first text document is unclassified and was created on September 30, 1996 at 22:45 hours. Its subheader is shown in Table IX.

6.1.2.4. 2 Sample USMTF message: The following is a sample USMTF message that is a data portion associated with a text subheader for MTF.

```
EXER/GRAU MESSER//
OVERLAY/A/420TH MI BDE/24153000ZFEB98/OP AREA 3//
GENTEXT/OVERLAY DESCRIPTION/THIS OVERLAY IDENTIFIES AN
APACHE HELICOPTER IN OPERATION AREA 3//
IMG/DTE:970223/PRJ:MI/MSN:C031/FR/56-61,68/-/TOT:1322Z/50000
/BEN:0173-99999/SFX:A123/CAT:80000//
ICONID/A/421ST MI BDE/24190000ZFEB98/001/001/AFAPMHA00000000/E//
EQUIP/APACHE/AIRCRAFT/MAIN//
ICONLOC/313448.0N1102032W/-/-/-/-/ELE:00370M/273T/0.OKPH//
```

TABLE X. Text subheader for USMTF.

NITF TEXT SUBHEADER FIELD	FORMAT	COMMENT
File Part Type (TE)	TE	2 characters
Text ID (TEXTID)	0000000005	10 characters
Text Date & Time (TXTDT)	19980224153000	14 characters
Text Title (TXTITL)	Fifth sample text file.	23 characters followed by 57 spaces - 80 total characters
Text Security Classification (TSCLAS)	U	1 character
Text Codewords (TSCODE)		40 spaces
Text Control and Handling (TSCTLH)		40 spaces
Text Releasing Instructions (TSREL)		40 spaces
Text Classification Authority (TSCAUT)		20 spaces
Text Security Control Number (TSCTLN)		20 spaces
Text Security Downgrade (TSDWNG)		6 spaces
Encryption (ENCRYP)	0	1 character - required default
Text Format (TXTFMT)	MTF	3 characters
Extended Subheader Data Length (TXSHDL)	00000	5 digits

6.2 Product considerations. The NITF provides a very flexible means to package imagery products. One of the main objectives of NITF is to provide increased interoperability among potentially disparate imagery systems. For the purposes of NITF, interoperability means the ability to exchange NITF formatted imagery products among NITF capable systems in a manner that is meaningful and useful to the end users. This places a significant burden on

NITF read capable implementations to be able to interpret and use potentially any combination of NITF file format options that may be created by NITF file producers. Consequently, significant care should be taken when defining product specifications for NITF formatted imagery products. The objective of the following discussion is to describe several generalized product configurations that can be used as the basis for defining specific imagery products. These product configurations are typical of those successfully used within the imagery and mapping community to date.

6.2.1 NITF product configurations.

6.2.1.1 General. An imagery product may potentially be produced under one of the following concepts.

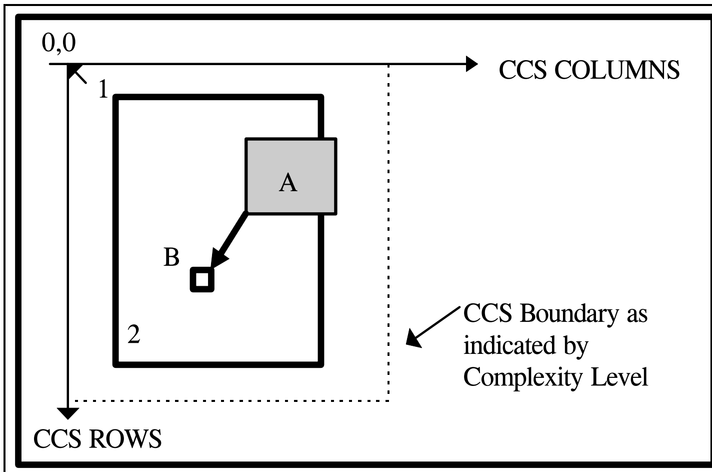
6.2.1.1.1 Single file, single base image. This is the most common use of the NITF format. In this product concept, the NITF file is produced with a focus on a single image, commonly called the 'base image'. All other segments and extended data within the file are focused on amplifying the information portrayed in the base image.

6.2.1.1.2 Single file, multiple images. In this product concept, the NITF file is produced containing multiple images, all of which have equal or similar significance to the value of the product. Other segments and extended data within the file are focused on amplifying the information portrayed in the image(s) to which they are associated.

6.2.1.1.3 Single file, no image. This type of product may only have graphic segments, or only text segments, or only extension segments, or any combination of these segments. The significance of the data within the file may pertain only to that file, or it may pertain to one or more files with which it is associated.

6.2.1.1.4 Multiple correlated files. For this product concept, the product consists of multiple NITF files that are interrelated as defined in the governing product specification.

6.2.1.2 Single file, single base image. For this type of product file, there is one image of central focus, the base image, placed on the CCS plane. Its first pixel may be located at the origin (0,0) of the CCS, or off-set from the CCS origin according to the row/column coordinate values placed in the location (LOC) field of the image subheader. Figure 17 provides a representative portrayal for the following discussion.



1. Common Coordinate System Origin (0,0)
2. Image DLVL =100 ALVL =000 ILOC =45,50
A. Inset Image DLVL =110 ALVL =100 ILOC =50,300
B. Inset Graphic (Box & Arrow) DLVL =120 ALVL =110 ILOC =250,-100

FIGURE 17. Single file, single base image.

6.2.1.2.1 Image segment overlays. Additional images, often called subimages or inset images, may be included as separate image segments in the file. The purpose of these images is to add information or clarity about the base image. Their placement in the CCS plane is controlled by the value of each segment's ALVL and Location (LOC) row/column value. When overlay images are attached to the base image, the LOC value represents a row/column off-set in the CCS from the location specified by the base image row/column LOC value. If the overlay image is unattached to any other segment (ALVL=000), the overlay's LOC value is a row/column off-set from the CCS origin (0,0).

6.2.1.2.2 Graphic segment overlays. Graphic Segments are used to provide graphical (lines, polygons, ellipses, etc.) and textual annotation to the base image. The graphic representation is done using CGM. In a manner similar to image segment overlays, the placement of graphics in the CCS plane is controlled by the value of each segment's ALVL and LOC values. CGM has its own internal Cartesian coordinate space called "Virtual Display Coordinates (VDC)" that has its own defined origin (0,0) point. The row/column value in the graphic segment LOC field identifies the placement of the graphic's VDC origin point relative to the CCS origin when ALVL=000, or relative to the segment LOC to which it is attached.

6.2.1.2.3 Non-destructive overlays. NITF image and graphic segment overlays are handled in a non-destructive manner. The overlays may be placed anywhere within the bounds of the CCS (defined for a specific NITF file by the Complexity level (Clevel)). They may be placed totally on the base image, partially on the base image, or entirely off of the base image. Any image or graphic segment can be placed on or under any other segment, fully or partially. The visibility of pixel values of overlapping segments is determined by the DLVL assigned to that segment. Each displayable segment (images and graphics) is assigned a DLVL (ranging from 001 - 999) that is unique within the file. At any CCS pixel location shared by more than one image or graphic, the visible pixel value is the one from the segment having the greatest DLVL value. If the user of a NITF file opts to move an overlay, or turn off the presentation of an overlay, the next greatest underlying pixel value(s) will then become visible. This approach allows for the non-destructible nature of NITF overlays as opposed to the 'burned in' approach where overlay pixel values are used to replace pixels values of the underlying image.

6.2.1.2.4 Text segments. Text segments allow inclusion in the NITF file of textual information related to the base image, perhaps a textual description of the activities portrayed in the image. For the purpose of this standard, segment refers to header or subheader and associated data. Below is a sample GRAPHREP text message:

```
EXER/GRAU MESSER//
MSGID/GRAPHREP-OVERLAY/420TH MI BDE//
OVERLAY/A/420TH MI BDE/24153000ZFEB98/OP AREA 3//
GENTEXT/OVERLAY DESCRIPTION/THIS OVERLAY IDENTIFIES AN
APACHE HELICOPTER IN OPERATION AREA 3//
IMG/DTE:970223/PRJ:MI/MSN:C031/FR/56-61,68/-/TOT:1322Z/50000
/BEN:0173-99999/SFX:A123/CAT:80000//
ICONID/A/421ST MI BDE/24190000ZFEB98/001/001/AFAPMHA00000000/E//
EQUIP/APACHE/AIRCRAFT/MAIN//
GRD/24190000ZFEB98/-/ACRCVR//
ICONLOC/313448.0N1102032W/-/-/-/-/ELE:00370M/273T/0.OKPH//
```

6.2.1.2.5 Extension data. The NITF file header and each standard data type sub-header have designated expandable fields to allow for the optional inclusion of extension data. The inclusion of extension data provides the ability to add data/information about the standard data type (metadata) that is not contained in the basic fields of the headers and subheaders. The additional data is contained within one or more NITF tagged record extensions that are placed in the appropriate field (user defined data field or extended data field) of the standard data type subheader for which the metadata applies. When tagged record extensions have application across multiple data types in the file, or otherwise apply to the entire NITF file in general, they are placed in the appropriate file header fields. Whereas general purpose NITF readers should always be able to portray image and graphic segments and act on standard header and subheader data, they may not always be able to act on product specific extension data. Upon receipt of a file that contains extension data, a NITF compliant system should at least ignore the extensions and properly interpret the other legal components of the NITF file. Exemplary use of tagged record extensions:

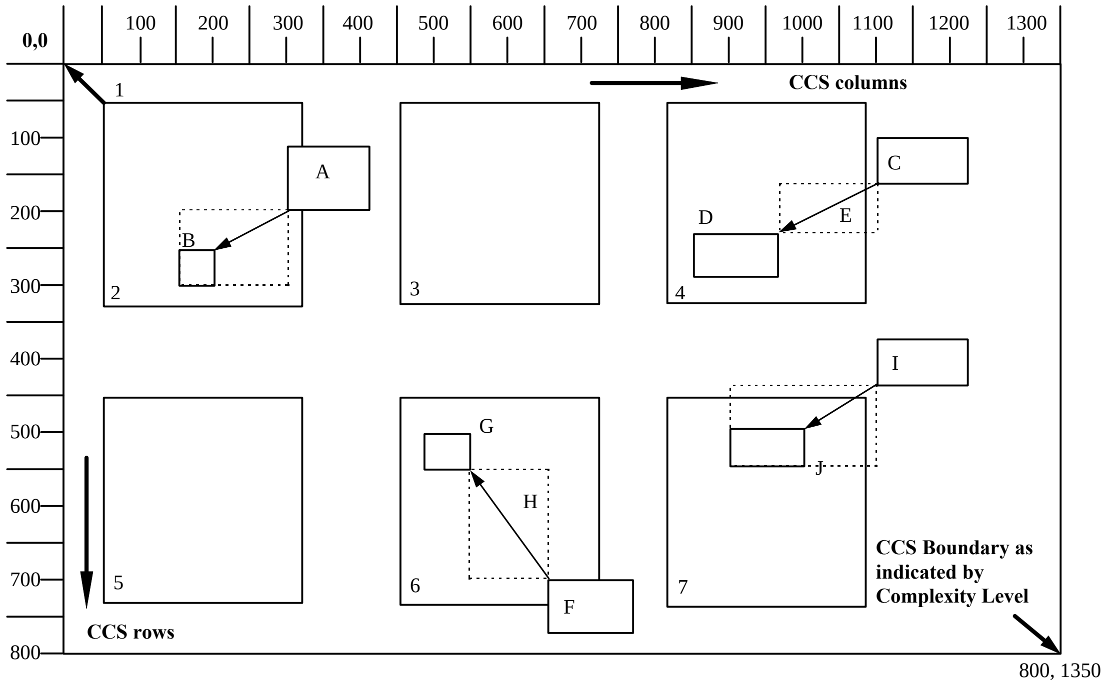
a. Data about people, buildings, places, landmarks, equipment or other objects that may appear in the image.

b. Data to allow correlation of information among multiple images and annotations within a NITF file.

c. Data about the equipment settings used to obtain the digital image, xray, etc.

d. Data to allow geo-positioning of items in the imagery or measurement of distances of items in the imagery.

6.2.1.3 Single file, multiple images without overlap. For this type of product file, multiple images of equal or similar focus (multiple 'base' images) are placed within the CCS plane. Each image is located at an off-set from the CCS origin such that there is no overlap among the images. The Complexity Level of the file must be chosen such that the bounds of the CCS for the file are sufficient to contain the extent of all segments within the file. Figure 18 provides a representative portrayal for this product type.



	DISPLAY LEVEL	ATTACHMENT LEVEL	LOCATION
1. Common Coordinate System Origin (0,0)			
2. Image	DLVL=100	ALVL=000	50, 50
(A) Image Segment Overlay	DLVL=110	ALVL=100	70, 250
(B) Graphic Overlay (CGM Rectangle & Arrow)	DLVL=120	ALVL=110	100, -125
3. Image	DLVL=200	ALVL=000	50, 450
4. Image	DLVL=300	ALVL=000	50, 800
(C) Image Segment Overlay	DLVL=310	ALVL=300	50, 300
(D) Graphic Segment Overlay (CGM Rectangle	DLVL=320	ALVL=300	200, 25
(E) Graphic Segment Overlay (CGM Arrow)	DLVL=330	ALVL=300	100, 150
5. Image	DLVL=400	ALVL=000	450, 50
6. Image	DLVL=500	ALVL=000	450, 450
(F) Image Segment Overlay	DLVL=510	ALVL=500	250, 200
(G) Graphic Segment Overlay (CGM Rectangle)	DLVL=520	ALVL=500	50, 40
(H) Graphic Segment Overlay (CGM Arrow)	DLVL=530	ALVL=500	90, 100
7. Image	DLVL=600	ALVL=000	-100, 300
(I) Image Segment Overlay	DLVL=610	ALVL=600	-100, 300
(J) CGM Graphic Overlay (Rectangle & Arrow)	DLVL=620	ALVL=600	-25, 100

FIGURE 18. Single file, multiple images.

6.2.1.3.1 Overlays. Each image may be overlaid with additional image and graphic segments in the same fashion as described for the single file, single image case above. All overlays associated with a specific image should be attached to that specific image. Display Levels assigned to each image and graphic in the file must be unique within the file.

6.2.1.3.2 Text segments. Each text segment should be clearly marked as to whether it applies to the file as a whole, or if it is associated with specific images within the file. For the purpose of this standard, segment refers to header or subheader and associated data.

6.2.1.3.3 Extension data. Tagged record extensions are placed in the file header extension fields when applicable to the file as a whole. Extensions specific to a segment are placed in that segment's subheader.

6.2.1.4 Single file, no image. An NITF single file product does not always contain an image. It could contain one or more graphic segments, one or more text segments, one or more extension segments, or any combination of these non-image segments. The file may be useful as a stand alone product, or it may be intended for use in conjunction with other NITF files. For example, the file could contain graphic overlays to be merged with or applied to another NITF file that was prepositioned or transmitted at an earlier time. Any general purpose NITF reader should at least be able to interpret and render the standard segments of no image NITF files on a stand alone basis.

6.2.1.5 Multiple correlated files. An imagery product may be comprised of multiple NITF files that are interrelated in a specified manner. This approach vastly increases the potential combination and permutation of options a general purpose NITF reader would need to support to maintain full interpret capability. Therefore, each NITF file in a multiple correlated file set must be structured such that a general purpose NITF reader can properly interpret and render the file as if it were a stand alone product. The correlation of multiple NITF files in a single product must be explicitly and unambiguously defined in a product specification. NITF readers can then be further categorized according to specific multiple file product specifications that are supported. Representative use of multiple correlated NITF files includes:

6.2.1.5.1 Stereo imagery. Some stereo image products are comprised of separate NITF files for the stereo components of each image scene.

6.2.1.5.2 Imagery mosaics. Some extremely large image and map products consist of multiple NITF files structured such that they can be pieced together in mosaic fashion by the interpret application as if the multiple files were a single larger image.

6.2.1.5.3 Reduced resolution data sets (Rsets). Some Rset products are comprised consist of multiple NITF files. One file contains a full resolution image and the other files contain the same image in a variety of lower resolutions.

6.2.1.5.4 Imagery and maps. Some geo-positioning products exist which consist of multiple separate NITF files containing interrelated maps, images, graphics, legends, product indices, and geo-reference data.

6.3 Sample NITF file structure. The following is an example of handling a file that has control tags with overflow. The file has a single image.

TABLE XI. Sample NITF file structure.

NITF HEADER	IMAGE SUBHEADER	IMAGE DATA	DATA EXTENSION SUBHEADER	DATA EXTENSION

	MAIN NITF HEADER																	
FIELD NAME	FHDR	CLEVEL	ETC	FL	HL	NUMI	LISH001	LI001	NUMS	NUMX	NUMT	NUMDES	LDSH001	LD001	NUMRES	UDHDL	XHDL
BYTES	9	2		1	6	3	6	10	3	3	3	3	4	9	3	5	5
FIELD VALUE	NITF02.10	06		000805075764	000417	001	098442	0084934656	000	000	000	001	0249	000042000	000	00000	00000

	IMAGE SUBHEADER								DES SUBHEADER				
FIELD NAME	IM	ETC	IMAG	UDIDL	IXSHDL	IXSOFL	IXSHD	IMAGE DATA	DE	DESTAG	ETC	DESOFLW	DESITEM DESSHL DATA EXTENSION SEG 42000
BYTES	2		4	5	5	3	TAG DATA		2	25		6	34
FIELD VALUE	IM		1.0	00000	98003	001	98000		DE	CONTROLLED EXTENSIONS		UDID	0010000

TRE 1 (32,000 BYTES)	TRE 2 (27,000 BYTES)	TRE 3 (39,000 BYTES)	TRE 4 (42,000 BYTES)

Note: Capacity of IXSHD is 99,999 bytes. You cannot split a TRE, therefore the first 3 TREs fit into the IXSHD and the 4th TRE is overflowed into the Data Extension Area.

6.4 Subject term (key word) listing.

Annotation, Imagery
Blocked Image Mask
Compression Algorithm
Compression, Bi-Level
compression, Imagery
Facsimile Compression
File Format Graphics
Grey Scale Imagery
Group 3 Facsimile
Image
Image Compression
Image Dissemination
Image Transmission
Imagery, Bi-Level
Overlay
Picture
Quantization Matrices
Raster
Secondary Imagery Dissemination Systems
SIDS
Symbols
Tag
Transparent Pixel
Transparent Pixel Mask

6.5 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extent of the changes. Differences between MIL-STD-2500A and this standard are described in NIMA NNPP-97, NITFS Program Plan.

APPENDIX A

NITF TABLES

A.1 SCOPE

This appendix is a mandatory part of this standard. The information contained herein is intended for compliance.

A.2 APPLICABLE DOCUMENTS

This section is not applicable to this appendix.

A.3 DEFINITIONS

The definitions in section 3 of this standard apply to this appendix.

A.4 DETAILED REQUIREMENTS

TABLE A-1. NITF file header.
(TYPE “R” = Required, “C” = Conditional, “< >“ = BCS Spaces allowed for entire field)
(“†” annotations are explained at the end of the table)

FIELD	NAME	SIZE	VALUE RANGE	TYPE
FHDR	File Profile Name & Version. A BCS character string of the form NITFNN.NN which indicates this file is formatted using version NN.NN of NITF. The valid value for this field is 02.10.	9	BCS-A NITF 02.10	R
CLEVEL	Complexity Level. This field shall contain the complexity level required to interpret fully all components of the file. Values are integer to assigned in accordance with NIMA-N0105-97.	2	BCS-A, 01-99	R
STYPE	Standard Type. Standard type or capability. A BCS character string of the form BF01 which indicates that this file is formatted using ISO/IEC 12087-5. NITF02.10 is intended to be registered as a profile of ISO/IEC 12087-5.	4	BF01 BCS-A	R
OSTAID	Originating Station ID. This field shall contain the identification code or name of the originating organization, system, station, or product. It shall not be filled with BCS spaces (0x20).	10	BCS-A (non-blank)	R
FDT	File Date & Time. This field shall contain the time (UTC) of the file’s origination in the format CCYYMMDDhhmmss, where CC is the first two digits of the year (00-99), YY is the last two digits of the year (00-99), MM is the month (01-12), DD is the day (01-31), hh is the hour (00-23), mm is the minute (00-59), and ss is the second (00-59). UTC is assumed to be the time zone designator to express the time of day.	14	BCS-N CCYYMMDDhhmmss	R
FTITLE	File Title. This field shall contain the title of the file or shall be filled with BCS spaces (0x20).	80	BCS-A (Default is BCS spaces (0x20))	<R>

TABLE A-1. NITF file header - Continued.

FIELD	NAME	SIZE	VALUE RANGE	TYPE
FSCLAS	File Security Classification. This field shall contain a valid value representing the classification level of the entire file. Valid values are T (=Top Secret), S (=Secret), C (=Confidential), R (=Restricted), U (=Unclassified).	1	BCS-A T, S, C, R, or U	R
NOTE: If FSCLAS is T, S, C, or R, then FSCLSY must be populated with a valid code for the security classification system used.				
FSCLSY	File Security Classification System. This field shall contain valid values indicating the national or multinational security system used to classify the file. Country Codes per FIPS 10-4 shall be used to indicate national security systems; codes found in DIAM 65-19 shall be used to indicate multinational security systems. If this field is all BCS spaces (0x20), it shall imply that no security classification system applies to the file.	2	BCS-A (Default is BCS spaces (0x20))	<R>
NOTE: If any of the following fields are populated with anything other than spaces, then FSCLSY must be populated with a valid code for the security classification system used: FSCODE, FSREL, FSDCTP, FSDCDT, FSDCXM, FSDG, FSDGDT, FSCLTX, FSCATP, FSCAUT, FSCRSN, FSSRDT, and FSCTLN.				
FSCODE	File Codewords. This field shall contain a valid indicator of the security compartments associated with the file. Values include one or more of the tri/digraphs found in DIAM 65-19 and/or Table A-4. Multiple entries shall be separated by single BCS spaces (0x20): The selection of a relevant set of codewords is application specific. If this field is all BCS spaces (0x20), it shall imply that no codewords apply to the file.	11	BCS-A (Default is BCS spaces (0x20))	<R>
FSCTLH	File Control and Handling. This field shall contain valid additional security control and/or handling instructions (caveats) associated with the file. Values include digraphs found in DIAM 65-19 and/or Table A-4. The digraph may indicate single or multiple caveats. The selection of a relevant caveat(s) is application specific. If this field is all BCS spaces (0x20), it shall imply that no additional control and handling instructions apply to the file.	2	BCS-A (Default is BCS spaces (0x20))	<R>
FSREL	File Releasing Instructions. This field shall contain a valid list of country and/or multilateral entity codes to which countries and/or multilateral entities the file is authorized for release. Valid items in the list are one or more country codes as found in FIPS 10-4 and/or codes identifying multilateral entities as found in DIAM 65-19. If this field is all BCS spaces (0x20), it shall imply that no file release instructions apply.	20	BCS-A (Default is BCS spaces (0x20))	<R>

TABLE A-1. NITF file header - Continued.

FIELD	NAME	SIZE	VALUE RANGE	TYPE
FSDCTP	File Declassification Type. This field shall contain a valid indicator of the type of security declassification or downgrading instructions which apply to the file. Valid values are DD (=declassify on a specific date), DE (=declassify upon occurrence of an event), GD (=downgrade to a specified level on a specific date), GE (=downgrade to a specified level upon occurrence of an event), O (=OADR), and X (= exempt from automatic declassification). If this field is all BCS spaces (0x20), it shall imply that no file security declassification or downgrading instructions apply.	2	BCS-A (Default is BCS spaces (0x20))	<R>
FSDCDT	File Declassification Date. This field shall indicate the date on which a file is to be declassified if the value in File Declassification Type is DD. If this field is all BCS spaces (0x20), it shall imply that no file declassification date applies.	8	BCS-A CCYYMMDD (Default is BCS spaces (0x20))	<R>
FSDCXM	File Declassification Exemption. This field shall indicate the reason the file is exempt from automatic declassification if the value in File Declassification Type is X. Valid values are X1 through X8 and X251 through X259. X1 through X8 correspond to the declassification exemptions found in DOD 5200.1-R, paragraphs 4-202b(1) through (8) for material exempt from the 10-year rule. X251 through X259 correspond to the declassification exemptions found in DOD 5200.1-R, paragraphs 4-301a(1) through (9) for permanently valuable material exempt from the 25-year declassification system. If this field is all BCS spaces (0x20), it shall imply that a file declassification exemption does not apply.	4	BCS-A (Default is BCS spaces (0x20))	<R>
FSDG	File Downgrade. This field shall indicate the classification level to which a file is to be downgraded if the values in File Declassification Type are GD or GE. Valid values are S (=Secret), C (=Confidential), R (= Restricted). If this field is all BCS spaces (0x20), it shall imply that file security downgrading does not apply.	1	BCS-A (Default is BCS spaces (0x20))	<R>
FSDGDT	File Downgrade Date. This field shall indicate the date on which a file is to be downgraded if the value in File Declassification Type is GD. If this field is all BCS spaces (0x20), it shall imply that a file security downgrading date does not apply.	8	BCS-A CCYYMMDD (Default is BCS spaces (0x20))	<R>

TABLE A-1. NITF file header - Continued.

FIELD	NAME	SIZE	VALUE RANGE	TYPE
FSCLTX	File Classification Text. This field shall be used to provide additional information about file classification to include identification of a declassification or downgrading event if the values in File Declassification Type are DE or GE. It may also be used to identify multiple classification sources and/or any other special handling rules. Values are user defined free text. If this field is all BCS spaces (0x20), it shall imply that additional information about file classification does not apply.	43	BCS-A (Default is BCS spaces (0x20))	<R>
FSCATP	File Classification Authority Type. This field shall indicate the type of authority used to classify the file. Valid values are O (= original classification authority), D (= derivative from a single source), and M (= derivative from multiple sources). If this field is all BCS spaces (0x20), it shall imply that file classification authority type does not apply.	1	BCS-A (Default is BCS spaces (0x20))	<R>
FSCAUT	File Classification Authority. This field shall identify the classification authority for the file dependent upon the value in File Classification Authority Type. Values are user defined free text which should contain the following information: original classification authority name and position or personal identifier if the value in File Classification Authority Type is O; title of the document or security classification guide used to classify the file if the value in File Classification Authority Type is D; and Derive-Multiple if the file classification was derived from multiple sources. In the latter case, the file originator will maintain a record of the sources used in accordance with existing security directives. One of the multiple sources may also be identified in File Classification Text if desired. If this field is all BCS spaces (0x20), it shall imply that no file classification authority applies.	40	BCS-A (Default is BCS spaces (0x20))	<R>
FSCRSN	File Classification Reason. This field shall contain values indicating the reason for classifying the file. Valid values are A through G. These correspond to the reasons for original classification per E.O. 12958, Section 1.5.(a) through (g). If this field is all BCS spaces (0x20), it shall imply that no file classification reason applies.	1	BCS-A (Default is BCS spaces (0x20))	<R>
FSSRDT	File Security Source Date. This field shall indicate the date of the source used to derive the classification of the file. In the case of multiple sources, the date of the most recent source shall be used. If this field is all BCS spaces (0x20), it shall imply that a file security source date does not apply.	8	BCS-A CCYYMMDD (Default is BCS spaces (0x20))	<R>

TABLE A-1. NITF file header - Continued.

FIELD	NAME	SIZE	VALUE RANGE	TYPE
FSCTLN	File Security Control Number. This field shall contain a valid security control number associated with the file. The format of the security control number shall be in accordance with the regulations governing the appropriate security channel(s). If this field is all BCS spaces (0x20), it shall imply that no file security control number applies.	15	BCS-A (Default is BCS spaces (0x20))	<R>
FSCOP	File Copy Number. This field shall contain the copy number of the file. If this field is all BCS zeros (0x30), it shall imply that there is no tracking of number file copies.	5	BCS-N 00000-99999 (Default is BCS zeros (0x30))	R
FSCPYS	File Number of Copies. This field shall contain the total number of copies of the file. If this field is all BCS zeros (0x30), it shall imply that there is no tracking of numbered file copies.	5	BCS-N 00000-99999 (Default is BCS zeros (0x30))	R
ENCRYP	Encryption. This field shall contain the value BCS zeros (0x30) until such time as this specification is updated to define the use of other values.	1	BCS-N 0 = Not Encrypted	R
FBKGC	File Background Color. This field shall contain the three color components of the file background in the order Red, Green, Blue. Where (0x00, 0x00, 0x00) is black and (0xFF, 0xFF, 0xFF) is white.	3	Unsigned Binary integer (0x00-0xFF, 0x00-0xFF, 0x00-0xFF)	R
ONAME	Originator's Name. This field shall contain a valid name for the operator who originated the file. If the field is all BCS spaces (0x20), it shall represent that no operator is assigned responsibility for origination.	24	BCS-A (Default is BCS spaces (0x20))	<R>
OPHONE	Originator's Phone Number. This field shall contain a valid phone number for the operator who originated the file. If the field is all BCS spaces (0x20), it shall represent that no phone number is available for the operator assigned responsibility for origination.	18	BCS-A (Default is BCS spaces (0x20))	<R>
FL	File Length. This field shall contain the length in bytes of the entire file including all headers, subheaders, and data.	12	BCS-N 000000000388-999999999999	R
HL	NITF File Header Length. This field shall contain a valid length in bytes of the NITF file header.	6	BCS-N 000388-999999	R
NUMI	Number of Images. This field shall contain the number of separate image items included in the file. This field shall be BCS zeros (0x30) if and only if no images are included in the file.	3	BCS-N 000-999	R
NOTE: LISHnnn and LInnn fields repeat in pairs such that LISH001, LI01; LISH002, LI002; .....LISHnnn,LInnn.				
LISHnnn	Length of n^{th} Image Subheader. This field shall contain a valid length in bytes for the nnn^{th} image subheader, where nnn is the number of the image counting from the first image (nnn=001) in order of the images' appearance in the file. This field shall occur as many times as specified in the NUMI field. This field is conditional and shall be omitted if the NUMI field contains BCS zeros (0x30).	6	BCS-N 000439-999999	C

TABLE A-1. NITF file header - Continued.

FIELD	NAME	SIZE	VALUE RANGE	TYPE
LInnn	Length of nth Image. This field shall contain a valid length in bytes of the nnnth image, where nnn is the image number of the image counting from the first image (nnn=001) in order of the images' appearance in the file. If the image is compressed, the length after compression shall be used. This field shall occur as many times as specified in the NUMI field. This field is conditional and shall be omitted if the NUMI field contains BCS zeros (0x30).	10	BCS-N 0000000001-9999999999	C
NUMS	Number of Graphics. This field shall contain the number of separate graphic items included in the file. This field shall be BCS zeros (0x30) if and only if no graphics are included in the file.	3	BCS-N 000-999	R
NOTE: LSSHnnn and LSnnn fields repeat in pairs such that LSSH001, LS00; LSSH001, LS002; .....LSSHnnn,LSnnn.				
LSSHnnn	Length of nth Graphic Subheader. This field shall contain a valid length in bytes for the nnnth graphic subheader, where nnn is the number of the graphics counting from the first graphic (nnn=001) in the order of the graphics' appearance in the file. This field shall occur as many times as specified in the NUMS field. This field is conditional and shall be omitted if the NUMS contains BCS zeros (0x30).	4	BCS-N 0258-9999	C
LSnnn	Length of nth Graphic. This field shall contain a valid length in bytes of the nnnth graphic, where nnn is the number of the graphic, counting from the first graphic (nnn=001) in the order of the graphics' appearance in the file. This field shall occur as many times as specified in the NUMS field. This field is conditional and shall be omitted if NUMS field contains BCS zeros (0x30).	6	BCS-N 000001-999999	C
NUMX	Reserved for Future Use. This field is reserved for future use and shall be filled with BCS zeros (0x30).	3	BCS-N 000	R
NUMT	Number of Text Files. This field shall contain the number of separate text items included in the file. This field shall be BCS zeros (0x30) if and only if no text items are included in the file.	3	BCS-N 000-999	R
NOTE: LTSHnnn and LTnnn fields repeat in pairs such that LTSH001, LT00; LTSH001, LT002; .....LTSHnnn,LTnnn.				
LTSHnnn	Length of nth text subheader. This field shall contain a valid length in bytes for the nnnth text item subheader, where nnn is the number of the text item, counting from the first text item (nnn=001) in the order of the text items' appearance in the file. This field shall occur as many times as specified in the NUMT field. This field is conditional and shall be omitted if the NUMT field contains BCS zeros (0x30).	4	BCS-N 0282-9999	C

TABLE A-1. NITF file header - Continued.

FIELD	NAME	SIZE	VALUE RANGE	TYPE
LTnnn	Length of n^th Text File. This field shall contain a valid length in bytes of the nnn^th text item, where nnn is the number of the text item, counting from the first text item (nnn=001) in the order of the text items' appearance in the file. This field shall occur as many times as specified in the NUMT field. This field is conditional and shall be omitted if the NUMT field contains BCS zeros (0x30).	5	BCS-N 00001-99999	C
NUMDES	Number of Data Extension Segments. This field shall contain the number of separate data extension segments included in the file. This field shall be BCS zeros (0x30) if and only if no data extension segments are included in the file.	3	BCS-N 000-999	R
NOTE: LDSHnnn and LDnnn fields repeat in pairs such that LDSH001, LD00; LDSH001, LD002; .....LDSHnnn,LDnnn.				
LDSHnnn	Length of n^th Data Extension Segment Subheader. This field shall contain a valid length in bytes for the nnn^th data extension segment subheader, where nnn is the number of the data extension segment counting from the first data extension segment (nnn=001) in order of the data extension segment's appearance in the file. This field shall occur as many times as are specified in the NUMDES field. This field is conditional and shall be omitted if the NUMDES field contains BCS zeros (0x30).	4	BCS-N 0200-9999	C
LDnnn	Length of n^th Data Extension Segment Data. This field shall contain a valid length in bytes of the data in the nnn^th data extension segment, where nnn is the number of the data extension segment counting from the first data extension segment (nnn=001) in order of the data extension segment's appearance in the file. This field shall occur as many times as are specified in the NUMDES field. This field is conditional and shall be omitted if the NUMDES fields contains BCS zeros (0x30).	9	BCS-N 000000001-999999999	C
NUMRES	Number of Reserved Extension Segments. This field shall contain the number of separate reserved extension segments included in the file. This field shall be BCS zeros (0x30) if and only if no reserved extension segments are included in the file.	3	BCS-N 000-999	R
NOTE: LRESHnnn and LREnnn fields repeat in pairs such that LRESH001, LRE001; LRESH001, LRE002; .....LRESHnnn,LREnnn.				
LRESHnnn	Length of n^th Reserved Extension Segment Subheader. This field shall contain a valid length in bytes for the nnn^th reserved extension segment subheader, where nnn is the number of the reserved extension segment counting from the first reserved extension segment (nnn=001) in order for the reserved extension segment's appearance in the file. This field shall occur as many times as are specified in the NUMRES field. This field is conditional and shall be omitted if the NUMRES field contains BCS zeros (0x30).	4	BCS-N 0001-9999	C

TABLE A-1. NITF file header - Continued.

FIELD	NAME	SIZE	VALUE RANGE	TYPE
LREnnn	Length of nth Reserved Extension Segment Data Field. This field shall contain a valid length in bytes for the nnnth reserved extension segment subheader, where nnn is the number of the reserved extension segment counting from the first reserved extension segment (nnn=001) in order of the reserved extension segment's appearance in the file. This field shall occur as many times as are specified in the NUMRES field. This field is conditional and shall be omitted if the NUMRES field contains BCS zeros (0x30).	7	BCS-N 0000001-9999999	C
UDHDL	User Defined Header Data Length. A value of BCS zeros (0x30) shall represent that no tagged record extensions are included in the UDHD. If a-tagged record extension exists, the field shall contain the sum of the length of all the tagged record extensions (see paragraph 5.7.1.1) appearing in the UDHD field plus 3 bytes (length of UDHOFL field). If a tagged record extension is too long to fit in the UDHD field, it may be put in a data extension segment (see paragraph 5.7.1.4).	5	BCS-N 00000 or 00003-99999	R
UDHOFL	User Defined Header Overflow. This field shall contain BCS zeros (0x30) if the tagged record extensions in UDHD do not overflow into a DES, or shall contain the sequence number of the DES into which they do overflow. This field shall be omitted if the field UDHDL contains BCS zeros (0x30).	3	BCS-N 000-999	C
UDHD	User Defined Header Data. If present, this field shall contain tagged record extension data (see paragraph 5.8.1.1). The length of this field shall be the length specified by the field UDHDL minus 3 bytes. Tagged record extensions shall appear one after the other with no intervening bytes. The first byte of this field shall be the first byte of the first tagged record extension appearing in the field. The last byte of this field shall be the last byte of the last tagged record extension to appear in the field. This field shall be omitted if the field UDHDL contains BCS zeros (0x30).	†[1]	Tagged Record Extension(s)	C
XHDL	Extended Header Data Length. A value of BCS zeros (0x30) shall represent that no tagged record extensions are included in the XHD. If a tagged record extension exists, the field shall contain the sum of the length of all the tagged record extensions (see paragraph 5.7.1.2) appearing in the XHD field plus 3 bytes (length of XHDLOFL field). If a tagged record extension is too long to fit in the XHD field, it may be put in a data extension segment (see paragraph 5.7.1.4).	5	BCS-N 00000 or 00003-99999	R
XHDLOFL	Extended Header Data Overflow. This field shall contain BCS zeros (0x30) if the tagged record extensions in XHD do not overflow into a DES, or shall contain the sequence number of the DES into which they do overflow. This field shall be omitted if the field XHD contains BCS zeros (0x30).	3	BCS-N 000-999	C

TABLE A-1. NITF file header - Continued.

FIELD	NAME	SIZE	VALUE RANGE	TYPE
XHD	Extended Header Data. If present, this field shall contain tagged record extensions (see paragraph 5.8.1.2) approved and under configuration management of the ISMC. The length of this field shall be the length specified by the field XHDL minus 3 bytes. Tagged record extensions shall appear one after the other with no intervening bytes. The first byte of this field shall be the first byte of the first tagged record extension appearing in the field. The last byte of this field shall be the last tagged record extension to appear in the field. This field shall be omitted if the field XHDL contains BCS zeros (0x30).	††[1]	Tagged Record Extension(s)	C

†[1] As specified in UDHDL value minus 3 bytes
††[1] As specified in XHDL value minus 3 bytes

TABLE A-2. NITF image category (ICAT) and representation (IREP) associations.

IMAGE CATEGORY (ICAT)	DEFINITION	IMAGE REPRESENTATION (IREP)	STANDARD EXTENSION
VIS SL TI FL RD EO OP HR HS CP BP SAR SARIQ IR MS FP MRI XRAY CAT VD	Visible Imagery Side-Looking Radar Thermal Infrared Forward Looking Infrared Radar Electro-optical Optical High Resolution Radar Hyperspectral Color Frame Photography Black/White Frame Photography Synthetic Aperture Radar SAR Radio Hologram Infrared Multispectral Fingerprints Magnetic Resonance Imagery X-rays CAT Scans Video	MONO, RGB, RGB/LUT,YCbCr601, MULTI	If geo-referenced, presence of spatial location and positional accuracy is recommended.
MAP	Raster Maps	MONO, RGB, RGB/LUT, YCbCr601	If geo-referenced, presence of spatial location and positional accuracy is recommended.
LEG	Legends	MONO, RGB, RGB/LUT, YCbCr601	none
PAT	Color Patch	RGB, YCbCr601	none
DTEM	Matrix Data (elevations)	1D, ND	Presence of spatial location and positional accuracy is recommended.
MATR	Matrix Data (other)	1D, ND, 2D	Presence of spatial location and positional accuracy is recommended.
LOCG	Location Grid	2D	Presence of spatial location and positional accuracy is recommended.

TABLE A-3. NITF image subheader.
(TYPE “R” = Required, “C” = Conditional, “< >“ = BCS Spaces allowed for entire field)
(“†” annotations are explained at the end of the table)

FIELD	NAME	SIZE	VALUE RANGE	TYPE
IM	File Part Type. This field shall contain the characters “IM” to identify the subheader as an image subheader.	2	BCS-A IM	R
IID1	Image ID1. This field shall contain a valid alphanumeric identification code associated with the image. The valid codes are determined by the application.	10	BCS non-blank User defined	R
IDATIM	Image Date & Time. This field shall contain the time (UTC) of the image acquisition in the format CCYYMMDDhhmmss, where CC is the first two digits of the year (00-99), YY is the last two digits of the year (00-99), MM is the month (01-12), DD is the day (0-31), hh is the hour (00-23), mm is the minute (00-59), ss is the second (00-59). UTC (Zulu) is assumed to be the time zone designator to express the time of day.	14	BCS-N CCYYMMDDhhmmss	R
TGTID	Target ID. This field shall contain the identification of the primary target in the format, BBBBBBBBBBFFFFFCC, consisting of ten characters of BE (Basic Encyclopedia) identifier, followed by five characters of functional category code, followed by the two character country code as specified in FIPS PUB 10-4.	17	BCS-A (Default is BCS spaces (0x20))	<R>
IID2	Image IID2. This field can contain the identification of additional information about the image.	80	BCS-A (Default is BCS spaces (0x20))	<R>
ISCLAS	Image Security Classification. This field shall contain a valid value representing the classification level of the image. Valid values are T (=Top Secret), S (=Secret), C (=Confidential), R (=Restricted), U (=Unclassified).	1	BCS-A T, S, C, R, or U	R
NOTE If ISCLAS is T, S, C, or R, then ISCLSY must be populated with a valid code for the security classification system used.				
ISCLSY	Image Security Classification System. This field shall contain valid values indicating the national or multinational security system used to classify the image. Country Codes per FIPS 10-4 shall be used to indicate national security systems; codes found in DIAM 65-19 shall be used to indicate multinational security systems. If this field is all BCS spaces (0x20), it shall imply that no security classification system applies to the image.	2	BCS-A (Default is BCS spaces (0x20))	<R>
NOTE If any of the following fields are populated with anything other than spaces, then ISCLSY must be populated with a valid code for the security classification system used: ISCODE, ISREL, ISDCTP, ISDCDT, ISDCXM, ISDG, ISDGDT, ISCLTX, ISCATP, ISCAUT, ISCRSN, ISSRDT, and ISCTLN.				
ISCODE	Image Codewords. This field shall contain a valid indicator of the security compartments associated with the image. Values include one or more of the tri/digraphs found in DIAM 65-19 and/or Table A-4. Multiple entries shall be separated by single BCS spaces (0x20): The selection of a relevant set of codewords is application specific. If this field is all BCS spaces (0x20), it shall imply that no codewords apply to the image.	11	BCS-A (Default is BCS spaces (0x20))	<R>

TABLE A-3. NITF image subheader - Continued.

FIELD	NAME	SIZE	VALUE RANGE	TYPE
ISCTLH	Image Control and Handling. This field shall contain valid additional security control and/or handling instructions (caveats) associated with the image. Values include digraphs found in DIAM 65-19 and/or Table A-4. The digraph may indicate single or multiple caveats. The selection of a relevant caveat(s) is application specific. If this field is all BCS spaces (0x20), it shall imply that no additional control and handling instructions apply to the image.	2	BCS-A (Default is BCS spaces (0x20))	<R>
ISREL	Image Releasing Instructions. This field shall contain a valid list of country and/or multilateral entity codes to which countries and/or multilateral entities the image is authorized for release. Valid items in the list are one or more country codes as found in FIPS 10-4 and/or codes identifying multilateral entities as found in DIAM 65-19. If this field is all BCS spaces (0x20), it shall imply that no image release instructions apply.	20	BCS-A (Default is BCS spaces (0x20))	<R>
ISDCTP	Image Declassification Type. This field shall contain a valid indicator of the type of security declassification or downgrading instructions which apply to the image. Valid values are DD (=declassify on a specific date), DE (=declassify upon occurrence of an event), GD (=downgrade to a specified level on a specific date), GE (=downgrade to a specified level upon occurrence of an event), O (=OADR), and X (= exempt from automatic declassification). If this field is all BCS spaces (0x20), it shall imply that no image security declassification or downgrading instructions apply.	2	BCS-A (Default is BCS spaces (0x20))	<R>
ISDCDT	Image Declassification Date. This field shall indicate the date on which a image is to be declassified if the value in Image Declassification Type is DD. If this field is all BCS spaces (0x20), it shall imply that no image declassification date applies.	8	BCS-A CCYYMMDD (Default is BCS spaces (0x20))	<R>
ISDCXM	Image Declassification Exemption. This field shall indicate the reason the image is exempt from automatic declassification if the value in Image Declassification Type is X. Valid values are X1 through X8 and X251 through X259. X1 through X8 correspond to the declassification exemptions found in DOD 5200.1-R, paragraphs 4-202b(1) through (8) for material exempt from the 10-year rule. X251 through X259 correspond to the declassification exemptions found in DOD 5200.1-R, paragraphs 4-301a(1) through (9) for permanently valuable material exempt from the 25-year declassification system. If this field is all BCS spaces (0x20), it shall imply that a image declassification exemption does not apply.	4	BCS-A (Default is BCS spaces (0x20))	<R>

TABLE A-3. NITF image subheader - Continued.

FIELD	NAME	SIZE	VALUE RANGE	TYPE
ISDG	Image Downgrade. This field shall indicate the classification level to which a image is to be downgraded if the values in Image Declassification Type are GD or GE. Valid values are S (=Secret), C (=Confidential), R (= Restricted). If this field is all BCS spaces (0x20), it shall imply that image security downgrading does not apply.	1	BCS-A (Default is BCS spaces (0x20))	<R>
ISDGDT	Image Downgrade Date. This field shall indicate the date on which a image is to be downgraded if the value in Image Declassification Type is GD. If this field is all BCS spaces (0x20), it shall imply that a image security downgrading date does not apply.	8	BCS-A CCYYMMDD (Default is BCS spaces (0x20))	<R>
ISCLTX	Image Classification Text. This field shall be used to provide additional information about image classification to include identification of a declassification or downgrading event if the values in Image Declassification Type are DE or GE.. It may also be used to identify multiple classification sources and/or any other special handling rules. Values are user defined free text. If this field is all BCS spaces (0x20), it shall imply that additional information about image classification does not apply.	43	BCS-A (Default is BCS spaces (0x20))	<R>
ISCATP	Image Classification Authority Type. This field shall indicate the type of authority used to classify the image. Valid values are O (= original classification authority), D (= derivative from a single source), and M (= derivative from multiple sources). If this field is all BCS spaces (0x20), it shall imply that image classification authority type does not apply.	1	BCS-A (Default is BCS spaces (0x20))	<R>
ISCAUT	Image Classification Authority. This field shall identify the classification authority for the image dependent upon the value in Image Classification Authority Type. Values are user defined free text which should contain the following information: original classification authority name and position or personal identifier if the value in Image Classification Authority Type is O; title of the document or security classification guide used to classify the image if the value in Image Classification Authority Type is D; and Derive-Multiple if the image classification was derived from multiple sources. In the latter case, the image originator will maintain a record of the sources used in accordance with existing security directives. One of the multiple sources may also be identified in Image Classification Text if desired. If this field is all BCS spaces (0x20), it shall imply that no image classification authority applies.	40	BCS-A (Default is BCS spaces (0x20))	<R>

TABLE A-3. NITF image subheader - Continued.

FIELD	NAME	SIZE	VALUE RANGE	TYPE
ISCRSN	Image Classification Reason. This field shall contain values indicating the reason for classifying the image. Valid values are A through G. These correspond to the reasons for original classification per E.O. 12958, Section 1.5.(a) through (g). If this field is all BCS spaces (0x20), it shall imply that no image classification reason applies.	1	BCS-A (Default is BCS spaces (0x20))	<R>
ISSRDT	Image Security Source Date. This field shall indicate the date of the source used to derive the classification of the image. In the case of multiple sources, the date of the most recent source shall be used. If this field is all BCS spaces (0x20), it shall imply that a image security source date does not apply.	8	BCS-A CCYYMMDD (Default is BCS spaces (0x20))	<R>
ISCTLN	Image Security Control Number. This field shall contain a valid security control number associated with the image. The format of the security control number shall be in accordance with the regulations governing the appropriate security channel(s). If this field is all BCS spaces (0x20), it shall imply that no image security control number applies.	15	BCS-A (Default is BCS spaces (0x20))	<R>
ENCRYP	Encryption. This field shall contain the value BCS zero (0x30) until such time as this specification is updated to define the use of other values.	1	BCS-N (Default is BCS zero (0x30))	R
ISORCE	Image Source. This field shall contain a description of the source of the image. If the source of the data is classified, then the description shall be preceded by the classification, including codeword(s) contained in table A-4. If this field is all BCS spaces (0x20), it shall imply that no image source data applies.	42	BCS-A (Default is BCS spaces (0x20))	<R>
NROWS	Number of Significant Rows in Image. This field shall contain the total number of rows of significant pixels in the image. When NPPBV * NBPC > NROWS, the remaining last rows (NPPBV * NBPC - NROWS) shall contain fill data (that is, only the rows indexed 0 through NROWS -1 of the image contain “significant” data). The pixel fill values are determined by the application.	8	BCS-N 00000002-99999999	R
NCOLS	Number of Significant Columns in Image. This field shall contain the total number of columns of significant pixels in the image. When NPPBH * NBPR > NCOLS, the remaining last pixels of each column (NPPBH * NBPR - NCOLS) shall contain fill data (that is, only the columns indexed 0 through NCOLS -1 of the image contain “significant” data). The pixel fill values are determined by the application.	8	BCS-N 00000002-99999999	R

TABLE A-3. NITF image subheader - Continued.

FIELD	NAME	SIZE	VALUE RANGE	TYPE
PVTYPE	Pixel Value Type. This field shall contain an indicator of the type of computer representation used for the value for each pixel for each band in the image. Valid entries are INT for integer, B for bi-level, SI for 2's complement signed integer, R for real, and C for complex. The data bits of INT and SI values shall appear in the file in order of significance, beginning with the MSB and ending with the LSB. INT and SI data types shall be limited to 16 bits. R values shall be represented according to IEEE 32-bit floating point representation (IEEE 754). C values shall be represented with the Real and Imaginary parts, each represented in IEEE 32-bit floating point representation (IEEE 754) and appearing in adjacent four-byte blocks, first Real, then Imaginary. B (bi-level) pixel values shall be represented as single bits with value 1 or 0.	3	BCS-A INT, B, SI, R, C	R
IREP	Image Representation. This field shall contain a valid indicator for the general kind of image represented by the data. Valid representation indicators are MONO for monochrome; RGB for red, green, or blue true color, RGB/LUT for mapped color; 1D for monoband data; 2D for two dimensional data; ND for multidimensional data; and MULTI for multiband imagery. In addition, compressed imagery can have this field set to YCbCr601 when compressed in the ITU-R Recommendation BT.601-5 color space using JPEG (field IC=C3, C5, or I1). This field should be used in conjunction with the ICAT, ISUBCATnn, and IREPBANDnn fields to interpret the significance of each band in the image.	8	BCS-A MONO, RGB, RGB/LUT, 1D, 2D, ND, MULTI, YCbCr601 (See table A-2)	R
ICAT	Image Category. This field shall contain a valid indicator of the specific category of image, raster or grid data. Valid categories include VIS for visible imagery, SL for side-looking radar, TI for thermal infrared, FL for forward looking infrared, RD for radar, EO for electro-optical, OP for optical, HR for high resolution radar, HS for hyperspectral, CP for color frame photography, BP for black/white frame photography, SAR for synthetic aperture radar, SARIQ for SAR radio hologram, IR for infrared, MS for multispectral, FP for fingerprints, MRI for magnetic resonance imagery, XRAY for x-rays, CAT for CAT scans, and VD for video. Valid categories for geographic products or geo-reference support data are MAP for raster maps, PAT for color patch, LEG for legends, DTEM for elevation models, MATR for other types of matrix data, and LOCG for location grids. This field should be used in conjunction with the IREP, ISUBCATnn, and IREPBANDnn fields to interpret the significance of each band in the image.	8	BCS-A VIS, SL, TI, FL, RD, EO, OP, HR, HS,CP, BP, SAR, SARIQ, IR MS, FP, MRI, XRAY, CAT, MAP, PAT, LEG, DTEM, MATR, LOCG, VD (See table A-2) (Default is VIS)	R

TABLE A-3. NITF image subheader - Continued.

FIELD	NAME	SIZE	VALUE RANGE	TYPE
ABPP	Actual Bits-Per-Pixel Per Band. This field shall contain the number of "significant bits" for the value in each band of each pixel without compression. Even when the image is compressed, ABPP contains the number of significant bits per pixel that were present in the image before compression. This field shall be less than or equal to Number of Bits Per Pixel (field NBPP). The number of adjacent bits within each NBPP is used to represent the value. These "representation bits" shall be left justified or right justified within the NBPP bits, according to the value in the PJUST field. For example, if 11-bit pixels are stored in 16 bits, their field shall contain 11 and NBPP shall contain 16. The default number of "significant bits" to be used (if this field is all BCS zeros (0x30)) is the value contained in NBPP.	2	BCS-N 01-96	R
PJUST	Pixel Justification. When ABPP is not equal to NBPP, this field indicates whether the significant bits are left justified (L) or right justified (R). Nonsignificant bits in each pixel shall contain the value 0. Right justification is recommended.	1	BCS-A L or R (Default is R)	R
ICORDS	Image Coordinate System. This field shall contain a valid code indicating the type of coordinate system used for providing an approximate location of the image in the Image Geographic Location field (IGEOLO). The valid values for this field are : U=UTM expressed in Military Grid Reference System (MGRS) form, N=UTM (Northern hemisphere), S=UTM (Southern hemisphere), G= GEOGRAPHIC, and D=Decimal degrees (DMA TR 8350.2, WGS84, 2d edition). (Choice between N and S is based on hemisphere of northernmost point.) The Geodetic reference system is WGS84. If no coordinate system is identified, the space (BCS 0x20) shall be used.	1	BCS-A U, G, N, S, D or (Default is BCS spaces (0x20))	<R>

TABLE A-3. NITF image subheader - Continued.

FIELD	NAME	SIZE	VALUE RANGE	TYPE
IGEOLO	Image Geographic Location. This field shall contain an approximate geographic location, in terms of corner locations, of the image in the coordinate system specified in the ICORDS field. Coordinates shall be populated in the IGEOLO field to the precision of the corner coordinates. Non significant digits of the field shall be replaced with BCS blanks (0x20). (example: "ddmm Xdddmm Yddmm Xdddmm Yddmm Xdddmm Yddmm XdddmmY") The locations of the four corners of the (significant) image data shall be given in image coordinate order: (0,0), (0, MaxCol), (MaxRow, MaxCol), (MaxRow, 0). MaxCol and MaxRow shall be determined from the values contained, respectively, in NCOLS and NROWS as MaxCol = NCOLS -1 and MaxRow = NROWS -1. Valid corner locations in geographic coordinates shall be expressed as latitude and longitude. The format ddmmssX represents degrees, minutes, and seconds of latitude with X = N or S for north or south, and dddmmssY represents degrees, minutes, and seconds of longitude with Y = E or W for east or west, respectively. For the UTM coordinate system, coordinates shall be expressed either in plain UTM coordinates or using MGRS. Plain UTM coordinates use the format zzeeeeeennnnnnn where "zz" represents the UTM zone number, and "eeeeee," "nnnnnnn" represent Easting and Northing. UTM expressed in MGRS use format zzBJKeeeeennnnn where "zzBJK" represents the zone, band and 100 km x 100km area within the zone and "eeeee," "nnnnn" represent residuals of Easting and Northing. Decimal degrees are expressed as ±dd.ddd±ddd.ddd(four times) where ±dd.ddd equals latitude ("+"=northern hemisphere, "-"=southern hemisphere) and ±ddd.ddd =longitude ("+"=eastern hemisphere, "-"=western hemisphere). (Null if not calculable.) NOTE: Provide the value only to the decimal places (precision) warranted by the sources and methods used to determine the location. The remaining places will be blank. There is no implied accuracy associated with the data in this field. Additional precision for geospatial or geo-referencing applications can be found in geospatial related extensions if present in the file.	60	BCS-N ±dd.ddd±ddd.ddd (four times) or ddmmssXdddmmssY (four times) or zzBJKeeeeennnnn (four times) or zzeeeeeennnnnnn (four times)	C
NICOM	Number of Image Comments. This field shall contain the valid number of 80 character blocks (ICOMn) that follow to be used as free text image comments.	1	BCS-N 0-9	R

TABLE A-3. NITF image subheader - Continued.

FIELD	NAME	SIZE	VALUE RANGE	TYPE
ICOMn	Image Comment n. The field (ICOM1 through ICOMn), when present, shall contain free-form BCS-A text. They are intended for use as a single comment block and should be used that way. This field shall contain the n^{th} free text image comment, where n is defined as follows: $1 \leq n \leq$ NICOM. If the image comment is classified, it shall be preceded by the classification, including codeword(s). This field shall be omitted if the value in the NICOM field is 0.	80	BCS-A User defined	C
IC	Image Compression. This field shall contain a valid code indicating the form of compression used in representing the image data. Valid values for this field are, C1 to represent bi-level, C3 to represent JPEG, C4 to represent Vector Quantization, C5 to represent lossless JPEG, I1 to represent down sampled JPEG, and NC to represent the image is not compressed. Also valid are M1, M3, M4, and M5 for compressed images, and NM for uncompressed images indicating an image that contains a block mask and/or a transparent pixel mask. The format of a mask image is identical to the format of its corresponding non-masked image except for the presence of an Image Data Mask at the beginning of the image data area. The format of the Image Data Mask is described in paragraph 5.4.3.2 and is shown in table A-3(A). The definitions of the compression schemes associated with codes C1/M1, C3/M3, C4/M4, and C5/M5 are given, respectively, in ITU-T T-4, AMD2 08/95, MIL-STD-188-198A, MIL-STD-188-199, and NIMA N0106-97. C1=ITU-T T-4 AMD2 08/95, C3=MIL-STD-188-198A, C4= MIL-STD-188-199, and C5= NIMA N0106-97.	2	BCS-A NC, NM, C1, C3, C4, C5, I1, M1, M3, M4, M5	R

TABLE A-3. NITF image subheader - Continued.

FIELD	NAME	SIZE	VALUE RANGE	TYPE
COMRAT	Compression Rate Code. If the Image Compression (IC) field contains, C1, C4, M1, or M4, this field shall be present and contain a code indicating the compression rate for the image. If the value in IC is C1 or M1, the valid codes are 1D, 2DS, and 2DH, where: 1D represents One-dimensional Coding 2DS represents Two-dimensional Coding Standard Vertical Resolution (K=2) 2DH represents Two-dimensional Coding High Vertical Resolution (K=4) A BCS zero (0x30) will be used for the Y value when custom Q-Tables are used. Explanation of these codes can be found in ITU-T T-4, AMD2 08/95. If the value in IC is C3, C5, I1, or M5, the value of this field shall be 00.0. The value 00.0 represents embedded tables and is required by JPEG. Explanation of embedded tables can be found in MIL-STD-188-198A and NIMA N0105-97. If the value in IC is C4 or M4, this field shall contain a value given in the form nn.n representing the number of bits-per-pixel for the compressed image. Explanation of the compression rate for vector quantization can be found in MIL-STD-188-199. This field is omitted if the value in IC is NC or NM. If IC = I1, value = 00.0.	4	BCS-A See description for constraints	C
NBANDS	Number of Bands. This field shall contain the number of data bands within the specified image. This field and the IREP field are interrelated and independent of the IMODE field. The corresponding values for (IREP, NBANDS) are (MONO, 1); (RGB, 3); (RGB/LUT, 1); (YCbCr601, 3); (MULTI, 2-9); and 0 for multi-spectral images with greater than 9 bands. For 1D, 2D, and ND, NBANDS reflects the number of components at each data point.	1	BCS-A 0-9 See description for details	R
XBANDS	Number of Multi-Spectral Bands. When NBANDS contains the value 0, this field shall contain the number of bands comprising the multi-spectral image.	5	BCS-N 00010-99999	C
. . . . .				
NOTE: The fields IREPBANDnn through LUTDnnm repeat the number of times indicated in the NBANDS field or the XBANDS field.				

TABLE A-3. NITF image subheader - Continued.

FIELD	NAME	SIZE	VALUE RANGE	TYPE
IREPBANDnn	nnth Band Representation. When NBANDS contains the value 1, this field shall contain all spaces. In all other cases, this field shall contain a valid indicator of the interpretation of the nnth band. The band number is a positive integer when IREP contains MULTI. In all other cases, the use of this field is user defined. If the IREP field contains the value "2D," this field may contain "LX" or "LY." However, its purpose is to provide the significance of the nnth band of the image with regard to the general image type as recorded in IREP. The significance of each band in the image can be derived from the combination of the IREP, IREPBANDnn, ICAT, and ISUBCATnn fields.	2	BCS-A, (Default is BCS spaces (0x20)), R, G, B, Y, Cb, Cr, 01-99, LX, LY	<-C>
ISUBCATnn	nnth Band Subcategory. (This field is repeated for each band). The use of this field is user-defined except for the location grids and matrix data. Its purpose is to provide the significance of the nnth ban of the image with regard to the specific category (ICAT) of the overall image. An example would be the wave length of IR imagery. For location grids, the number of bands is strictly equal to 2, consequently, there are only 2 fields ISUBCAT1 and ISUBCAT2. Standard values of these fields for the Location grids are either ISUBCAT1=CGX and ISUBCAT2=CGY for the cartographic X (Easting) and Y (Northing) bands, or ISUBCAT1=GGX, and ISUBCAT2=GGY, for the geographic X(longitude), and Y(latitude) bands. Candidate values for the matrix data should be taken from STANAG 7074 (DIGEST) part 4 annex B.	6	BCS-A User defined (Default is BCS spaces (0x20))	<-R>
IFCnn	nnth Band Image Filter Condition. This field shall contain the value N (to represent none). Other values are reserved for future use.	1	BCS-A N	R
IMFLTnn	nnth Band Standard Image Filter Code. This field is reserved for future use. It shall be filled with BCS spaces (0x20).	3	BCS-A Fill with BCS spaces (0x20)	<-R>
NLUTSnn	nnth Band Number of LUTS. This field shall contain the number of look-up tables associated with the nnth band of the image. Use of the look-up tables is user defined in all cases after the first band.	1	BCS-N 0-4	<R>
NELUTnn	nnth Band Number of LUT Entries. This field shall contain the number of entries in each of the look-up tables for the nnth band of data. This field shall be omitted if the value in NLUTSnn is BCS zero (0x30).	5	BCS-N 1-65536	<C>

TABLE A-3. NITF image subheader - Continued.

FIELD	NAME	SIZE	VALUE RANGE	TYPE
LUTDnnm	nn^{th} Band Data of the m^{th} LUT. This field shall be omitted if the m^{th} LUT of the nn^{th} Band Number of LUTs is 0. Otherwise, this field shall contain the data defining the mm^{th} look-up table for the nn^{th} image band. Each entry in the look-up table is composed of one byte, ordered from most significant bit to least significant bit, representing a value form 0 to 255. To use the look-up table, for each integer k, 0≤k≤NELUTnn-1, the pixel value k in the nn^{th} image band shall be mapped to the value of the k^{th} byte of the look-up table. This field supports only integer band data (PVTYPE = INT). NOTE: This is a repeating field based on the value of NLUTSnn. When there are more than one table (NELUTnn>1, the net effect is to have the LUT ordered in band sequential fashion, e.g., all the red values followed by green values followed by blue values.	†[3]	LUT Values	<C>
ISYNC	Image Sync code. This field shall contain BCS zero (0x30).	1	BCS-N 0	R
IMODE	Image Mode. This field shall contain an indicator of whether the image bands are stored in the file sequentially or band interleaved by block or band interleaved by pixel format or band interleaved by row. Valid values are B, P, R, and S. The significance of the IMODE value must be interpreted with the knowledge of whether the image is JPEG compressed (IC=C3, C5, M3, or M5), VQ compressed (IC=C4, or M4), or uncompressed (IC=NC or NM). When IC=C1 or M1, the use of IMODE defaults to B. When IC=I1, IMODE is B. For the uncompressed case: The value R represents band interleaved by row, where the ordering mechanism stores the pixel values of each band in row sequential order. Within each block, all pixel values of the first row of the first band are followed by pixel values of the first row of the second band continuing until all values of the first row are stored. The remaining rows are stored in a similar fashion until the last row of values has been stored. Each block shall be zero filled to the next octet boundary when necessary. The value S represents band sequential, where all blocks for the first band are followed by all blocks for the second band, and so on: [(block1, band1), (block2, band1), ... (blockM, band1)], [(block1, band2), (block2, band 2), ... (blockM, band2)] ... [(block1, bandN), (block2, bandN), ... (blockM, bandN)]. The values B and P indicate variations on block sequential where all data from all bands for the first block is followed by all data from all bands for the second block, and so on. The variations are based on the way the bands are organized within each block. B represents band interleaved by block. This means that within each block, the bands follow one	1	BCS-A B, P, R, S	R

TABLE A-3. NITF image subheader - Continued.

FIELD	NAME	SIZE	VALUE RANGE	TYPE
IMODE (continued)	another: [(block1, band1), (block1, band2), ...(block1, bandN)], [(block2, band1), (block2, band2), ... (block2, bandN)], ... [(blockM, band1), (blockM, band2), ... (blockM, bandN)]. P represents band interleaved by pixel within each block: such as, for each block, one after the other, the full pixel vector (all band values) appears for every pixel in the block, one pixel after another, the block column index varying faster than the block row index. If the NBANDS field is 1, the cases B and S coincide. In this case, this field shall contain B. If the Number of Blocks is 1(NBPR = NBPC = 1), this field shall contain B for non-interleaved by pixel, and P for interleaved by pixel. The value S is only valid for images with multiple blocks and multiple bands. For the JPEG-compressed case: The presence of B, P, or S implies specific ordering of data within the JPEG image data representation. The interpretation of the values of IMODE for this case is specified in MIL-STD-188-198**A**. For the Vector Quantization compressed case: VQ compressed images are normally either RGB with a color look-up table or monochromatic. In either case, the image is single band, and the IMODE field defaults to B. However, it is possible to have a multiband VQ compressed image in band sequential, band interleaved by block, or band interleaved by pixel format.			
NBPR	Number of Blocks Per Row. This field shall contain the number of image blocks in a row of blocks (see paragraph 5.4.2.2) in the horizontal direction. If the image consists of only a single block, this field shall contain the value one.	4	BCS-N 0001-9999	R
NBPC	Number of Blocks Per Column. This field shall contain the number of image blocks in a column of blocks (see paragraph 5.4.2.2) in the vertical direction. If the image consists of only a single block, this field shall contain the value one.	4	BCS-N 0001-9999	R
NPPBH	Number of Pixels Per Block Horizontal. This field shall contain the number of pixels horizontally in each block of the image. It shall be the case that NBPR*NPPBH≥NCOLS.	4	BCS-N 0001-8192	R
NPPBV	Number of Pixels Per Block Vertical. This field shall contain the number of pixels vertically in each block of the image. It shall be the case that NBPC*NPPBV≥NROWS.	4	BCS-N 0001-8192	R

TABLE A-3. NITF image subheader - Continued.

FIELD	NAME	SIZE	VALUE RANGE	TYPE
NBPP	Number of Bits Per Pixel Per Band. If IC contains NC, NM, C4, or M4, this field shall contain the number of storage bits used for the value from each component of a pixel vector. The value in this field always shall be greater than or equal to Actual Bits Per Pixel (ABPP). For example, if 11-bit pixels are stored in 16 bits, this field shall contain 16 and Actual Bits Per Pixel shall contain 11. If IC = C3, M3, C5, M5, or I1 this field shall contain the value 8 or the value 12. If IC = C1, this field shall contain the value 1.	2	BCS-N 01-96	R
IDLVL	Display Level. This field shall contain a valid value that indicates the graphic display level of the image relative to other displayed file components in a composite display. The valid values are 001 to 999. The display level of each displayable file component (image or graphic) within a file shall be unique; that is, each number from 001 to 999 is the display level of, at most, one item. The meaning of display level is fully discussed in paragraph 5.3.3. The image or graphic component in the file having the minimum display level shall have attachment level 0.	3	BCS-N 001-999	R
IALVL	Attachment Level. This field shall contain a valid value that indicates the attachment level of the image. Valid values for this field are 0, and the display level value of any other image or graphic in the file. The meaning of attachment level is fully discussed in paragraph 5.3.4. The image, graphic, or text component in the file having the minimum display level shall have attachment level 0.	3	BCS-N 000-998 (Default is 000)	R
ILOC	Image Location. The image location is the location of the first pixel of the first line of the image. This field shall contain the image location represented as rrrrrccccc, where rrrrr and ccccc are the row and column offset from the ILOC or SLOC value of the item to which the image is attached. A row or column value of 00000 indicates no offset. Positive row and column values indicate offsets down and to the right and range from 00001 to 99999, while negative row and column values indicate offsets up and to the left and must be within the range -0001 to -9999. The location in the common coordinate system of all displayable graphic components can be computed from the offsets given in the ILOC and SLOC fields.	10	BCS-N -9999 ≤ rrrrr ≤ 99999 to -9999 ≤ ccccc ≤ 99999 (Default is BCS zeros (0x30))	R

TABLE A-3. NITF image subheader - Continued.

FIELD	NAME	SIZE	VALUE RANGE	TYPE
IMAG	Image Magnification. This field shall contain the magnification (or reduction) factor of the image relative to the original source image. Decimal values are used to indicate magnification, and decimal fraction values indicate reduction. For example, "2.30" indicates the original image has been magnified by a factor of "2.30," while "0.5" indicates the original image has been reduced by a factor of 2. The default value is 1.0, indicating no magnification or reduction. In addition, the following values shall be used for reductions that are reciprocals of nonnegative powers of 2: /2 (for 1/2), /4 (for 1/4), /8 (for 1/8), /16 (for 1/16), /32 (for 1/32), /64 (for 1/64), /128 (for 1/128).	4	BCS-A /2, /4, /8, /16, /32, /64, /128 or decimal value (Default is 1.0 followed by BCS space (0x20))	R
UDIDL	User Defined Image Data Length. A value of 0 shall represent that no tagged record extensions are included in the UDID field. If a tagged record extension exists, the field shall contain the sum of the length of all the tagged record extensions (see paragraph 5.7.l.l) appearing in the UDID field plus 3 bytes (length of UDOFL field). If a tagged record extension is too long to fit in the UDID field, it may be put in a data extension segment (see paragraph 5.8.1.3.1.)	5	BCS-N 00000 or 00003-99999	R
UDOFL	User Defined Overflow. If present, this field shall contain 000 if the tagged record extensions in UDID do not overflow into a DES, or shall contain the sequence number of the DES into which they do overflow. This field shall be omitted if the field UDIDL contains BCS zeros (0x30).	3	BCS-N 000-999	C
UDID	User Defined Image Data. If present, this field shall contain tagged record extensions (see paragraph 5.8.1.1). The length of this field shall be the length specified by the field UDIDL minus 3. Tagged record extensions in this field for an image shall contain information pertaining specifically to the image. Tagged record extensions shall appear one after the other with no intervening bytes. The first byte of this field shall be the first byte of the first tagged record extension appearing in the field. The last byte of this field shall be the last byte of the last tagged record extension to appear in the field. This field shall be omitted if the field UDIDL contains BCS zeros (0x30).	††[3]	Tagged Record Extensions	C

TABLE A-3. NITF image subheader - Continued.

FIELD	NAME	SIZE	VALUE RANGE	TYPE
IXSHDL	Extended Subheader Data Length. This field shall contain the length in bytes in IXSHD plus 3 (length of IXSOFL). The length is 3 plus sum of the lengths of all the tagged record extensions (see paragraph 5.7.1.2) appearing in the IXSHD field. A value of BCS zeros (0x30) shall represent that no tagged record extensions are included in the IXSHD field. If a tagged record extension exists, the field shall contain the sum of the length of all the tagged record extensions (see paragraph 5.7.1.2) appearing in the IXSHD field plus 3 bytes (length of IXSOFL field). If a tagged record extension is too long to fit in the IXSHD field, it shall may be put in a data extension segment (see paragraph 5.7.1.4).	5	BCS-N 00000 or 00003-99999	R
IXSOFL	Extended Subheader Overflow. If present, this field shall contain "000" if the tagged record extensions in IXSHD do not overflow into a DES, or shall contain the sequence number of the DES into which they do overflow. This field shall be omitted if the field IXSHDL contains BCS zeros (0x30).	3	BCS-N 000-999	C
IXSHD	Extended Subheader Data. If present, this field shall contain tagged record extensions (see paragraph 5.8.1.2) approved and under configuration management by the ISMC. The length of this field shall be the length specified by the field IXSHDL minus 3. Tagged record extensions in this field for an image shall contain information pertaining specifically to the image. Tagged record extensions shall appear one after the other in this field with no intervening bytes. The first byte of this field shall be the first byte of the first tagged record extension appearing in the field. The last byte of this field shall be the last byte of the last tagged record extension to appear in the field. This field shall be omitted if the field IXSHDL contains 0.	†††[3]	Tagged Record Extension(s)	C

†[3] One Byte for each entry
††[3] As specified in UDIDL minus 3 bytes
†††[3] As specified in IXSHDL minus 3 bytes

TABLE A-3(A). NITF image data mask table.
(TYPE "R" = Required, "C" = Conditional, "< >" = BCS Spaces allowed for entire field)
("†" annotations are explained at the end of the table)

FIELD	NAME	SIZE	VALUE RANGE	TYPE
IMDATOFF	Blocked Image Data Offset. This field is included if the IC value equals NM, M1, M3, M4, or M5. It identifies the offset from the beginning of the Image Data Mask to the first byte of the blocked image data. This offset, when used in combination with the offsets provided in the BMR fields, can provide random access to any recorded image block in any image band.	4	Binary integer: 0x00000000 to 0xFFFFFFFF	C
BMRLNTH	Block Mask Record Length. This field is included if the IC value equals NM, M1, M3, M4, or M5. It identifies the length of each Block Mask Record in bytes. When present, the length of each Block Mask Record is 4 bytes. The total length of all the block Mask Records is equal to BMRLNTH x NBPR x NBPC x NBANDS (one 4 byte record for each block of each band in the image). If all of the image blocks are recorded, this value may be set to 0, and the conditional BMR fields are not recorded/transmitted. Otherwise, the value may be set to 4, and the conditional BMR fields are recorded/transmitted and can be used as an off-set index for each image block in each band of the image. If this field is present, but coded as 0, then only a pad pixel mask is included.	2	Unsigned binary integer; 0x0000=No Block mask record; 0x0004=Block mask records (4 bytes each) are present	C
TMRLNTH	Pad Pixel Mask Record Length. This field is included if the IC value equals NM, M1, M3, M4, or M5. It identifies the length of each Pad Pixel Mask Record in bytes. When present, the length of each Pad Pixel Mask Record is 4 bytes. The total length of the Pad Pixel Mask Records is equal to TMRLNTH x NBPR x NBPC x NBANDS (one 4 byte record for each block for each band in the image). If none of the image blocks contain pad pixels, this value is set to 0, and the conditional TMR fields are not recorded/transmitted. For IC value of M3, the value shall be set to 0. If this field is present, but coded as 0, then a Block Mask is included.	2	Unsigned binary integer; 0x0000=No Pad pixel mask records; 0x0004=Pad pixel mask records (4 bytes each) are present	C
TPXCDLNTH	Transparent Output Pixel Code Length. This field is included if the IC value equals NM, M1, M3, M4, or M5. It identifies the length in bits of the Transparent Output Pixel Code. If coded as 0, then no transparent pixels are present, and the TPXCD field is not recorded. For IC value of M3, the value shall be set to 0..	2	Unsigned binary integer; 0x0000=No pad pixels; 0x0001 to 0x0010=pad pixel code length in bits	C

TABLE A-3(A). NITF image data mask table - Continued.

FIELD	NAME	SIZE	VALUE RANGE	TYPE
TPXCD	Pad Output Pixel Code. This field is included if the IC value equals NM, M1, M3, M4, or M5 and TPXCDLNTH is not 0. It contains the output pixel code that represents a pad pixel in the image. This value is unique within the image, and allows the user to identify pad pixels. The pad output pixel code length is determined by TPXCDLNTH, but the value is stored in a maximum of 2 bytes. If the number of bits used by TPXCD is less than the number of bits available for storage, the value shall be justified in accordance with the PJUST field in the image subheader.	†[3A]	Binary integer; 0 to 2^n -1 where n=TPXCDLNTH	C
NOTE: The BMRnBNDm record repeats; one 4 byte record for each block of each band in the image. This results in a table containing an offset value (or 0xFFFFFFFF) for each block of each band of the image.				
BMRnBNDm	Block n, Band m. This field shall contain the n^{th} Block Mask Record of band m. It is recorded/transmitted only if the BMRLNTH field is not 0. The field shall contain an offset in bytes from the beginning of the Blocked Image Data to the first byte of block n of band m. If block n of band m is not recorded/transmitted in the image data, the offset value is defaulted to 0xFFFFFFFF. The offsets for all blocks in band 1 are recorded followed by block offsets for band 2, etc. (band sequential). The number of BMR records for each band is NBPR * NBPC.	4	Binary integer Increment n prior to m $0 \leq n \leq$ NBPR*NBPC -1 $0 \leq m \leq$ max(NBANDS,XBANDS) (Default is 0xFFFFFFFF if the block is not recorded)	C
. . . .				
NOTE: The TMRnBNDm record repeats; one 4 byte record for each block of each band in the image. This results in a table containing an offset value (or 0xFFFFFFFF) for each block of each band of the image.				
TMRnBNDm	Pad Pixel n, Band m. This field shall contain the n^{th} Pad Pixel mask for band m. It is recorded/transmitted only if the TMRLNTH field is not 0. The field shall contain an offset in bytes from the beginning of the Blocked Image Data to the first byte of block n of band m if block n contains pad pixels, or 0xFFFFFFFF to indicate that this block does not contain pad pixels. The offsets for all blocks in band 1 are recorded followed by block offsets for band 2, etc. (band sequential). The number of TMR records for each band is NBPR * NBPC.	4	Binary integer Increment n prior to m $0 \leq n \leq$ NBPR*NBPC.-1 $0 \leq m \leq$ max(NBANDS,XBANDS) (Default is 0xFFFFFFFF if the block is not recorded)	C

†[3A] The length of the TPXCD field is the next highest number of bytes that can contain the number of bits identified in the TPXCDLNTH field. For example, a TPXCDLNTH value of 12 would be stored in a TPXCD field of two bytes.

TABLE A-4. Security control markings.

ORCON	OR
PROPIN	PI
US ONLY	UO
LIMDIS	DS
ATOMAL	AT
COSMIC	CS
CNWDI	CN
CRYPTO	CR
FOUO	FO
RESTRICTED DATA	RD
FORMREST DATA	RF
SIOP	SH
SIOP/ESI	SE
COPYRIGHT	PX
EFTO	TX
LIM OFF USE (UNCLAS)	LU
NONCOMPARTMENT	NT
PERSONAL DATA	IN
SAO	SA
SAO-1	SL
SAO-2	HA
SAO-3	HB
SAO-SI-2	SK
SAO-SI-3	HC
SAO-SI-4	HD
SPECIAL CONTROL	SC
SPECIAL INTEL	SI
WARNING NOTICE - SEC CLAS IS BASED ON THE FACT OF EXISTENCE AND AVAIL OF THIS GRAPHIC	WN
OTHER CODEWORDS	USE APPROPRIATE DIGRAPH

TABLE A-5. NITF graphic subheader.
(TYPE "R" = Required, "C" = Conditional, "< >" = BCS Spaces allowed for entire field)
("†" annotations are explained at the end of the table)

FIELD	NAME	SIZE	VALUE RANGE	TYPE
SY	File Part Type. This field shall contain the characters SY to identify the subheader as a graphic subheader.	2	BCS-A SY	R
SID	Graphic ID. This field shall contain a valid alphanumeric identification code associated with the graphic. The valid codes are determined by the application.	10	BCS-A User defined, non-blank	R
SNAME	Graphic name. This field shall contain an alphanumeric for the graphic.	20	BCS-A (Default is BCS spaces (0x20))	<R>
SSCLAS	Graphic Security Classification. This field shall contain a valid value representing the classification level of the graphic. Valid values are T (=Top Secret), S (=Secret), C (=Confidential), R (=Restricted), U (=Unclassified).	1	BCS-A T, S, C, R, or U	R
NOTE: If SSCLAS is T, S, C, or R, then SSCLSY must be populated with a valid code for the security classification system used.				
SSCLSY	Graphic Security Classification System. This field shall contain valid values indicating the national or multinational security system used to classify the graphic. Country Codes per FIPS 10-4 shall be used to indicate national security systems; codes found in DIAM 65-19 shall be used to indicate multinational security systems. If this field is all BCS spaces (0x20), it shall imply that no security classification system applies to the graphic.	2	BCS-A (Default is BCS spaces (0x20))	<R>
NOTE: If any of the following fields are populated with anything other than spaces, then SSCLSY must be populated with a valid code for the security classification system used: SSCODE, SSREL, SSDCTP, SSDCDT, SSDCXM, SSDG, SSDGDT, SSCLTX, SSCATP, SSCAUT, SSCRSN, SSSRDT, and SSCTLN.				
SSCODE	Graphic Codewords. This field shall contain a valid indicator of the security compartments associated with the graphic. Valid values include one or more of the tri/digraphs found in DIAM 65-19 and/or Table A-4. Multiple entries shall be separated by single BCS spaces (0x20): The selection of a relevant set of codewords is application specific. If this field is all BCS spaces (0x20), it shall imply that no codewords apply to the graphic.	11	BCS-A (Default is BCS spaces (0x20))	<R>
SSCTLH	Graphic Control and Handling. This field shall contain valid additional security control and/or handling instructions (caveats) associated with the graphic. Values include digraphs found in DIAM 65-19 and/or Table A-4. The digraph may indicate single or multiple caveats. The selection of a relevant caveat(s) is application specific. If this field is all BCS spaces (0x20), it shall imply that no additional control and handling instructions apply to the graphic.	2	BCS-A (Default is BCS spaces (0x20))	<R>

TABLE A-5. NITF graphic subheader - Continued.

FIELD	NAME	SIZE	VALUE RANGE	TYPE
SSREL	Graphic Releasing Instructions. This field shall contain a valid list of country and/or multilateral entity codes to which countries and/or multilateral entities the graphic is authorized for release. Valid items in the list are one or more country codes as found in FIPS 10-4 and/or codes identifying multilateral entities as found in DIAM 65-19. If this field is all BCS spaces (0x20), it shall imply that no graphic release instructions apply.	20	BCS-A (Default is BCS spaces (0x20))	<R>
SSDCTP	Graphic Declassification Type. This field shall contain a valid indicator of the type of security declassification or downgrading instructions which apply to the graphic. Valid values are DD (=declassify on a specific date), DE (=declassify upon occurrence of an event), GD (=downgrade to a specified level on a specific date), GE (=downgrade to a specified level upon occurrence of an event), O (=OADR), and X (= exempt from automatic declassification). If this field is all BCS spaces (0x20), it shall imply that no graphic security declassification or downgrading instructions apply.	2	BCS-A (Default is BCS spaces (0x20))	<R>
SSDCDT	Graphic Declassification Date. This field shall indicate the date on which a graphic is to be declassified if the value in Graphic Declassification Type is DD. If this field is all BCS spaces (0x20), it shall imply that no graphic declassification date applies.	8	BCS-A CCYYMMDD	R
SSDCXM	Graphic Declassification Exemption. This field shall indicate the reason the graphic is exempt from automatic declassification if the value in Graphic Declassification Type is X. Valid values are X1 through X8 and X251 through X259. X1 through X8 correspond to the declassification exemptions found in DOD 5200.1-R, paragraphs 4-202b(1) through (8) for material exempt from the 10-year rule. X251 through X259 correspond to the declassification exemptions found in DOD 5200.1-R, paragraphs 4-301a(1) through (9) for permanently valuable material exempt from the 25-year declassification system. If this field is all BCS spaces (0x20), it shall imply that a graphic declassification exemption does not apply.	4	BCS-A (Default is BCS spaces (0x20))	<R>
SSDG	Graphic Downgrade. This field shall indicate the classification level to which a graphic is to be downgraded if the values in Graphic Declassification Type are GD or GE. Valid values are S (=Secret), C (=Confidential), R (= Restricted). If this field is all BCS spaces (0x20), it shall imply that graphic security downgrading does not apply.	1	BCS-A (Default is BCS spaces (0x20))	<R>
SSDGDT	Graphic Downgrade Date. This field shall indicate the date on which a graphic is to be downgraded if the value in Graphic Declassification Type is GD. If this field is all BCS spaces (0x20), it shall imply that a graphic security downgrading date does not apply.	8	BCS-A CCYYMMDD	R

TABLE A-5. NITF graphic subheader - Continued.

FIELD	NAME	SIZE	VALUE RANGE	TYPE
SSCLTX	Graphic Classification Text. This field shall be used to provide additional information about graphic classification to include identification of a declassification or downgrading event if the values in Graphic Declassification Type are DE or GE.. It may also be used to identify multiple classification sources and/or any other special handling rules. Values are user defined free text. If this field is all BCS spaces (0x20), it shall imply that additional information about graphic classification does not apply.	43	BCS-A (Default is BCS spaces (0x20))	<R>
SSCATP	Graphic Classification Authority Type. This field shall indicate the type of authority used to classify the graphic. Valid values are O (= original classification authority), D (= derivative from a single source), and M (= derivative from multiple sources). If this field is all BCS spaces (0x20), it shall imply that graphic classification authority type does not apply.	1	BCS-A (Default is BCS spaces (0x20))	<R>
SSCAUT	Graphic Classification Authority. This field shall identify the classification authority for the graphic dependent upon the value in Graphic Classification Authority Type. Values are user defined free text which should contain the following information: original classification authority name and position or personal identifier if the value in Graphic Classification Authority Type is O; title of the document or security classification guide used to classify the graphic if the value in Graphic Classification Authority Type is D; and Derive-Multiple if the graphic classification was derived from multiple sources. In the latter case, the graphic originator will maintain a record of the sources used in accordance with existing security directives. One of the multiple sources may also be identified in Graphic Classification Text if desired. If this field is all BCS spaces (0x20), it shall imply that no graphic classification authority applies.	40	BCS-A (Default is BCS spaces (0x20))	<R>
SSCRSN	Graphic Classification Reason. This field shall contain values indicating the reason for classifying the graphic. Valid values are A through G. These correspond to the reasons for original classification per E.O. 12958, Section 1.5.(a) through (g). If this field is all BCS spaces (0x20), it shall imply that no graphic classification reason applies.	1	BCS-A (Default is BCS spaces (0x20))	<R>
SSSRDT	Graphic Security Source Date. This field shall indicate the date of the source used to derive the classification of the graphic. In the case of multiple sources, the date of the most recent source shall be used. If this field is all BCS spaces (0x20), it shall imply that a graphic security source date does not apply.	8	BCS-A CCYYMMDD	R

TABLE A-5. NITF graphic subheader - Continued.

FIELD	NAME	SIZE	VALUE RANGE	TYPE
SSCTLN	Graphic Security Control Number. This field shall contain a valid security control number associated with the graphic. The format of the security control number shall be in accordance with the regulations governing the appropriate security channel(s). If this field is all BCS spaces (0x20), it shall imply that no graphic security control number applies.	15	BCS-A (Default is BCS spaces (0x20))	<R>
ENCRYP	Encryption. This field shall contain the value BCS zero (0x30) until such time as this specification is updated to define the use of other values.	1	BCS-N 0=Not Encrypted (Default is BCS zero (0x30))	R
STYPE	Graphic Type. This field shall contain a valid indicator of the representation type of the graphic. The valid value is C, which represents Computer Graphics Metafile. The graphic data contain a Computer Graphics Metafile in binary format that defines the graphic according to MIL-STD-2301. Future versions of the NITF may include additional CGM profiles.	1	BCS-A C for CGM	R
SRES1	Reserved for Future Use. Reserved.	13	BCS-N 0000000000000-9999999999999 (Default is BCS zeros (0x30))	R
SDLVL	Display Level. This field shall contain a valid value that indicates the graphic display level of the graphic relative to other displayed file components in a composite display. The valid values are 001 to 999. The display level of each displayable file component (image or graphic) within a file shall be unique; that is, each number from 001 to 999 is the display level of, at most, one item. The meaning of display level is discussed fully in paragraph 5.3.3. The graphic or image component in the file having the minimum display level shall have attachment level 0.	3	BCS-N 001-999	R
SALVL	Attachment Level. This field shall contain a valid value that indicates the attachment level of the graphic. Valid values for this field are 0 and the display level value of any other image or graphic in the file. The meaning of attachment level is discussed fully in paragraph 5.3.4. The graphic or image component in the file having the minimum display level shall have attachment level 0.	3	BCS-N 000-998 (Default is BCS zeros (0x30))	R

TABLE A-5. NITF graphic subheader - Continued.

FIELD	NAME	SIZE	VALUE RANGE	TYPE
SLOC	Graphic Location. The graphics location is specified by providing the location of a point bearing a particular relationship to the graphic. For a CGM graphic, the point is the Virtual Device Coordinate (VDC) origin as defined in ISO/IEC 8632-1. This field shall contain the graphic location represented as rrrrrccccc, where rrrrr and ccccc are the row and column offset from the ILOC or SLOC value of the item to which the graphic is attached. A row and column value of 00000 indicates no offset. Positive row and column values indicate offsets down and to the right and range from 00001 to 99999, while negative row and column values indicate offsets up and to the left and must be within the range -0001 to -9999. The location in this common coordinate system of all displayable graphic components can be computed from the offsets given in the ILOC and SLOC fields.	10	BCS-N -9999≤rrrrr≤99999 -9999≤ccccc≤99999 (Default is BCS zeros (0x30))	R
SBND1	First Graphic Bound Location. This field shall contain an ordered pair of integers defining a location in Cartesian coordinates for use with CGM graphics. It is the upper left corner of the bounding box for the CGM graphic. See paragraph 5.5.2.1 for a complete description. The format is rrrrrccccc, where rrrrr is the row and ccccc is the column offset from ILOC or SLOC value of the item to which the graphic is attached. If the graphic is unattached (SALVL-0), rrrrr and ccccc represent offsets from the origin of the coordinate system that is common to all images and graphics in the file having attachment level 0. The range for rrrrr and ccccc shall be -9999 to 99999.	10	BCS-N rrrrrccccc	R
SCOLOR	Graphic Color. If STYPE = C, this field shall contain a C if the CGM contains any color pieces or an M if it is monochrome (i.e., black, white, or levels of grey).	1	BCS-A C, M	R
SBND2	Second Graphic Bound Location. This field shall contain an ordered pair of integers defining a location in Cartesian coordinates for use with CGM graphics. It is the lower right corner of the bounding box for the CGM graphic. See paragraph 5.5.2.1 for a complete description. The format is rrrrrccccc, where rrrrr is the row and ccccc is the column offset from ILOC or SLOC value of the item to which the graphic is attached. If the graphic is unattached (SALVL=0), rrrrr and ccccc represent offsets from the origin of the coordinate system that is common to all images and graphics in the file having attachment level 0. The range for rrrrr and ccccc shall be -9999 to 99999.	10	rrrrrccccc	R
SRES2	Reserved for Future Use. This field is reserved for future use. The default value shall be BCS zeros (0x30).	2	BCS-N 00 - 99 (Default is BCS zeros (0x30))	R

TABLE A-5. NITF graphic subheader - Continued.

FIELD	NAME	SIZE	VALUE RANGE	TYPE
SXSHDL	Extended Subheader Data Length. A value of 0 shall represent that no tagged record extensions are included in the graphic subheader. If a tagged record extension exists, the field shall contain the sum of the length of all the tagged record extensions (see paragraph 5.7.1.2) appearing in the SXSHD field plus 3 bytes (length of SXSOFL field). If a tagged record extension is too long to fit in the SXSHD field, it shall be put in a data extension segment (see paragraph 5.7.2.2).	5	BCS-N 00000 or 00003-09741	R
SXSOFL	Extended Subheader Overflow. If present, this field shall contain "000" if the tagged record extensions in SXSHD do not overflow into a DES or shall contain the sequence number of the DES into which they do overflow. This field shall be omitted if the field SXSHDL contains BCS zeros (0x30)..	3	BCS-N 000-999	C
SXSHD	Extended Subheader Data. If present, this field shall contain tagged record extensions (see paragraph 5.7.1.2) approved and under configuration management by the ISMC. The length of this field shall be the length specified by the field SXSHDL minus 3 bytes. Tagged record extensions in this field for a graphic shall contain information pertaining specifically to the graphic. Tagged record extensions shall appear one after the other in this field with no intervening bytes. The first byte of this field shall be the first byte of the first tagged record extension appearing in the field. The last byte of this field shall be the last byte of the last tagged record extension to appear in the field. This field shall be omitted if the field SXSHDL contains BCS zeros (0x30).	†[5]	Tagged Record Extensions	C

†[5] As specified by the SHSHDL field minus 3 bytes

TABLE A-6. NITF text subheader.
(TYPE “R” = Required, “C” = Conditional, “< >“ = BCS Spaces allowed for entire field)
(“†” annotations are explained at the end of the table)

FIELD	NAME	SIZE	VALUE RANGE	TYPE
TE	File Part Type. This field shall contain the characters “TE” to identify the subheader as a text subheader.	2	TE	R
TEXTID	Text ID. This field shall contain a valid alphanumeric identification code associated with the text item. The valid codes are determined by the application.	7	BCS-A (User defined, non-blank)	R
TXTALVL	Text Attachment Level. This field shall contain a valid value that indicates the attachment level of the text. Valid values for this field are 000 and the display level value of any image or graphic in the file.	3	BCS-N 000-998 (Default is BCS zeros (0x30))	R
TXTDT	Text Date & Time. This field shall contain the time (UTC) of origination of the text in the format CCYYMMDDhhmmss, where CC is the first two digits of the year (00-99), YY is the last two digits of the year (00-99), MM is the month (01-12), DD is the day (01-31), hh is the hour (00-23), mm is the minute (00-59), and ss is the second (00-59). UTC (Zulu) is assumed to be the time zone designator to express the time of day.	14	BCS-A CCYYMMDDhhmmss	R
TXTITL	Text Title. This field shall contain the title of the text item.	80	BCS-A (Default is BCS spaces (0x20))	<R>
TSCLAS	Text Security Classification. This field shall contain a valid value representing the classification level of the text. Valid values are T (=Top Secret), S (=Secret), C (=Confidential), R (=Restricted), U (=Unclassified).	1	BCS-A T, S, C, R, or U	R
NOTE: If TSCLAS is T, S, C, or R, then TSCLSY must be populated with a valid code for the security classification system used.				
TSCLSY	Text Security Classification System. This field shall contain valid values indicating the national or multinational security system used to classify the text. Country Codes per FIPS 10-4 shall be used to indicate national security systems; codes found in DIAM 65-19 shall be used to indicate multinational security systems. If this field is all BCS spaces (0x20), it shall imply that no security classification system applies to the text.	2	BCS-A (Default is BCS spaces (0x20))	<R>
NOTE: If any of the following fields are populated with anything other than spaces, then TSCLSY must be populated with a valid code for the security classification system used: TSCODE, TSREL, TSDCTP, TSDCDT, TSDCXM, TSDG, TSDGDT, TSCLTX, TSCATP, TSCAUT, TSCRSN, TSSRDT, and TSCTLN.				
TSCODE	Text Codewords. This field shall contain a valid indicator of the security compartments associated with the text. Values include one or more of the tri/digraphs found in DIAM 65-19 and/or Table A-4. Multiple entries shall be separated by single BCS spaces (0x20): The selection of a relevant set of codewords is application specific. If this field is all BCS spaces (0x20), it shall imply that no codewords apply to the text.	11	BCS-A (Default is BCS spaces (0x20))	<R>

TABLE A-6. NITF text subheader - Continued.

FIELD	NAME	SIZE	VALUE RANGE	TYPE
TSCTLH	Text Control and Handling. This field shall contain valid additional security control and/or handling instructions (caveats) associated with the text. Values include digraphs found in DIAM 65-19 and/or Table A-4. The digraph may indicate single or multiple caveats. The selection of a relevant caveat(s) is application specific. If this field is all BCS spaces (0x20), it shall imply that no additional control and handling instructions apply to the text.	2	BCS-A (Default is BCS spaces (0x20))	<R>
TSREL	Text Releasing Instructions. This field shall contain a valid list of country and/or multilateral entity codes to which countries and/or multilateral entities the text is authorized for release. Valid items in the list are one or more country codes as found in FIPS 10-4 and/or codes identifying multilateral entities as found in DIAM 65-19. If this field is all BCS spaces (0x20), it shall imply that no text release instructions apply.	20	BCS-A (Default is BCS spaces (0x20))	<R>
TSDCTP	Text Declassification Type. This field shall contain a valid indicator of the type of security declassification or downgrading instructions which apply to the text. Valid values are DD (=declassify on a specific date), DE (=declassify upon occurrence of an event), GD (=downgrade to a specified level on a specific date), GE (=downgrade to a specified level upon occurrence of an event), O (=OADR), and X (= exempt from automatic declassification). If this field is all BCS spaces (0x20), it shall imply that no text security declassification or downgrading instructions apply.	2	BCS-A (Default is BCS spaces (0x20))	<R>
TSDCDT	Text Declassification Date. This field shall indicate the date on which a text is to be declassified if the value in Text Declassification Type is DD. If this field is all BCS spaces (0x20), it shall imply that no text declassification date applies.	8	BCS-A CCYYMMDD	<R>
TSDCXM	Text Declassification Exemption. This field shall indicate the reason the text is exempt from automatic declassification if the value in Text Declassification Type is X. Valid values are X1 through X8 and X251 through X259. X1 through X8 correspond to the declassification exemptions found in DOD 5200.1-R, paragraphs 4-202b(1) through (8) for material exempt from the 10-year rule. X251 through X259 correspond to the declassification exemptions found in DOD 5200.1-R, paragraphs 4-301a(1) through (9) for permanently valuable material exempt from the 25-year declassification system. If this field is all BCS spaces (0x20), it shall imply that a text declassification exemption does not apply.	4	BCS-A (Default is BCS spaces (0x20))	<R>

TABLE A-6. NITF text subheader - Continued.

FIELD	NAME	SIZE	VALUE RANGE	TYPE
TSDG	Text Downgrade. This field shall indicate the classification level to which a text is to be downgraded if the values in Text Declassification Type are GD or GE. Valid values are S (=Secret), C (=Confidential), R (= Restricted). If this field is all BCS spaces (0x20), it shall imply that text security downgrading does not apply.	1	BCS-A (Default is BCS spaces (0x20))	<R>
TSDGDT	Text Downgrade Date. This field shall indicate the date on which a text is to be downgraded if the value in Text Declassification Type is GD. If this field is all BCS spaces (0x20), it shall imply that a text security downgrading date does not apply.	8	BCS-A CCYYMMDD	R
TSCLTX	Text Classification Text. This field shall be used to provide additional information about text classification to include identification of a declassification or downgrading event if the values in Text Declassification Type are DE or GE.. It may also be used to identify multiple classification sources and/or any other special handling rules. Values are user defined free text. If this field is all BCS spaces (0x20), it shall imply that additional information about text classification does not apply.	43	BCS-A (Default is BCS spaces (0x20))	<R>
TSCATP	Text Classification Authority Type. This field shall indicate the type of authority used to classify the text. Valid values are O (= original classification authority), D (= derivative from a single source), and M (= derivative from multiple sources). If this field is all BCS spaces (0x20), it shall imply that text classification authority type does not apply.	1	BCS-A (Default is BCS spaces (0x20))	<R>
TSCAUT	Text Classification Authority. This field shall identify the classification authority for the text dependent upon the value in Text Classification Authority Type. Values are user defined free text which should contain the following information: original classification authority name and position or personal identifier if the value in Text Classification Authority Type is O; title of the document or security classification guide used to classify the text if the value in Text Classification Authority Type is D; and Derive-Multiple if the text classification was derived from multiple sources. In the latter case, the text originator will maintain a record of the sources used in accordance with existing security directives. One of the multiple sources may also be identified in Text Classification Text if desired. If this field is all BCS spaces (0x20), it shall imply that no text classification authority applies.	40	BCS-A (Default is BCS spaces (0x20))	R>

TABLE A-6. NITF text subheader - Continued.

FIELD	NAME	SIZE	VALUE RANGE	TYPE
TSCRSN	Text Classification Reason. This field shall contain values indicating the reason for classifying the text. Valid values are A through G. These correspond to the reasons for original classification per E.O. 12958, Section 1.5.(a) through (g). If this field is all BCS spaces (0x20), it shall imply that no text classification reason applies.	1	BCS-A (Default is BCS spaces (0x20))	<R>
TSSRDT	Text Security Source Date. This field shall indicate the date of the source used to derive the classification of the text. In the case of multiple sources, the date of the most recent source shall be used. If this field is all BCS spaces (0x20), it shall imply that a text security source date does not apply.	8	BCS-A CCYYMMDD	R
TSCTLN	Text Security Control Number. This field shall contain a valid security control number associated with the text. The format of the security control number shall be in accordance with the regulations governing the appropriate security channel(s). If this field is all BCS spaces (0x20), it shall imply that no text security control number applies.	15	BCS-A (Default is BCS spaces (0x20))	<R>
ENCRYP	Encryption. This field shall contain the value BCS zero (0x30) until such time as this specification is updated to define the use of other values.	1	BCS-A 0=Not Encrypted	R
TXTFMT	Text Format. This field shall contain a valid three-character code indicating the format or type of text data. Valid codes are MTF to indicate USMTF (Refer to MIL-STD-6040 for examples of the USMTF format), STA to indicate BCS-A, UC2 to indicate 2-octet coded characters, and UT1 to indicated 1-octet coded characters, Basic Latin and Latin Supplement 1. Refer to section 3 for additional discussion of standards and the BCS.	3	BCS-A MTF, STA, UC2,-UT1	R
TXSHDL	Extended Subheader Data Length. A value of 0 shall represent that no tagged record extensions are included in the text subheader. If a tagged record extension exists, the field shall contain the sum of the length of all the tagged record extensions (see paragraph 5.7.1.2) appearing in the TSXHD field plus 3 bytes (length of TSXOFL field). If a tagged record extension is too long to fit in the TXSHD field, it shall be put in a data extension segment (see paragraph 5.7.1.4).	5	BCS-N 00000 or 00003-09717	R
TXSOFL	Extended Subheader Overflow. If present, this field shall contain “000” if the tagged record extensions in TXSHD do not overflow into a DES, or shall contain the sequence number in the file of the DES into which they do overflow. This field shall be omitted if the field TXSHDL contains BCS zeros (0x30).	3	BCS-N (000-999)	C

TABLE A-6. NITF text subheader - Continued.

FIELD	NAME	SIZE	VALUE RANGE	TYPE
TXSHD	Extended Subheader Data. If present, this field shall contain tagged record extensions (see paragraph 5.7.1.2) approved and under configuration management by the ISMC. The length of this field shall be the length specified by the field TXSHDL minus 3. Tagged record extensions in this field shall contain information pertaining specifically to the text. Tagged record extensions shall appear one after the other in this field with no intervening bytes. The first byte of this field shall be the first byte of the first tagged record extension appearing in the field. The last byte of this field shall be the last byte of the last tagged record extension to appear in the field. This field shall be omitted if the field TXSHDL contains BCS zeros (0x30).	†6	BCS-A	C

†6 As specified by the value in the TXSHDL field minus 3 bytes.

TABLE A-7. Registered and controlled tagged record extension format.
(TYPE "R" = Required, "C" = Conditional, "< >" = BCS Spaces allowed for entire field)
("†" annotations are explained at the end of the table)

FIELD	NAME	SIZE	VALUE RANGE	TYPE
RETAG or CETAG	Unique Extension Type Identifier. This field shall contain a valid alphanumeric identifier properly registered with the ISMC.	6	BCS-A	R
REL or CEL	Length of REDATA Field. This field shall contain the length in bytes of the data contained in REDATA or CETAG. The tagged record's length is 11 + REL or CEL.	5	BCS-N (00001 to 99988)	R
REDATA or CEDATA where appropriate	User-defined Data. This field shall contain data of either binary or character data types defined by and formatted according to user specification. The length of this field shall not cause any other NITF field length limits to be exceeded, but is otherwise fully user defined.	†7	User-defined	R

†7 As indicated in REL or CEL field

TABLE A-8. NITF data extension segment subheader.
(TYPE "R" = Required, "C" = Conditional, "< >" = BCS Spaces allowed for entire field)
("†" annotations are explained at the end of the table)

FIELD	NAME	SIZE	VALUE RANGE	TYPE
DE	File Part Type. This field shall contain the characters "DE" to identify the subheader as a data extension.	2	BCS-A DE	R
DESTAG	Unique DES Type Identifier. This field shall contain a valid alphanumeric identifier properly registered with the ISMC.	25	BCS-A (Registered value only)	R
DESVER	Version of the Data Field Definition. This field shall contain the alphanumeric version number of the use of the tag. The version number is assigned as part of the registration process.	2	BCS-N (01 to 99)	R

TABLE A-8. NITF data extension segment subheader - Continued.

FIELD	NAME	SIZE	VALUE RANGE	TYPE
DESSG	Security Group. This field shall contain a series of fields containing security classification information for the DES as a whole. The fields included shall mirror those of the NITF file header from FSCLAS through FSCNTL, including field length and content, but be applicable to the DES only. The field names shall be DESCLAS through DESCNTL respectively, simply substituting "DE" for "F."	167	(See table A-1, FSCLAS through FSCNTL)	R
DESOFLW	Overflowed Header Type. This field shall be present if DESTAG = TRE_OVERFLOW. Its presence indicates that the DES contains a tagged record extension (TRE) that would not fit in the file header or segment subheader where it would ordinarily be located. Its value indicates the segment type to which the enclosed tagged record is relevant.	6	BCS-A (XHD, IXSHD, SXSHD, TXSHD, UDHD, UDID)	C
DESITEM	Data Item Overflowed. This field shall be present if DESOFLW is present. It shall contain the number of the data item in the file, of the type indicated in DESOFLW to which the tagged record extensions in the segment apply. For example, if DESOFLW = UDID and DESITEM = 3, then the tagged record extensions in the segment apply to the third image in the file. If the value of DESOFLW = UDHD, the value of DESITEM shall be BCS zeros (0x30).	3	BCS-N (000 to 999)	C
DESSHL	Length of User-defined Subheader Fields. This field shall contain the number of bytes in the field DESSHF. If this field contains BCS zeros (0x30), DESSHF shall not appear in the DES subheader. This field shall contain BCS zeros (0x30) if DESTAG = "Registered Extensions" or "Controlled Extensions."	4	BCS-N (0000-9999)	R
DESSHF	User-defined Subheader Fields. This field shall contain user-defined fields. Data in this field shall be alphanumeric, formatted according to user specification.	†[8]	BCS-A (User defined)	C
DESDATA	User-defined Data Field. This field shall contain data of either binary or character types defined by and formatted according to the user's specification. However, if DESTAG=TRE_OVERFLOW, the tagged records shall appear according to their definition with no intervening bytes. The length of this field shall not cause another NITF field length limits to be exceeded, but is otherwise fully user defined.	††[8]	User defined.	R

†[8] Value specified in DESSHL

††[8] Determined by user. If DESTAG = "TRE_OVERFLOW" this signifies the sum of the lengths of the included tagged records.

TABLE A-9. NITF reserved extension segment subheader.
(TYPE “R” = Required, “C” = Conditional, “< >“ = BCS Spaces allowed for entire field)
(“†” annotations are explained at the end of the table)

FIELD	NAME	SIZE	VALUE RANGE	TYPE
RE	File Part Type. This field shall contain the characters “RE” to identify the subheader as a reserved extension.	2	BCS-A RE	R
RESTAG	Unique RES Type Identifier. This field shall contain a valid alphanumeric identifier properly registered with the ISMC.	25	BCS-A (Registered value only, non-blank)	R
RESVER	Version of the Data Field Definition. This field shall contain the alphanumeric version number of the use of the tag. The version number is assigned as part of the registration process.	2	BCS-N (01 to 99)	R
RESSG	Security Group. This field shall contain a series of fields containing security classification information for the RES as a whole. The fields included shall mirror those of the NITF file header from FSCLAS through FSCNTL, including the field length and content, but be applicable to the RES only. The field names shall be RESCLAS through RESCNTL respectively, simply substituting “RE” for “F.”	167	(See table A-1, FSCLAS through FSCNTL)	R
RESSHL	Length of User-defined Subheader Fields. This field shall contain the number of bytes in the field RESSHF. If this field contains BCS zeros (0x30), RESSHF shall not appear in the RES subheader.	4	BCS-N (0000-9999)	R
RESSHF	User-defined Subheader Fields. This field shall contain user-defined fields. Data in this field shall be alphanumeric, formatted according to user specification.	†[9]	BCS-A (User defined)	C
RESDATA	User-defined Data Field. This field shall contain data of either binary or character types defined by and formatted according to the user’s specification. The length of this field shall not cause any other NITF field length limits to be exceeded, but is otherwise fully user defined.	††[9]	User defined	R

†[9] Value specified in RESSHL
††[9] Determined by the definition of the specific reserved extension segment as registered and controlled with the ISMC.

APPENDIX B

IMPLEMENTATION CONSIDERATIONS

B.1 SCOPE

B.1.1 This appendix is not a mandatory part of the standard. The information contained in it is explanatory and intended for guidance only.

B.1.2 NITF implementation guidelines. The National Imagery Transmission Format (NITF) has been developed to provide image exchange capabilities among computer systems of various designs and capabilities. This appendix discusses general considerations pertinent to successful implementation of the NITF. Guidelines will be presented, and potential problems will be highlighted. The NITF preprocessor and postprocessor software, the software necessary to write and read a NITF file based on host files containing the data items to be included, are to be written by the user. The combination of the preprocessor and postprocessor hereafter will be referred to as the "NITF implementation." Preprocessing is sometimes called "packing," and postprocessing is called "unpacking." NITF implementation sample software is available through your point of contact.

B.2 APPLICABLE DOCUMENTS

Though not referenced, the following related documents are listed for information only.

NATIONAL IMAGERY AND MAPPING AGENCY PUBLICATION

DMA TR 8358.1	-	Datums, Ellipsoids, Grids, and Grid Reference System

STANDARDIZATION AGREEMENTS

Q-STAG 509	-	Military Symbols
STANAG 2019	-	Military Symbols for Land Based Systems
STANAG 2211	-	Geodetic Datums, Ellipsoids, Grids and Grid References
STANAG 4420	-	Display Symbology and Colours for NATO Maritime Units
STANAG 5500	-	NATO Message Text Formatting System (FORMETS) - ADatP-3
STANAG 7085	-	Interoperable Data Links for Imaging Systems
STANAG 1059	-	National Distinguishing Letters for use by NATO Forces
STANAG 2215	-	Evaluation of Land Maps, Aeronautical Charts and Digital Topographic Data
STANAG 3277	-	Air Reconnaissance Request/Task form
STANAG 7023	-	Air Reconnaissance Imagery Data Architecture
STANAG 7024	-	Imagery Air Reconnaissance Tape Recorder Standard

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

ISO 8601	-	Data elements and interchange formats - Information interchange - Representation of dates and times
ISO 8879	-	Information processing - Text and office systems - Standard Generalized Mark-up Language (SGML)
ISO/IEC 9069	-	Information processing - SGML support facilities - SGML Document Interchange Format (SDIF)
ISO 11172-2	-	Information technology - Coding of moving pictures and associated audio for digital storage media at up to about 1.5 Mbit/s: Video
ISO/IEC 13818-1	-	Information technology - Generic coding of moving pictures and associated audio information: Systems
ISO/IEC 13818-2	-	Information technology - Generic coding of moving pictures and associated audio information: Video
ISO/IEC 13818-3	-	Information technology - Generic coding of moving pictures and associated audio information: Audio

B.3 DEFINITIONS

The definitions in section 3 of this standard apply to this appendix.

B.4 GENERAL REQUIREMENTS

B.4.1 Scope of NITF implementation. NITF describes the format of images and graphics and text within the NITF file only. It does not define the image or text requirements of the host system. The host system is responsible for the handling of unpacked image and text files, as well as image and text display capabilities.

B.4.2 Creating headers and subheaders. This standard specifies legal values for the header and subheader fields. The NITF preprocessor for any particular host system will be responsible for enforcing the field values as stated in this standard.

B.4.3 Character counts. The NITF uses explicit byte counts to delimit fields. No end-of-field characters are used. These byte counts are critical for the proper interpretation of a NITF file. The NITF preprocessor should compute these byte counts based on file contents to insure accuracy. All fields in the NITF header and subheaders must be present exactly as specified in the NITF header and subheader descriptions, and no additional fields may be inserted. The NITF uses various conditional fields whose presence is determined by previous fields and counts. If an expected conditional field is missing, the remainder of the file will be misinterpreted. A similar result will occur if a conditional field is inserted when it is not required. For these reasons, the item count fields are critical, and every effort must be made to ensure their accuracy. The NITF preprocessor should compute these item counts based on file contents whenever possible.

B.4.4 Data entry. To reduce any operator workload imposed by the preprocessor, each preprocessor should provide for the automatic entry of data. Global default values for the particular NITF version should be inserted automatically in the file. System default values, such as the standard size parameters for a base image, also should be entered automatically by the preprocessor. Values that are known to the system, such as the time or the computed size of an overlay, also should be entered automatically.

B.4.5 Out of bounds field values. The file creator is responsible for ensuring that all NITF field values are within the bounds specified by the NITF document.

B.4.6 Use of images in NITF. The NITF specifies a format for images contained within a NITF file only. A NITF implementation must be capable of translating this format to and from the host system's local format. Some host systems have multiple formats for binary data. In these cases, the NITF implementation must use the appropriate host format to provide the necessary data exchange services with other system packages. When imagery data of less than M bits-per-pixel is displayed on an M-bit (2^M grey shades) display device, it must be transformed into the dynamic range of the device. One way to do this is to modify the LUTs of the display device. However, if M-bit and less than M-bit imagery is displayed simultaneously, the M-bit image will appear distorted. The recommended method is to convert the less than M-bit imagery into M-bit imagery, then use the standard LUTs. The following equation will transform a less than M-bit pixel into and M-bit pixel:

N = number of bits-per-pixel
P_N = N-bit pixel value
P_M = M-bit pixel value

$$P_M = \frac{2^M - 1}{2^N - 1} P_N$$

B.4.7 Use of text files in the NITF. The text format field is provided to help the reader of the file determine how to interpret the text data received. The file reader is responsible for interpreting the various text formats.

B.4.7.1 STA. All lines within a NITF STA text segment will be separated by carriage return/line feed pairs. It is the responsibility of the local system to translate these pairs into the local format. NITF STA has no standard line length. The host system must be capable of processing lines that are longer than the local standard.

B.4.7.2 MTF. MTF formatted text is a specialized case of STA formatted text as defined in MIL-STD-6040. It is intended to be machine interpretable while still being human readable. As a minimum, NITF interpret implementations must be able to present the text as required for STA formatted text. MTF does not use carriage returns, line feeds, and form feeds in the text stream. As an option, an implementation may structure the presentation to align the text for improved human viewing according to the provisions of MIL-STD-6040. An implementation may also pass the content of the MTF text to an MTF capable application.

B.4.7.3 Formatted Documents. The Text Segment is intended to convey plain text, not marked up text typical of word processed documents. Documents formatted to such things as Standardized Graphic Mark-up Language (SGML), Hypertext Mark-up Language (HTML), Rich Text Format (RTF), etc. can be accommodated through the use of a DES specialized for this purpose. At the time of publication, a DES to contain formatted documents had not been defined. Such a DES may be developed and submitted for use through the registration process described in appendix C.

B.4.8 Converting color to grey scale. Full color may be specified as the file background and for various attributes of segments within a NITF file (e.g. color imagery and color annotations). Color items for receiving systems unable to support the presentation of full colors must be mapped to colors that are able to be supported and displayed.

B.4.8.1 Eight-bit grey scale presentation. For 8-bit grey scale systems an appropriate conversion is:

GREY (8-bit) = 0.299*RED + 0.587*GREEN + 0.114*BLUE

B.4.8.2 One-bit grey scale presentation. For 1-bit bi-tonal (e.g. black and white) systems, an appropriate conversion is to first calculate the grey scale conversion as shown above. Then, BITONE(1-bit) = 1 (white), when GREY (8-bit) > 127

BITONE(1-bit) = 0 (black), when GREY (8-bit) <= 127

B.4.8.3 Greater than eight-bit grey scale presentation. For 8+ bit grey scale systems, color components can first be converted to 8-bit grey scale followed by a dynamic range adjustment to the bit range supported by the presentation device.

B.4.8.4 Washout. The potential exists for overlays to be inadvertently hidden or washed out when compared to the background over which they are placed, particularly when converting from color to grey scale. The application developer should take a design approach that obviates the potential for a recipient to inadvertently overlook presentation material caused by inadequate lack of contrast in the presentation.

TABLE B-1. Basic Latin character set.
(Shaded areas are not used for NITF BCS.)
(Unshaded is NITF BCS.)

	000	001	002	003	004	005	006	007
0	000	016	SP 032	0 048	@ 064	P 080	` 096	p 112
1	001	017	! 033	1 049	A 065	Q 081	a 097	q 113
2	002	018	“ 034	2 050	B 066	R 082	b 098	r 114
3	003	019	# 035	3 051	C 067	S 083	c 099	s 115
4	004	020	$ 036	4 052	D 068	T 084	d 100	t 116
5	005	021	% 037	5 053	E 069	U 085	e 101	u 117
6	006	022	& 038	6 054	F 070	V 086	f 102	v 118
7	007	023	‘ 039	7 055	G 071	W 097	g 103	w 119
8	008	024	(040	8 056	H 072	X 088	h 104	x 120
9	009	025	) 042	9 057	I 073	Y 089	i 1005	y 121
A	010	026	* 042	: 058	J 074	Z 090	j 106	z 122
B	011	027	+ 043	; 059	K 075	[091	k 107	{ 123
C	012	028	‘ 044	< 060	L 076	\ 092	1 108	³ 124
D	013	029	- 045	= 061	M 077	] 093	m 109	} 125
E	014	030	. 046	> 062	N 078	^ 094	n 110	~ 126
F	015	031	/ 047	? 063	O 079	_ 095	o 111	128

TABLE B-2. Latin 1 supplement character set.
(Shaded areas are non-ASCII.)
(Unshaded areas are additional characters used in UT1.)

	008	009	00A	00B	00C	00D	00E	00F
0	128	144	NB SP 160	° 176	À 192	Ð 208	à 224	ð 240
1	129	145	¡ 161	± 177	Á 193	Ñ 209	á 225	ñ 241
2	130	146	¢ 162	^{2} 178	Â 194	Ò 210	â 226	ò 242
3	131	147	£ 163	^{3} 179	Ã 195	Ó 211	ã 227	ó 243
4	132	148	¤ 164	´ 180	Ä 196	Ô 212	ä 228	ô 244
5	133	149	¥ 165	µ 181	Å 197	Õ 213	å 229	õ 245
6	134	150	¦ 166	¶ 182	Æ 198	Ö 214	æ 230	ö 246
7	135	151	§ 167	· 183	Ç 199	× 215	ç 231	÷ 247
8	136	152	¨ 168	¸ 184	È 200	Ø 216	è 232	ø 248
9	137	153	© 169	^{1} 185	É 201	Ù 217	é 233	ù 249
A	138	154	ª 170	º 186	Ê 202	Ú 218	ê 234	ú 250
B	139	155	« 171	» 187	Ë 203	Û 219	ë 235	û 251
C	140	156	¬ 172	¼ 188	Ì 204	Ü 220	ì 236	ü 252
D	141	157	- 173	½ 189	Í 205	Ý 221	í 237	ý 253
E	142	158	® 174	¾ 190	Î 206	Þ 222	î 238	þ 254
F	143	159	¯ 175	¿ 191	Ï 207	ß_ 223	ï 239	ÿ 255

TABLE B-3. Basic Latin character set explanation.

Decimal	Hex	Name
032	20	SPACE
033	21	EXCLAMATION MARK
034	22	QUOTATION MARK
035	23	NUMBER SIGN
036	24	DOLLAR SIGN
037	25	PERCENT SIGN
038	26	AMPERSAND
039	27	APOSTROPHE
040	28	LEFT PARENTHESIS
041	29	RIGHT PARENTHESIS
042	2A	ASTERISK
043	2B	PLUS SIGN
044	2C	COMMA
045	2D	HYPHEN-MINUS
046	2E	FULL STOP
047	2F	SOLIQUS
048	30	DIGIT ZERO
049	31	DIGIT ONE
050	32	DIGIT TWO
051	33	DIGIT THREE
052	34	DIGIT FOUR
053	35	DIGIT FIVE
054	36	DIGIT SIX
055	37	DIGIT SEVEN
056	38	DIGIT EIGHT
057	39	DIGIT NINE
058	3A	COLON
059	3B	SEMICOLON
060	3C	LESS-THAN SIGN
061	3D	EQUALS SIGN
062	3E	GREATER-THAN SIGN
063	3F	QUESTION MARK
064	40	COMMERCIAL AT
065	41	LATIN CAPITAL LETTER A
066	42	LATIN CAPITAL B
067	43	LATIN CAPITAL C
068	44	LATIN CAPITAL D
069	45	LATIN CAPITAL E
070	46	LATIN CAPITAL F
071	47	LATIN CAPITAL G
072	48	LATIN CAPITAL H
073	49	LATIN CAPITAL I
074	4A	LATIN CAPITAL J
075	4B	LATIN CAPITAL K
076	4C	LATIN CAPITAL L
077	4D	LATIN CAPITAL M
078	4E	LATIN CAPITAL N
079	4F	LATIN CAPITAL O
080	50	LATIN CAPITAL P
081	51	LATIN CAPITAL Q

TABLE B-3. Basic Latin character set explanation - Continued.

Decimal	Hex	Name
082	52	LATIN CAPITAL R
083	53	LATIN CAPITAL S
084	54	LATIN CAPITAL T
085	55	LATIN CAPITAL U
086	56	LATIN CAPITAL V
087	57	LATIN CAPITAL W
088	58	LATIN CAPITAL X
089	59	LATIN CAPITAL Y
090	5A	LATIN CAPITAL Z
091	5B	LEFT SQUARE BRACKET
092	5C	REVERSE SOLIDUS
093	5D	RIGHT SQUARE BRACKET
094	5E	CIRCUMFLEX ACCENT
095	5F	LOW LINE
096	60	GRAVE ACCENT
097	61	LATIN SMALL LETTER A
098	62	LATIN SMALL LETTER B
099	63	LATIN SMALL LETTER C
100	64	LATIN SMALL LETTER D
101	65	LATIN SMALL LETTER E
102	66	LATIN SMALL LETTER F
103	67	LATIN SMALL LETTER G
104	68	LATIN SMALL LETTER H
105	69	LATIN SMALL LETTER I
106	6A	LATIN SMALL LETTER J
107	6B	LATIN SMALL LETTER K
108	6C	LATIN SMALL LETTER L
109	6D	LATIN SMALL LETTER M
110	6E	LATIN SMALL LETTER N
111	6F	LATIN SMALL LETTER O
112	70	LATIN SMALL LETTER P
113	71	LATIN SMALL LETTER Q
114	72	LATIN SMALL LETTER R
115	73	LATIN SMALL LETTER S
116	74	LATIN SMALL LETTER T
117	75	LATIN SMALL LETTER U
118	76	LATIN SMALL LETTER V
119	77	LATIN SMALL LETTER W
120	78	LATIN SMALL LETTER X
121	79	LATIN SMALL LETTER Y
122	7A	LATIN SMALL LETTER Z
123	7B	LEFT CURLY BRACKET
124	7C	VERTICAL LINE
125	7D	RIGHT CURLY BRACKET
126	7E	TILDE

TABLE B-4. BCS-A character set explanation.

Decimal	Hex	Name
160	A0	NO BREAK SPACE
161	A1	INVERTED EXCLAMATION MARK
162	A2	CENT SIGN
163	A3	POUND SIGN
164	A4	CURRENCY SIGN
165	A5	YEN SIGN
166	A6	BROKEN BAR
167	A7	SECTION SIGN
168	A8	DIAERESIS
169	A9	COPYRIGHT
170	AA	FEMININE ORDINAL INDICATOR
171	AB	LEFT-POINTING DOUBLE ANGLE QUOTATION MARK
172	AC	NOT SIGN
173	AD	SOFT HYPHEN
174	AE	REGISTERED SIGN
175	AF	MACRON
176	B0	DEGREE SIGN
177	B1	PLUS-MINUS SIGN
178	B2	SUPERSCRIPT TWO
179	B3	SUPERSCRIPT THREE
180	B4	ACUTE ACCENT
181	B5	MICRO SIGN
182	B6	PILCROW SIGN
183	B7	MIDDLE DOT
184	B8	CEDILLA
185	B9	SUPERSCRIPT ONE
186	BA	MASCULINE ORDINAL INDICATOR
187	BB	RIGHT POINTING DOUBLE ANGLE QUOTATION MARK
188	BC	VULGAR FRACTION ONE QUARTER
189	BD	VULGAR FRACTION ONE HALF
190	BE	VULGAR FRACTION THREE QUARTERS
191	BF	INVERTED QUESTION MARK
192	C0	LATIN CAPITAL LETTER A WITH GRAVE
193	C1	LATIN CAPITAL LETTER A WITH ACUTE
194	C2	LATIN CAPITAL LETTER A WITH CIRCUMFLEX
195	C3	LATIN CAPITAL LETTER A WITH TILDE
196	C4	LATIN CAPITAL LETTER A WITH DIAERESIS
197	C5	LATIN CAPITAL LETTER A WITH RING ABOVE
198	C6	LATIN CAPITAL LIGATURE AE
199	C7	LATIN CAPITAL LETTER C WITH CEDILLA
200	C8	LATIN CAPITAL LETTER E WITH GRAVE
201	C9	LATIN CAPITAL LETTER E WITH ACUTE
202	CA	LATIN CAPITAL LETTER E WITH CIRCUMFLEX
203	CB	LATIN CAPITAL LETTER E WITH DIAERESIS
204	CC	LATIN CAPITAL LETTER I WITH GRAVE
205	CD	LATIN CAPITAL LETTER I WITH ACUTE
206	CE	LATIN CAPITAL LETTER I WITH CIRCUMFLEX
207	CF	LATIN CAPITAL LETTER I WITH DIAERESIS
208	D0	LATIN CAPITAL LETTER ETH (ICELANDIC)
209	D1	LATIN CAPITAL N WITH TILDE

TABLE B-4. BCS-A character set explanation - Continued.

Decimal	Hex	Name
210	D2	LATIN CAPITAL LETTER O WITH GRAVE
211	D3	LATIN CAPITAL LETTER O WITH ACUTE
212	D4	LATIN CAPITAL LETTER O WITH CIRCUMFLEX
213	D5	LATIN CAPITAL LETTER O WITH TILDE
214	D6	LATIN CAPITAL LETTER O WITH DIAERESIS
215	D7	MULTIPLICATION SIGN
216	D8	LATIN CAPITAL LETTER WITH STROKE
217	D9	LATIN CAPITAL LETTER U WITH GRAVE
218	DA	LATIN CAPITAL LETTER U WITH ACUTE
219	DB	LATIN CAPITAL LETTER U WITH CIRCUMFLEX
220	DC	LATIN CAPITAL LETTER U WITH DIAERESIS
221	DD	LATIN CAPITAL LETTER Y WITH ACUTE
222	DE	LATIN CAPITAL LETTER THORN (ICELANDIC)
223	DF	LATIN SMALL LETTER SHARP S (GERMAN)
224	E0	LATIN SMALL A WITH GRAVE
225	E1	LATIN SMALL LETTER A WITH ACUTE
226	E2	LATIN SMALL LETTER A WITH CIRCUMFLEX
227	E3	LATIN SMALL LETTER A WITH TILDE
228	E4	LATIN SMALL LETTER A WITH DIAERESIS
229	E5	LATIN SMALL LETTER A WITH RING ABOVE
230	E6	LATIN SMALL LIGATURE AE
231	E7	LATIN SMALL LETTER C WITH CEDILLA
232	E8	LATIN SMALL LETTER E WITH GRAVE
233	E9	LATIN SMALL LETTER E WITH ACUTE
234	EA	LATIN SMALL LETTER E WITH CIRCUMFLEX
235	EB	LATIN SMALL LETTER E WITH DIAERESIS
236	EC	LATIN SMALL LETTER I WITH GRAVE
237	ED	LATIN SMALL LETTER I WITH ACUTE
238	EE	LATIN SMALL LETTER I WITH CIRCUMFLEX
239	EF	LATIN SMALL LETTER I WITH DIAERESIS
240	F0	LATIN SMALL LETTER ETH (ICELANDIC)
241	F1	LATIN SMALL LETTER N WITH TILDE
242	F2	LATIN SMALL LETTER O WITH GRAVE
243	F3	LATIN SMALL LETTER O WITH ACUTE
244	F4	LATIN SMALL LETTER O WITH CIRCUMFLEX
245	F5	LATIN SMALL LETTER O WITH TILDE
246	F6	LATIN SMALL LETTER O WITH DIAERESIS
247	F7	DIVISION SIGN
248	F8	LATIN SMALL LETTER O WITH STROKE
249	F9	LATIN SMALL LETTER U WITH GRAVE
250	FA	LATIN SMALL LETTER U WITH ACUTE
251	FB	LATIN SMALL LETTER U WITH CIRCUMFLEX
252	FC	LATIN SMALL LETTER U WITH DIAERESIS
253	FD	LATIN SMALL LETTER Y WITH ACUTE
254	FE	LATIN SMALL LETTER THORN (ICELANDIC)
255	FF	LATIN SMALL LETTER Y WITH DIAERESIS

B.4.9 File system constraints. A NITF file is presented as a stream of contiguous bytes. This format may not be suitable for some file systems (e.g. those that store files on block boundaries vice byte boundaries). The translation of files to and from the local file format for a system should be examined for potential incompatibilities before an implementation is attempted.

B.4.10 Security considerations. A NITF file contains sufficient security information in the file header, and subheaders to allow implementors to meet virtually any security requirement for displaying classification data. Exact security information handling requirements generally are specified by appropriate accreditation authorities or specific user requirements. It is recommended that implementors extract the classification data from one or more of the header/subheaders and ensure that the information is always displayed whenever the pertinent part of the NITF file is displayed. Implementations should not rely on graphic overlays alone to present security and handling instructions. Panning, roaming, zooming, and other imagery manipulation operations may cause security label graphics to move off the screen or not be printed.

B.4.11 NITF Printer incompatibilities. Some printers do not allow for transparent pixels in imagery (e.g., Postscript level 1 and 2). If a NITF composition uses CGM elements under images with NITF image padding (transparent pixels) the CGM will not be visible in any areas under the pad pixels. This problem can be avoided in two different ways.

a. Instead of using a CGM element, the background color may be specified with the FBKGC field in the main NITF file header. The background shape and size may be specified with the BGWIDTH and BGHIGHT fields of the BCKGDA TAG. (The BCKGDA TAG also specifies the background color and pixel size. The color specified in FBKGC must be the same as the color specified in the BCKGDA. If they are not the same, the BCKGDA TAG colors take precedence.) If the BCKGDA TAG is not present, the color specified in FBKGC applies to the entire common coordinate system up to the size of the C-level.

b. The CGM rectangle can be broken down into four (or more if the composition is complex) CGM rectangles that do not coincide with (obscure or lie under) the imagery. These CGM rectangles would then be specified with higher display levels than any of the images.

APPENDIX C

TAGGED RECORD EXTENSIONS

C.1 SCOPE

C.1.1 Scope. This appendix contains information about the definition, registration and control of tagged record extensions (tags) used within NITF 2.1 files. The four varieties of tagged record extensions include: Registered Extensions (RE); Controlled Extensions (CE); Data Extension Segments (DES); and Reserved Extension Segments (RES). This appendix is a mandatory part of the standard. The information contained herein is intended for compliance.

C.2 APPLICABLE DOCUMENTS

C.2.1. NITFS Tagged Record Extensions Register. Implementors and acquiring agencies should contact the NTB Registrar to identify the current issue(s) of the tagged record extensions and associated documentation applicable to their specific requirements. Otherwise, the documents listed in section 2 of this standard apply to this appendix. The NITFS Tagged Record Extensions Register is maintained as a World Wide Web on-line document. Access can be obtained through the following Universal Resource Locators (URLs):

http://jitc-emh.army.mil/nitf/nitf.htm
http://www.nima.mil/nitfs/
http://www-ismc.itsi.disa.mil
http://www-ismc.itsi.disa.mil/ntb

C.3 DEFINITIONS

C.3.1 Acronyms used in this appendix. The acronyms in section 3 of this standard apply to this appendix.

C.3.2 Definitions used in this standard. The definitions in section 3 of this standard apply to this appendix.

C.4 GENERAL REQUIREMENTS

C.4.1 Registration. All tagged record extensions (REs, CEs, DESs, and RESs) shall be registered with the Imagery Standards Management Committee's NITFS Technical Board (NTB) before use within NITF files.

C.4.2 Registrar. The NIMA is the designated registrar. The JITC serves as the executive agent to NIMA for oversight of registration activities and maintaining the register. The contact information for the NTB registrar is:

National Imagery and Mapping Agency
4600 Sangamore Road
Bethesda, MD 20816-5003
(301) 227-3696

Commander, Joint Interoperability Test Command
ATTN: NITFS Certification Test Facility
Building 57305
Fort Huachuca, AZ 85616-7020
(520) 538-5458

C.4.3 Registration submissions. Submissions for registering tagged record extensions shall include the following:

a. Identification of the submitting organization and point of contact for the submission.

b. Identification of the preparing organization and point of contact for the preparing activity.

c. Purpose and general description of the proposed tagged record extension(s).

d. Rationale and justification for including the submission within the NITFS.

e. Copy of the documentation defining the tagged record extension to be registered.

f. For REs only, analysis and rationale describing how use of the proposed RE will not adversely impact community use of the standardized features defined within the NITFS.

C.4.4 Configuration management. The NIMA registrar exercises configuration management control of the register. The register identifies the approved issue(s) and version(s) of tagged record extensions and associated specifications and documentation allowed for use within NITFS. Although another agency may be the proponent, author and/or configuration manager of tagged record extension specifications and documentation, only those issue(s) and version(s) identified and authorized in the register managed by NIMA are allowed for use within NITFS.

C.5 DETAILED REQUIREMENTS

C.5.1 Registered Extensions.

a. Only those REs accepted and registered by the NTB shall be used.

b. REs shall not be used nor submitted for registration if they adversely impact the utility of the standard features otherwise defined within the NITFS and its controlled extensions.

c. Nominated REs will be recorded in the “Register” upon approval by the NTB. At that time, a RE expiration date (typically two years from registration) will be established by the NTB and recorded. A RE(s) proponent may submit a request for registration renewal to the NTB, or a request for the RE(s) to become “Controlled”, prior to expiration of the tagged record extension’s registration. Otherwise, the RE(s) will be removed from the Register.

d. A sequence of REs may appear in either (or both) of the User Defined Header Data and Extended Header Data (EHD) fields of the NITF file header. REs may also appear in either (or both) of the User Defined Subheader and Extended Subheader Data fields for any standard data type item in the file.

e. When the RE carries data that is a associated with the file as a whole, it shall appear in the file header. If the RE carries data associated with a standard data item in the file, it shall appear in the sub-header of that specific data item.

f. REs may appear in a “TRE_OVERFLOW” DES when sufficient space is not available in the appropriate header or sub-header fields.

g. Upon receipt of a file which contains REs, a NITFS compliant system shall at least ignore the REs and properly interpret the other legal components of the NITF file.

C.5.2 Controlled Extensions.

a. Only those CEs accepted and registered by the NTB shall be used.

b. A sequence of CEs may appear in either (or both) of the User Defined Header Data and Extended Header Data (EHD) fields of the NITF file header. CEs may also appear in either (or both) the User Defined Subheader and Extended Subheader Data fields for any standard data type item in the file.

c. When the CE carries data that is a associated with the file as a whole, it shall appear in the file header. If the CE carries data associated with a standard data item in the file, it shall appear in the sub-header of that specific data item.

d. CEs may appear in a “TRE_OVERFLOW” DES when sufficient space is not available in the appropriate header or sub-header fields.

e. Upon receipt of a file which contains CEs, a NITFS compliant system shall at least ignore the CEs and properly interpret the other legal components of the NITF file.

C.5.3 Data Extension Segments.

a. Only those DESs accepted and registered by the NTB shall be used. The registry specifies the DES as mandatory or optional.

b. Upon receipt of a file which contains DESs, a NITFS compliant system shall at least ignore the DESs and properly interpret the other legal components of the NITF file.

C.5.3.1 “TRE_OVERFLOW” DES. This DES is used when a series of REs and/or CEs is to appear in a DES as “overflow” from the NITF file header or any sub-header. The format and use of the “TRE_OVERFLOW” DES is as described in paragraph 5.7.1.4.

C.5.3.2 “TRANSPORTABLE_FILE_STRUCT” DES. This DES is used to contain Transportable File Structure (TFS) formatted extension data. The format and use of the “TRANSPORTABLE_FILE_STRUCT” DES is described in paragraph ISO/IEC DIS 12087-5.

C.5.4 Reserved Extension Segments.

a. Only those RESs accepted and registered by the NTB shall be used. The registry specifies the RES as mandatory or optional.

b. Upon receipt of a file which contains a RES(s) that is not defined as mandatory by the registry, a NITFS compliant system shall at least ignore the RES(s) and properly interpret the other legal components of the NITF file.

CONCLUDING MATERIAL

Custodians:
- Army - SC
- Navy - OM
- Air Force - 90
- Misc - DC4

Review activities:
- OASD - DO, IR
- Army - TM2, IE, ET, AC, PT, SC1, SC2
- Air Force - 02, 13
- DLA - DH
- Misc - NS, DC7

Civil agency coordinating activities:
- COM - NIST
- DOE
- EPA
- GPO
- HHS - NIH
- DOI - BLM, GES, MIN
- DOT - CGCT

Preparing activity:
- Misc - MP

Agent:
- Not applicable

(Project INST-000203)

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1,2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER **MIL-STD-2500B**	2. DOCUMENT DATE (YYMMDD) **970822**

3. DOCUMENT TITLE
National Imagery Transmission Format Version 2.1

4. NATURE OF CHANGE *(Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)*

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME *(Last, First, Middle Initial)*	b. ORGANIZATION	
c. ADDRESS *(Include Zip Code)*	d. TELEPHONE *(Include Area Code)* (1) Commercial (2) AUTOVON *(If applicable)*	7. DATE SUBMITTED *(YYMMDD)*

8. PREPARING ACTIVITY
NATIONAL IMAGERY AND MAPPING AGENCY

a. NAME	b. TELEPHONE *(Include Area Code)* (1) Commercial **(301) 227-3696** (2) AUTOVON
c. ADDRESS *(Include Zip Code)* **4600 Sangamore Road** **Bethesda, MD 20816-5003**	**IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT:** Defense Quality and Standardization Office 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466 Telephone (703) 756-2340 AUTOVON 289-2340