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National Geospatial-Intelligence Agency

IMPLEMENTATION PRACTICES OF THE NATIONAL IMAGERY TRANSMISSION FORMAT STANDARD (IPON)

COMMON PRACTICES AND CONVENTIONS FOR THE IMPLEMENTATION AND USE OF THE NITFS SUITE OF STANDARDS

Coordination Draft Version 0.3A

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TBD/TBR Listing

Page Number	TBD/TBR	Description
B-1	TBD001	B.1.3 Background
F-1	TBD003	NITF to JPEG, SunRaster, TIFF, GeoTIFF
F-1	TBD004	JPEG, SunRaster, TIFF, GeoTIFF to NITF
F-1	TBD005	Feature Conversions within NITF Image Segments
K-1	TBD006	Appendix K
M-1	TBD008	Archetype
Q-1	TBD009	Appendix Q – Product Summaries & Archetypes for Tactical Products

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FOREWORD

The National Imagery Transmission Format Standard (NITFS) is the standard for the formatting and exchange of digital imagery and imagery-related products between members of the Intelligence Community. The Intelligence Community is made up of the Department of Defense (DOD) and other departments or agencies of the United States Government as defined by Executive Order 12333.

Members of the NITFS Technical Board (NTB) compiled these practices as an aid to those involved with the implementation and use of the NITFS. The content is based upon common practices, procedures, and guidelines used in fielded systems that have successfully implemented the NITFS. To meet a wide range and variety of imagery-related functional requirements, the NITFS has many combinations of implementation options to select from. Those implementing the NITFS should select and apply common practices to meet operational requirements whenever practicable.

The DOD and members of the Intelligence and Geospatial Community are committed to interoperability of systems used for formatting, transmitting, receiving, exchanging, and processing imagery and imagery-related information. These practices describe the application of the NITFS suite of standards in support of interoperability among systems within the National Systems for Geospatial Intelligence (NSGI), systems that interface with the NSGI, and commercial systems that implement the NITFS.

The suite of standards that comprise the NITFS has evolved over time to meet the requirements of user systems. These practices address implementation topics for the NITFS associated with NITF version 1.1, NITF version 2.0, and NITF version 2.1. Many of these practices are also suitable for use with Standardization Agreement (STANAG) 4545, North Atlantic Treaty Organisation (NATO) Secondary Imagery Format (NSIF). Both NITF version 2.1 and NSIF version 1.0 are now documented in the NSIF01.00 Profile of ISO/IEC 12087-5, Basic Image Interchange Format (BIIF).

Beneficial comments (recommendations, additions, and/or deletions) and other pertinent data which may be of use in improving this document should be addressed to Joint Interoperability Test Command, ATTN: NITFS Test Facility, 2001 Brainard Road, Fort Huachuca, AZ 85613-7051.

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EXECUTIVE SUMMARY

This document is a compilation of common practices, conventions, and guidelines for implementing the National Imagery Transmission Format Standard (NITFS). The objective is to help promote common specification and application of the NITFS suite of standards by all fielded and developmental digital imagery-related systems. It describes common conventions for implementing the suite of NITFS standards that promote and sustain NITFS compliance and interoperability for the production, storage, cataloging, discovery, selection, exploitation, and dissemination of digital imagery, raster map, and other related raster products.

The National Geospatial-Intelligence Agency (NGA/OST/GIS) has oversight of the standardization and testing process whereby digital imagery systems achieve and sustain NITFS compliance and interoperability. The practices herein address implementation conventions for NITF 1.1, NITF 2.0, NITF 2.1, and the related NITFS standards and specifications for imagery compression, graphic annotation, and data extensions.

These practices do not of themselves establish implementation requirements. NITFS implementation requirements are detailed in appropriate requirement documents, system specifications, interface specifications, statements of work, etc. Those involved with developing requirements, preparing specifications and acquisition documents, and implementing the NITFS should cite or draw from the information in this document to promote consistent application of the NITFS throughout the digital imagery enterprise.

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1 INTRODUCTION

1.1 Purpose

This document is a compilation of common practices, conventions, and guidelines for implementing the National Imagery Transmission Format Standard (NITFS). The objective is to help promote common specification and application of the NITFS suite of standards by all fielded and developmental digital imagery-related systems. It describes common conventions for implementing the suite of NITFS standards that promote and sustain NITFS compliance and interoperability for the production, storage, cataloging, discovery, selection, exploitation, and dissemination of digital imagery, raster map, and other related raster products.

1.2 Scope

This document contains technical information and specifications for the use and implementation of the NITFS within the digital imagery enterprise. It provides implementation practices and conventions applicable to efforts such as:

- Production Sources
  - Digital Point Positioning Database (DPPDB)
  - Controlled Image Base (CIB)
  - National Technical Means (NTM)
  - Front End Processing Environment (FPE)
  - Enhanced Processing Segment (EPS)
  - Low Cost Media (LCM) Production System
  - Joint Surveillance Target Attack Radar System (Joint STARS) Common Ground Station (CGS)
  - Common Imagery Processor (CIP)
- Archive and Dissemination Related Applications:
  - NGA Libraries (NL)
  - Image Product Library (IPL)
  - Information Access Services (IAS)
  - NIMA Common Client (CC)
  - BroadSword
  - Dissemination Element (DE)

- Digital Products Data Warehouse (DPDW)
- Enhanced Analyst Client

- Exploitation Related Applications:
  - Integrated Exploitation Capability
  - Multi-Source Intelligence Toolkit (MINT)
  - Precision Targeting Workstation (PTW)
  - Joint Tactical Workstation (JTW)
  - RULER mensuration engine
  - Commercial-Off-The-Shelf (COTS) Electronic Light Tables (ELTs)
  - Government-Off-The-Shelf (GOTS) ELTs
- Management Applications:
  - Imagery Exploitation Support System (IESS)
  - National Exploitation System (NES)
  - Enhanced Integration Tool (EIT)
  - Project for Information System Management (PRISM)
- Distributed Common Ground/Surface System (DCGS) Instances
  - Tactical Exploitation Segment (TES) (Army)
  - Joint Service Imagery Processing System - National (JSIPS-Nat) (Marines)
  - Tactical Exploitation Group (TEG) (Marines)
  - Joint Service Imagery Processing System - Navy (JSIPS-N) (Navy)
  - Deployable Shelterized System (DSS) (Air Force)
  - Deployable Transit-cased System (DTS)
  - Korean Combat Operations Intelligence Center (KCOIC)
- Commercial imagery providers
  - Space Imaging
  - DigitalGlobe

- Orbital Imaging

1.3 Background

1.3.1 NITF Version 1.1

The development of the National Imagery Transmission Format (NITF) was initiated in 1985 under the auspices of the Imagery Acquisition Management Plan (IAMP) Working Group of the Office of the Assistant Secretary of Defense, Command, Control, Communications, and Intelligence (OASD/C^3I). Version 1.0 of the NITF was published, but not released, in 1988. This version served as the prototype for demonstrating that the format could be implemented. In 1988 and 1989, the NITF was successfully implemented and tested on six different systems using operational communications media with cryptographic and forward error correction devices. The specification for NITF Version 1.1 was approved and released by OASD/C3I on 1 March 1989 as the NITF baseline version.

1.3.2 NITF Version 2.0

NITF version 2.0 was published along with a suite of military standards designated as the National Imagery Transmission Format Standard (NITFS) in June 1993. The major additions to NITF version 1.1 included the Tactical Communications Protocol 2 (TACO2) to enable transmission over tactical circuits; improved image compression using the Joint Photographic Experts Group (JPEG) compression algorithm; support for large images and color images; and symbolic annotations using Computer Graphics Metafile (CGM). The Central Imagery Office (CIO) had since been organized and became the NITFS Program Manager.

1.3.3 NITF Version 2.1

A number of factors have driven the changes made to NITF 2.0 during recent years. Among these are: 1) the creation of the National Geospatial-Intelligence Agency (NGA) (formerly NIMA); 2) the Department of Defense (DOD) mandate for the selection and implementation of commercial/international standards over government/military standards where possible; 3) user requirements for improved fusion of information, whether imagery, geospatial, or other data types; and 4) the ever increasing need to share data within and external to systems of the DOD/Intelligence Community. NITF 2.1 is based on extensive coordination among NITFS users, within the NSGI community, North Atlantic Treaty Organisation (NATO), Allied Nations, national and international standards bodies, and with commercial vendors and groups dealing with related standards and technologies. Military Standard 2500B and STANAG 4545 serve as the technical baseline for establishing an International Profile of International Organization for Standardization (ISO)/International Electrotechnical Commission (IEC) 12087-5, Basic Image Interchange Format (BIIF). A summary of changes made to the

existing NITF 2.0 baseline in support of the NITF 2.1 is addressed in Appendix C of the N-0105/98.

NITF Version 2.1 compliance testing began 1 October 1998. NITF 2.1 testing will be done in parallel with NITF 2.0 testing until the need for testing of NITF 2.0 capability ceases. The capability to test NITF 2.0 will be maintained until contractual requirements for NITF 2.0 have been satisfied. The need to unpack and interpret NITF 2.0 files will continue indefinitely.

1.3.4 NSIF Version 1.0

The NATO Secondary Imagery Format (NSIF) is essentially the NATO equivalent of NITF 2.1 file format. Both formats are profiles of the ISO BIIF and structurally mirror each other.

1.4 References

(Note: Those documents with version numbers designated as 0.9x are draft specifications that have not undergone validation testing as described in section 2.0 of N-0105. The implementation and test details of these specifications are subject to change based on the lessons learned by the first attempts to implement and test the features of these specifications. Implementers of these specifications are encouraged to coordinate their implementation efforts with the NITFS Test and Evaluation Facility personnel.)

1.4.1 Policy and Planning Documents

Executive Order 12958	Classified National Security Information, 17 April 1995.
CJCSI 6212.B	Interoperability and Support of National Security System and Information Technology Systems, May 8 2000
DOD/JTA V 3.1	Department of Defense Joint Technical Architecture Version 3.1, 31 March 2000.
DODD 4630.5	Interoperability and Supportability of Information Technology and National Security Systems (NSS); January 11, 2002.
DODI 4630.8	Procedures for Interoperability and Supportability of Information Technology and National Security Systems (NSS); May 2, 2002.
JIEO Circular 9008	NITFS Certification Test and Evaluation Program Plan, 30 June 1993, with Errata Sheet dated 20 June 1997. (Superceded by NGA Document N-0105; referenced herein for historical purposes.)

N-0105/98	National Imagery Transmission Format Standard (NITFS) Standards Compliance and Interoperability Test and Evaluation Program Plan
NITF 1.1 Vol I	Department of Defense, National Imagery Transmission Format, Certification Plan Volume I, Policy, 02 January 1990. (Superceded by NGA Document N-0105; referenced herein for historical purposes.)
NITF 1.1 Vol II	Department of Defense, National Imagery Transmission Format, Certification Plan Volume II, Processes and Procedures 02 January 1990. (Superceded by NGA Document N-0105; referenced herein for historical purposes.)

(Requests for copies of the above policy and planning documents may be addressed to the Joint Interoperability Test Command, NITFS Test and Evaluation Facility, 2001 Brainard Road, Fort Huachuca, AZ 85613-7051.)

1.4.2 Federal Information Processing Standards (FIPS)

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

1.4.3 Military Standards (MIL-STDs) and Handbooks

MIL-HDBK-1300A	Military Handbook for the National Imagery Transmission Format Standard (NITFS), 12 October 1994.
MIL-STD-2500A	National Imagery Transmission Format (Version 2.0) for the National Imagery Transmission Format Standard, 12 October 1994 with Notice 1, 07 February 1997; Notice 2, 26 September 1997; and Notice 3, 01 October 1998.
MIL-STD-2500B	National Imagery Transmission Format (Version 2.1) for the National Imagery Transmission Format Standard, 22 August 1997 with Notice 1, 02 October 1998 and Notice 2, 01 March 2001.
MIL-STD-188-161	Interoperability and Performance Standards for Digital Facsimile Equipment, 30 October 1991.
MIL-STD-188-196	Bi-Level Image Compression for the National Imagery Transmission Format Standard, 18 June 1993 with Notice 1, 27 June 1996.

MIL-STD 188-197A	Adaptive Recursive Interpolated Differential Pulse Code Modulation (ARIDPCM) Compression Algorithm for the National Imagery Transmission Format Standard, 12 October 1994.
MIL-STD-188-198A	Joint Photographic Experts Group (JPEG) Image Compression for the National Imagery Transmission Format Standard, 15 December 1993 with Notice 1, 12 October 1994 and Notice 2, 14 March 1997.
MIL-STD-188-199	Vector Quantization Decompression for the National Imagery Transmission Format Standard, 27 June 1994 with Notice 1, 27 June 1996.
MIL-STD-2301	Computer Graphics Metafile (CGM) Implementation Standard for the National Imagery Transmission Format Standard, 18 June 1993 with Notice 1, 12 October 1994.
MIL-STD-2301A	Computer Graphics Metafile (CGM) Implementation Standard for the National Imagery Transmission Format Standard, 05 June 1998.
MIL-STD-2045-44500	Tactical Communications Protocol 2 (TACO2) for the National Imagery Transmission Format Standard, 18 June 1993 with Notice 1, 29 July 1994 and Notice 2, 27 June 1996.
MIL-STD-2411	Raster Product Format, 6 October 1994, Change Notice 1 17 January 1995, Change Notice 2 16 August 2001
MIL-STD-2411-1	Registered Data Values for Raster Product Format, 30 August 1994, Change Notice 1 16 August 2001
MIL-STD-2411-2	Integration of Raster Product Files into the National Imagery Transmission Format, 26 August 1994
MIL-STD-6040	United States Message Text Format (MTF) Note: The baseline for this standard is updated frequently, but this has no impact within the context of its current use within the NITFS. Currency of the USMTF has potential impact when MTF data within NITF files is passed to external processes.
MIL-PRF-89041A	Controlled Image Base (CIB), 28 March 2000

MIL-PRF-89038	Compressed ARC Digitized Raster Graphics (CADRG), 6 October 1994, Ammendment 1 27 April 1999, Amendment 2 28 March 2000
MIL-PRF-89034	Digital Point Positioning Data Base (DPPDB), 23 March 1999, Amendment 1 27 June 2000

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

1.4.4 National Geospatial-Intelligence Agency (NGA)/National Imagery and Mapping Agency (NIMA) Specifications and Publications

N0101-G	Geospatial and Imagery Access Services Specification (GIAS), Version 3.5, 26 June 2000.
N0102-G	USIGS Interoperability Profile (UIP), 26 June 2000. SCN001, 06 August 2001.
N-0106-97	National Imagery Transmission Format Standard (NITFS) Bandwidth Compression Standards and Guidelines, 25 August 1997.
NSPIA	NIMA Standards Profile for Imagery Archive (NSPIA), 23 April 1997.
NTER	NITFS Tagged Extensions Registry (NTER), latest update as posted at: http://jitc.fhu.disa.mil/nitf/nitf.htm/tag_reg.htm
NSDE	NIMA Support Data Extensions (SDE) (Version 1.2) for The National Imagery Transmission Format Standard (NITFS), 13 March 1997.
NUTA	NIMA USIGS Technical Architecture (NUTA), 28 October 1997.
PIAE v2	National Imagery Transmission Format Standard Profile for Imagery Archive Extension (PIAE), Version 2.0, 25 April 1996.
PIAE v3	National Imagery Transmission Format Standard Profile for Imagery Archive Extensions (PIAE), Version 3.0, 25 September 1997. (E001)

RASG-9606-001	Airborne Synthetic Aperture Radar (SAR) Support Data Extensions (SDE) for the National Imagery Transmission Format (Version 2.0) of the National Imagery Transmission Format Standard, Version 0.9, 20 May 1996.
VIMAS	Visible, Infrared, and Multispectral Airborne Sensor Support Data Extensions for the National Imagery Transmission Format of the National Imagery Transmission Format Standard Version 0.9, 25 September 1997.
STDI-0001	National Support Data Extension (SDE) (Version 1.3) for the National Imagery Transmission Format Standard (NITFS), 2 October 1998
STDI-0002	The Compendium of Controlled Extensions (CE) for the National Imagery Transmission Format Version 2.1 16 November 2000

(Requests for copies of the above NGA/NIMA Specifications and Publications may be made to the National Geospatial-Intelligence Agency, Attn.: NGA/T/GIS, MS-P-24, 12310 Sunrise Valley Drive, Reston, VA 20191-3449.)

1.4.5 Standardized NATO Agreements

STANAG 4545	NATO Secondary Imagery Format (Version 1.0); Edition 1; Promulgation date: 27 November 1998.
STANAG 7074	Digital Geographic Information Exchange Standard (DIGEST), Edition 2.0, June 1997.

(Requests for copies of the above STANAG may be made to SAF/AQIJ, 1060 AF Pentagon (5D156), Washington, DC 20330-1060.)

1.4.6 International Standards

CCITT	Recommendation T.4, Standardization of Group 3 Facsimile Apparatus or Document Transmission, 1998
ISO/IEC Directives	Procedures for the technical work of ISO/IEC JTC1 on Information Technology, Third Edition 1995.
ISO/IEC TR10000-1	Information technology - Framework and Taxonomy of International Standardized Profiles - Part 1: General principles and documentation framework, third edition, 1995.

ISO/IEC TR10000-2	Information technology - Framework and taxonomy of International Standardized Profiles - Part 2 : Principles and Taxonomy for OSI Profiles, third edition, 1995.
ISO/IEC 8632-1:1994	Information Technology - Computer graphics metafile for the storage and transfer of picture description information - Part 1: Functional Specification, AMD 2, 01 July 1995.
ISO/IEC 8632-3:1994	Information Technology - Computer graphics metafile for the storage and transfer of picture description information - Part 3: Binary Encoding, AMD 2, 01 August 1995.
ISO/IEC 8632:1992	Information Technology - Computer graphics metafile for the storage and transfer of picture description information, AMD.1:1994 - Parts 1-4: Rules for Profiles.
ISO/IEC 9973:1994	1st Edition, Procedures for Registration of Graphical Items, 15 December 1994.
ISO/IEC 10646-1:1993	Information technology - Universal Multiple-Octet Coded Character Set (UCS) - Part 1: Architecture and Basic Multiple Plane, AMD 6, 15 Nov. 1996.
ISO/IEC 10918-1:1994	Information technology - Digital compression and coding of continuous-tone still images : Requirements and guidelines, 15 December 1994.
ISO/IEC 10918-2:1995	Information technology - Digital compression and coding of continuous-tone still images : Compliance testing, 15 August 1995.
ISO/IEC 10918-3:DIS	Information Technology; Digital Compression and Coding of Continuous-Tone Still Images; Part 1: Extensions, 01 May 1997.
ISO/IEC 10918-4:DIS	Information Technology; Digital Compression and Coding of Continuous-Tone Still Images: Part 4; Registration Procedures for JPEG Profile, APPn Marker, and SPIFF Profile ID Marker, 26 Dec. 96.
ISO/IEC 15444-1:2000	Information technology - JPEG 2000 image coding system - Part 1: Core Coding System
ISO/IEC 15444-1-AMD1	Information technology - JPEG 2000 image coding system - Part 1: Core Coding System, Amendment 1

ISO/IEC 15444-1-AMD2	Information technology - JPEG 2000 image coding system - Part 1: Core Coding System, Amendment 2
ISO/IEC 15444-4:2002	Information technology - JPEG 2000 image coding system - Part 4: Image Coding System: Conformance testing
ISO/IEC 11072:1993	Information technology - Computer graphics - Computer Graphics Reference Model, 01 Oct. 92.
ISO/IEC 12087-1:1995	Information technology - Computer graphics and image processing - Image processing and Interchange - Functional specification Part 1: Common architecture for imaging, 15 April 1995.
ISO/IEC 12087-2:1994	Information technology - Computer graphics and image processing - Image processing and Interchange - Functional specification Part 2: Programmer's imaging kernel system application program interface.
ISO/IEC 12087-3:1995	Information technology - Computer graphics and image processing - Image processing and Interchange - Functional specification Part 3: Image Interchange Facility (IIF), AMD 1, 15 December 1997.
ISO/IEC 12087-5: 1998	Information technology; Computer graphics and image processing; Image Processing and Interchange; Functional Specification - Part 5: Basic Image Interchange Format.
BPCGM01.00	Information Technology - Computer Graphics and Image Processing -Registered Graphical Item, Class: BIIF Profile - Computer Graphics Metafile Version 01.00 (BPCGM01.00)
BPJ2K01.00	Information technology - Computer graphics and image processing - registered graphical item - Class: BIIF Profile - BIIF Profile for JPEG 2000 Version 01.00 (BPJ2K01.00)
NSIF01.00	Information Technology - Computer Graphics and Image Processing -Registered Graphical Item, Class: BIIF Profile - NATO Secondary Imagery Format Version 01.00 (NSIF01.00)
ITU T.4 (1993:03)	Terminal Equipment and Protocols for Telematic Services - Standardization of Group 3 Facsimile Apparatus for Document Transmission, AMD2 08/95.

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

1.4.7 Other Documents

	Controlled Access Program Coordination Office (CAPCO), Intelligence Community Classification and Control Markings Implementation Manual and Register.
	IC Chief Information Officer, Intelligence Community Inter-Domain Transfer Policy, 9 November 1999, Draft. (U/FOUO)
	Bandwidth Compression (BWC) Guide for JPEG 2000 Visually Lossless and Numerically Lossless Compression of Imagery Data Working Draft 1.0
S2035A	NITF Implementation Requirements Document (NITFIRD)
DCID 1/7	Security Controls and Dissemination of Intelligence Information, 30 June 1998. (U/FOUO)

1.5 Applicability

The NITFS is the designated standard for the formatting and exchange of digital imagery and imagery-related products between members of the Intelligence Community as defined by Executive Order 12333, the Department of Defense (DOD) and other Departments or Agencies of the United States Government as governed by Memoranda of Agreement (MOAs) with those Agencies, and the Intelligence Community/DOD. Adherence to U.S. Federal and DOD standards is required before a particular system can be employed in joint or combined operations. The DOD Directive 4630.5 states that for purposes of compatibility, interoperability, and integration all Command, Control, Communications, and Intelligence (C^3I) systems developed for use by U.S. forces are considered to be for joint use.

1.6 Authority

The National Geospatial-Intelligence Agency (NGA) is the proponent for the NITFS suite of standards. The Defense Information Systems Agency (DISA) is the Lead Standardization Authority within the Defense Standardization Program for the NITFS suite of standards. The Director, Central Intelligence (DCI) is the Intelligence Community authority for mandatory NITFS compliance. The Assistant Secretary of Defense for Command, Control, Communications, and Intelligence (ASD/C^3I) is the DOD authority requiring compliance with the NITFS. The NGA/OST/GIS is the Test Program Authority and provides management oversight

for the NITFS Test and Evaluation Program. The JITC, an element of the DISA, is the Executive Agent to NGA/OST/GIS for execution of the NITFS Test and Evaluation Program. Figure 1-1 depicts these organizational relationships.

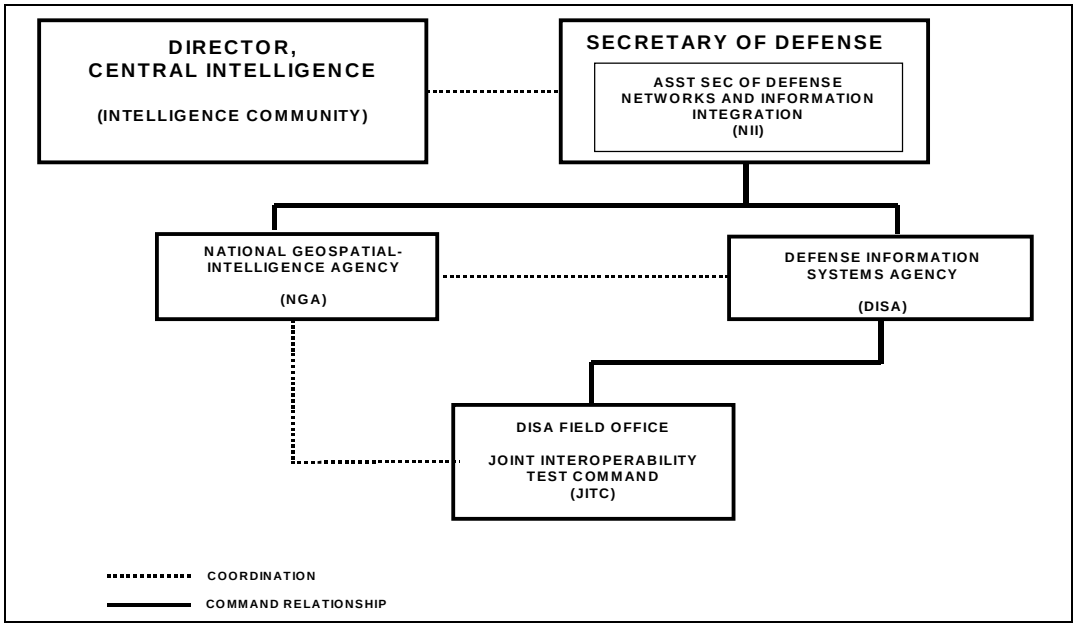

Figure 1-1. NITFS Test Organizational Relationships

1.7 Definitions

For the purpose of this specification, the following terms are defined as stated:

1.7.1 Certification (Interoperability)

Confirmation that a National Security System (NSS) and Information Technology System has undergone appropriate testing; that the applicable standards and requirements for compatibility, interoperability, and integration have been met; and a system is ready for joint and/or combined use. See JCSI 6212B.

(Note: For the NITF 2.0 test program, the term ‘System Certification’ was used to designate those systems (hardware and software) which implemented both NITF 2.0 and TACO2 and successfully completed NITFS compliance testing.)

1.7.2 Compliance Registration (Standards Compliance)

A statement attesting to the fact that an implementation, product, or component has been tested as meeting NITFS applicable compliance criteria. The degree of compliance is recorded in a registry.

1.7.3 NITFS Test and Evaluation Facility

The personnel, equipment, data, and facilities for conducting NITFS compliance testing and maintaining the NITF program for NGA along with policies, procedures, planning, etc.

1.7.4 Common Coordinate System

The virtual row and column coordinate space against which all NITF file components are ultimately referenced. The location of NITF components with an attachment level of zero is referenced to the origin of the Common Coordinate System. The extent of the common coordinate system is defined by the complexity level designation.

1.7.5 Compatibility, Interoperability, and Integration (CII)

A policy set by DOD and the Joint Staff defining the requirements certification process and identifying assessment criteria. See JCSI 6212.01B, DoD Directive 4630.5, DoD Instruction 4630.8, and the DoD 5000 series documents.

1.7.6 Configuration Item

A specific component of hardware and/or software that has an impact on NITFS compliance.

1.7.7 Configuration Management

A discipline applying technical and administrative direction and monitoring to:

- Identify and document the functional and physical characteristics of a configuration item.
- Control changes to those characteristics.
- Record and report change processing and implementation status.

1.7.8 Developmental System

A system that has not been approved for use and/or production.

1.7.9 Digital Imagery System

The equipment and procedures used in the collection, storage, display, manipulation, analysis, annotation, exchange, and/or transmission of imagery and imagery products.

1.7.10 Dissemination System

A system with functional requirements to distribute digital imagery via electronic communications channels. Imagery processing is primarily focused on preparing

the data for the eccentricities (e.g., constrained bandwidth, noise environment, etc.) of the communications channels across which it will be disseminated. Representative systems include the Dissemination Element (DE), Global Broadcast System (GBS), etc.

1.7.11 Exploitation System

Systems with functional requirements to analyze, exploit, and extract information from digital imagery to produce an exploited imagery product. Representative systems include Integrated Exploitation Capability, NIMA Softcopy Exploitation Systems as defined by the NIMA Imagery Information Exploitation Environment (NIIEE), Common Exploitation Workstation (CEW), etc.

1.7.12 Fielded System

A system that has been approved for use and/or production.

1.7.13 Implementation Under Test (IUT)

A candidate implementation of any portion of the NITFS suite of standards for which compliance testing is being performed. An implementation does not necessarily comprise a full imagery system.

1.7.14 Library System

A system with functional requirements to catalogue, store, and retrieve digital imagery. Representative systems include Image Product Library (IPL), and NGA Library, etc.

1.7.15 NITFS Compliance

The ability of an implementation to create and output NITFS compliant files and/or to accept NITFS files and recognize the component parts as prescribed in the NITFS Test and Evaluation Program Plan.

1.7.16 NITFS Component Compliance

A statement to the fact that an item (as opposed to a full implementation) has been tested for compliance to a specific subset of the NITFS compliance criteria.

1.7.17 Native Mode

The intrinsic attributes and operational mode of an imagery system. When an imagery system's architecture, design, and/or internal representation for images, graphics, labels, text, and/or other data is not in accordance with the NITFS, its native mode is considered to be other than NITFS.

1.7.18 NITF

The National Imagery Transmission Format. The term NITF is often used to describe a file that is formatted according to the NITFS. The term usually inherits the context of the latest version of NITF when the version is not specifically identified.

1.7.19 NITFS

The National Imagery Transmission Format Standard (NITFS) is comprised of the suite of standards applicable to the format and exchange of digital imagery. The term is used when addressing the overall national imagery standardization effort.

1.7.20 NITF Version 1.1

The initial version of NITF implemented for which a formal testing program was established. Requirements for compliance with NITF Version 1.1 are fully described in the NITF Version 1.1, Volume I, NITF Certification Plan Policy and Volume II, Certification Plan Processes and Procedures.

1.7.21 NITF Version 2.0

The second version of NITF implemented for which a formal testing program was established. Requirements for compliance with NITF Version 2.0 were, originally, fully described in Joint Interoperability and Engineering Organization (JIEO) Circular 9008, NITFS Certification Test and Evaluation Program Plan. JIEO 9008 has been superceded by N-0105/98, which contains applicable program information for NITF version 2.0.

1.7.22 NITF Version 2.1

The third version of NITF establishing the formal compliance test program and is documented in N-0105/98.

1.7.23 Pack

To create or construct an NITF file within the set of conditions and constraints defined for compliance with the NITFS.

1.7.24 Primary Imagery System

The equipment and procedures used in the electronic collection, storage, and exchange of original quality, non-exploited imagery and imagery products.

1.7.25 Production System

A system with functional requirements to generate digital imagery from sensor sources. Representative systems include Common Imagery Processor (CIP), Digital Production System (DPS), Point Positioning Production System (PPPS), etc.

1.7.26 Secondary Imagery Dissemination System (SIDS)

The equipment and procedures supporting the process of post-collection electronic dissemination of Command, Control, Communications, and Intelligence (C^3I) data, over a time interval ranging from near-real-time to a period of days, at a quality level determined by receiver requirements.

1.7.27 System Under Test (SUT)

A candidate imagery system for which NITFS compliance testing is being performed.

1.7.28 Tactical System

A system with requirements to operate when deployed into the battlefield; often characterized by the need to obtain data communications from military tactical communication channels vice fixed plant communications typical of commercial civilian organizations.

1.7.29 Unpack

To interpret and make appropriate use of the imagery, data, and associated information contained in an NITF compliant file. In most instances, this includes the capability to accurately display and/or print the contents of an NITF file.

1.7.30 NSGI Architecture Framework

The interrelated set of NSGI Architecture components that include the Operational Architecture, the Technical Architecture, the Systems Architecture, and the Data Architecture. The Operational Architecture identifies the operational element, activities, and information flows. The Technical Architecture identifies applicable standards and conventions that govern systems implementation and operation. The Systems Architecture overlays system capabilities onto requirements and identified standards to provide a map of current and future capabilities. The Data Architecture provides the common data modeling and terminology baseline needed to articulate and integrate the other component architecture views.

1.7.31 USIGS Interoperability Profile

The USIGS Interoperability Profile (UIP) defines the profile for software interface standards to be used to achieve interoperability between multiple clients and servers within the United States Imagery and Geospatial System architecture.

1.8 Test Program Concept

The NITFS Test and Evaluation Program is composed of the NITFS Test and Evaluation Facility, policies, procedures, and administrative and planning actions required to achieve and sustain an imagery implementation's compliance with the NITFS and interoperability within the NSGI through testing. The test program

supports both the DOD and the Intelligence Community objectives for ensuring an interoperable format for the exchange of digital imagery products among heterogeneous systems.

1.8.1 National Geospatial-Intelligence Agency

The NGA/OST/GIS oversees the process whereby imagery systems achieve and sustain NITFS compliance and interoperability through the NITFS Test and Evaluation Program. Initial compliance testing of an imagery system is achieved at the designated test facility, the JITC, or at alternate locations as approved by the JITC. Compliance to standards and interoperability within NSGI is sustained through retesting, as necessitated by changes to the NITFS, changes to (or problems with) tested NITFS configuration items, or when directed by NGA/OST/GIS, as long as the imagery system is operational.

1.8.2 Joint Interoperability Test Command

The JITC serves as NGA/OST/GIS's executive agent for execution of NITFS test related activities. The JITC has established an NITFS testing facility that supports compliance testing of NITFS capable implementations, validation testing of proposed additions to NITFS, and other NITFS related test activities.

1.9 NITFS Implementation and Use Policies

The following policies apply to the implementation and use of the NITFS:

1.9.1 General

Those systems, subsystems, and components within the United States Imagery and Geospatial System which exchange digital imagery shall achieve compliance with the NITFS as specified by the USIGS Architecture Framework, the USIGS Interoperability Profile (UIP), and the Joint Technical Architecture (JTA).

1.9.1.1 NITF Version 1.1. NITF 1.1 implementation began in 1989. NITF 2.0 implementation began in 1993. To support interoperability during the transition from NITF 1.1, all NITF 2.0 compliant systems were required to allow for the proper interpretation and use of NITF Version 1.1 formatted files and the creation of NITF Version 1.1 compliant files. The requirement for NITF 2.0 systems to create NITF 1.1 files is now optional. NITF 1.1 only systems should no longer be used in the field. However, due to the extensive existence of legacy NITF 1.1 files, NITF 2.0 and NITF 2.1 systems may elect to continue to interpret NITF 1.1 files if the implementations operational concept reflects a need to interpret NITF 1.1 files.

1.9.1.2 NITF Version 2.0. All currently fielded imagery systems should be at least NITF 2.0 compliant with plans in place to upgrade/replace to NITF 2.1 capabilities.

1.9.1.3 NITF Version 2.1. All NITF 2.1 compliant systems typically have a mode of operation that allows for proper interpretation and use of NITF Version 2.0 formatted files and that limits the creation of an NITF file content to the constraints of NITF version 2.0. Developmental systems shall be tested for and achieve NITF 2.1 compliance prior to fielding. NITF 2.1 capable systems may continue to properly interpret NITF Version 1.1 files if called for by the systems concept of operations.

1.9.1.4 Distributed Applications. Some developers may choose to implement systems that distribute NITFS functions across several processing platforms that are networked together. In such cases, the systems will be evaluated as a whole in determining which NITFS attributes and associated compliance criteria apply to each component of the system. In any case, provision shall be made for the system to fully satisfy the Complexity Level (CLEVEL) criteria for its applicable operational requirements before the system will be registered as NITFS compliant.

1.9.1.5 NITFS Components. Developers may choose to submit components and/or products that implement only a portion of the NITFS compliance requirements for testing and registration. The component shall be tested for compliance to the applicable standards. Component registration does not mean that any implementation that uses the registered component is deemed fully compliant with NITFS. Use of the registered component may, however, expedite test and evaluation of the implementation for compliance registration.

1.9.1.6 TACO2. The use of TACO2 continues today in some user communities. Although it is no longer required to obtain NITFS compliance registration, if implemented, it must pass NITFS compliance testing.

1.10 Points of Contact

1.10.1 NITFS Technical Board (NTB)

National Geospatial-Intelligence Agency
ATTN: OST/GIS (Mail Stop P-11)
12310 Sunrise Valley Drive
Reston, VA 20191-3449
Phone: (703) 262-4400
Fax: (703) 262-4401
URL: http://www.ismc.nga.mil/ntb

1.10.2 NITFS Test Information, Test Scheduling, Implementation Consulting

Joint Interoperability Test Command
NITFS Test and Evaluation Facility
ATTN: JTD
Building 57305
2001 Brainard Road
Fort Huachuca, AZ 85613-7020
Phone: (520) 538-5458 or 5494
Fax: (520) 538-5257
STU: (520) 538-5458
E-mail: jitcn@disa.mil
URL: http://jitc.fhu.disa.mil/nitf

1.10.3 Imagery Standardization and G/ISMC Information

National Geospatial-Intelligence Agency
ATTN: OST/GIS (Mail Stop P-11)
12310 Sunrise Valley Drive
Reston, VA 20191-3449
Phone: (703) 262-4400
Fax: (703) 262-4401
URL: http://www.ismc.nga.mil/ntb/

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2 GENERAL NITFS IMPLEMENTATION COMPLIANCE

2.1 General

2.1.1 NITFS Compliance Criteria

The NITFS compliance criteria are derived from the suite of NITFS documents and are documented in NGA document N-0105. NITF file components, attributes, allowable field values, formats, and field lengths are fully described in the NITFS documents. Since the NITFS is very flexible, it has many options, the use of which must be constrained for implementation if file exchange interoperability is to be achieved. The compliance criteria identify the features, capabilities, formats, field values, ranges, and associated boundary conditions of the NITFS against which an implementation is tested for compliance.

2.1.2 Pack/Unpack

For the purposes of this document, the term "pack" means to create or construct an NITF file within the set of conditions and constraints defined for compliance with the NITFS. The term "unpack" means to interpret and properly display imagery data (images and symbols) and accurately process associated information contained in an NITF file. In most instances, this includes the capability to accurately display and/or print the contents of an NITF file. Under some circumstances, unpacking a file results in a non-displayed product such as re-packing another file resulting from a translation or conversion process. For example, an imagery library or gateway server, often with no human involvement or intervention, may support translation or conversion services. In these cases, the resulting files will be evaluated using the applicable test criteria that pertain to the documented requirements of the specific interface involved. An implementation may be registered as having a pack-only capability, an unpack-only capability, or both a pack and unpack capability depending on the fielding intent and desire of the sponsor.

2.1.3 NITFS Compliance Principles

The NITFS compliance criteria are intended to strike a balance between fully implementing all the requirements in the standards and the planned operational requirements of the actual system(s) implementing the standard. The history of imagery systems is replete with examples of systems being deployed for use in environments for which they were not originally intended to operate. This fact drives the need to establish baseline requirements from the standards that are applicable to all implementations regardless of perceived operational requirements. Where clear architectural guidance exists, the applicable test criteria for the required services and features will be selected from among the criteria established in this plan. The cardinal principles are:

2.1.3.1 The packing implementation shall ensure all produced NITF files are NITFS compliant within the bounds of the established complexity levels. When the

implementation also supports unpacking, it must be capable of properly unpacking (and portraying when applicable) any file that it is able to pack.

2.1.3.2 The unpacking implementation shall ensure the information from NITF files is presented as the originator intended, at least for the fundamental segments of the file (images, symbols and text).

2.1.3.3 When unpacking NITF files with unrecognized content (e.g., content that cannot be properly interpreted or presented by the implementation, for example extension data), the implementation shall have a means to alert the system operator or administrator that the file(s) has unrecognized content in addition to what is being presented or interpreted.

2.1.4 Native Mode Rule

The 'Native Mode Rule' refers to the intrinsic attributes and operational capabilities of an imagery system. Those implementations offering features or attributes in their native mode of operation that directly correlate with elements defined in NITF 2.1, such as supporting the creation of symbol annotation, will be required to support those features and attributes in accordance with the NITFS.

2.2 NITFS Complexity Levels (CLEVELs)

Implementations of the NITFS are categorized and tested according to their ability to pack and/or unpack various CLEVELs of NITFS formatted files. This concept allows NITFS to be implemented on a wide range of hardware platforms with various levels of internal resources while maintaining a baseline level of interoperability between all compliance tested systems. For NITF 2.1, four CLEVELs have been defined, CL03, CL05, CL06, and CL07. A fifth CLEVEL, CL09, has been approved and is being incorporated into the suite of NITF standards. A summary of the attributes of each CLEVEL is listed in Table 2-1. Files shall be marked at the lowest CLEVEL for which they qualify.

2.3 Elements of NITFS Compliance

Table 2-1 contains an overview summary of the NITF 2.1 compliance criteria for general reference. The specific attributes and compliance test requirements are described in NGA document N-0105. N-0105 details the specific field values, ranges, and boundary conditions of the NITF file format required for compliance testing. These include specific test conditions for ARIDPCM Compression, Bi-Level Compression, JPEG Compression, Vector Quantization Decompression, CGM, TACO2, and NITF version 1.1 and 2.0 backward compatibility.

Unpack applications must be able to fully interpret any compliant file within the supported complexity level. Pack applications must ensure no files are produced which extend beyond the allowed features and ranges of the applicable complexity

level of the file being packed. Proper interpretation of the table is further defined by the NITFS Test Program Plan, N-0105.

Table 2-1. NITF 2.1 Compliance Criteria Summary*

Feature	Complexity Level			
	3	**5**	**6**	**7**
Common Coordinate System (CCS) Extent (origin) To max (row, column)	00000000, 00000000 To 00002047, 00002047	00000000, 00000000 To 00008191, 00008191	00000000, 00000000 To 00065535, 00065535	00000000,00000000 To 99999999,99999999
Maximum File Size	50Mbyte - 1byte (52,428,799 bytes)	1Gbyte - 1byte (1,073,741,823 bytes)	2Gbyte - 1byte (2,147,483,647 bytes)	10Gbyte - 1byte (10,737,418,239 bytes)
Image Size (Image(s) placed within CCS extent)	00000001-00002048 Rows X 00000001-00002048 Columns (R and C <= 2048)	00000001-00008192 Rows X 00000001-00008192 Columns (R or C > 2048)	00000001-00065536 Rows X 00000001-00065536 Columns (R or C > 8192)	00000001-99999999 Rows X 00000001-99999999 Columns (R or C > 65536)
Image Blocking (Rectangular blocks allowed)	Single and Multiple Blocks 0001 to 2048 Rows X 0001 to 2048 Cols	Single and Multiple Blocks 0001 to 8192 Rows X 0001 to 8192 Columns	Multiple blocking is mandatory for images that exceed 8192 pixels per row or column. 0001 to 8192 Rows X 0001 to 8192 Cols	
Monochrome (MONO) No Compression	Single Band 1, 8, 12, 16, 32, 64 Bits per pixel (NBPP) With and without LUT IC = NC, NM Image Mode (IMODE) = B			
Color 1 or 8-Bit (RGB/LUT) No Compression	Single Band 1 and 8 Bits per pixel (NBPP) With LUT IC = NC, NM IMODE = B			
Color 24-Bit (RGB) No Compression	Three Bands 8 Bits per pixel (NBPP) No LUT IC = NC, NM IMODE = B,P,R,S			

*Note: This table only provides an overview summary of compliance criteria. Proper interpretation of the table is specified in the text of this chapter and associated appendices.

Note: (The following information on CLEVEL 09 is in the coordination/approval cycle.) CLEVEL 09 is used to designate NITF 2.1 files that exceed the CLEVEL 07 constraints in Table A-10 but remain within the bounds of the standard. CLEVEL 09 designates that the file exceeds at least one of the CLEVEL 07 constraints: 1. Maximum File Size (greater than 10 Gbytes), 2. Image segments with the block size exceeding 8192 pixels per row or column, (see paragraph 5.4.2.2 d for additional implementation guidance). 3. More than 999 Bands, 4. More than 100 images, 5. More than 100 graphics segments, 6. Graphic aggregate size exceeds 2 Mbytes, 7. Number of Text Segments exceeds 32, 8. The number of DES exceeds 10.

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Table 2-1 NITF 2.1 Compliance Criteria Summary* (cont'd.)

Feature	Complexity Level			
	3	5	6	7
Multiband (MULTI) **No Compression**	1 to 9 bands 8, 16, 32, 64-bits per pixel per band With and without LUT in each band IC = NC, NM IMODE = B, P, R, S	1 to 255 bands 8, 16, 32, 64-bits per pixel per band With and without LUT in each band IMODE = B, P, R, S		1 to 999 bands 8, 16, 32, 64-bits per pixel per band With and without LUT in each band IC = NC, NM IMODE = B,P,R,S
JPEG DCT Compression **Monochrome (MONO)**	Single Band 8 & 12 Bit sample (NBPP) No LUT IC = C3, M3 IMODE B			
JPEG DCT Compression **Color 24-Bit (RGB)**	Three Bands 8-Bit Sample per band (NBPP) No LUT IC = C3, M3 IMODE = P			
JPEG Compression **Color 24-Bit (YCbCr601)**	Three Bands 8 Bit Sample per band (NBPP) No LUT IC = C3, M3 IMODE = P			
Downsampled JPEG DCT **Monochrome (MONO)**	Single Band Single Block Only 8-Bit sample (NBPP) No LUT IC = I1 IMODE = B (Image size may not exceed 2048 pixels per Row or Column)			
JPEG Lossless Compression **Monochrome (MONO)**	Single Band 8, 12 and 16-Bit Sample per band With or without LUT IC = C5, M5 IMODE = B (This feature is optional for implementation.)			
JPEG Lossless Compression **24-Bit Color (RGB)**	Three Bands 8-Bit Sample per band (NBPP) No LUT IC = C5, M5 IMODE = P (This feature is optional for implementation.)			
JPEG 2000 Compression **Monochrome (MONO)**	1 Band 1-32 bits per Pixel per Band With and without LUT IC = C8 IMODE = B Note: LUTs are typically only useful when the data is compressed numerically lossless.			

*Note: This table only provides an overview summary of compliance criteria. Proper interpretation of the table is specified in the text of this chapter and associated appendices.

Note: (The following information on CLEVEL 09 is in the coordination/approval cycle.) CLEVEL 09 is used to designate NITF 2.1 files that exceed the CLEVEL 07 constraints in Table A-10 but remain within the bounds of the standard. CLEVEL 09 designates that the file exceeds at least one of the CLEVEL 07 constraints: 1. Maximum File Size (greater than 10 Gbytes), 2. Image segments with the block size exceeding 8192 pixels per row or column, (see paragraph 5.4.2.2 d for additional implementation guidance). 3. More than 999 Bands, 4. More than 100 images, 5. More than 100 graphics segments, 6. Graphic aggregate size exceeds 2 Mbytes, 7. Number of Text Segments exceeds 32, 8. The number of DES exceeds 10.

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Table 2-1 NITF 2.1 Compliance Criteria Summary* (cont'd.)

Feature	Complexity Level			
	3	5	6	7
JPEG 2000 Compression Mapped Color (RGB/LUT)	1 Band 1-32 bits per Pixel per Band With LUT IC = C8 IMODE = B Note: LUTs are typically only useful when the data is compressed numerically lossless.			
JPEG 2000 Compression Color (RGB)	3 Bands 1-32 bits per Pixel per Band No LUT IC = C8 IMODE = B Note: The JPEG 2000 color transform may be used as part of the compression and decompression process when IREP = RGB.			
JPEG 2000 Compression Color (YCbCr601)	3 Bands 1-32 bits per Pixel per Band No LUT IC = C8 IMODE = B Note: When IREP = YCbCr601, it signifies that the data representation was YCbCr prior to the JPEG 2000 compression process. The internal JPEG 2000 color transform shall not be used.			
JPEG 2000 Compression Multiband (MULTI)	1 to 9 Bands 1-32 bits per Pixel per Band With and without LUT IC = C8 IMODE = B	1 to 255 Bands 1-32 bits per Pixel per Band With and without LUT IC = C8 IMODE = B		1 to 999 Bands 1-32 bits per Pixel per Band With and without LUT IC = C8 IMODE = B
Bi-LEVEL Compression (MONO)	Single Band, single Block 1-Bit per pixel (NBPP) With and without LUT IC = C1, M1 COMRAT = 1D, 2DS, 2DH IMODE = B (Image size may not exceed 2560 pixels per row by 8192 pixels per column)			
Bi-LEVEL Compression RGB/LUT	Single Band single Block Only 1-Bit per pixel (NBPP) With LUT IC = C1, M1 COMRAT = 1D, 2DS, 2DH IMODE = B (Image size may not exceed 2560 pixels per row by 8192 pixels per column)			
VQ Monochrome (MONO)	Single Band 8 Bits per pixel (NBPP) 4x4 Kernel organized in 4 tables With and without LUT IC = C4, M4 IMODE = B			

*Note: This table only provides an overview summary of compliance criteria. Proper interpretation of the table is specified in the text of this chapter and associated appendices.

Note: (The following information on CLEVEL 09 is in the coordination/approval cycle.) CLEVEL 09 is used to designate NITF 2.1 files that exceed the CLEVEL 07 constraints in Table A-10 but remain within the bounds of the standard. CLEVEL 09 designates that the file exceeds at least one of the CLEVEL 07 constraints: 1. Maximum File Size (greater than 10 Gbytes), 2. Image segments with the block size exceeding 8192 pixels per row or column, (see paragraph 5.4.2.2 d for additional implementation guidance). 3. More than 999 Bands, 4. More than 100 images, 5. More than 100 graphics segments, 6. Graphic aggregate size exceeds 2 Mbytes, 7. Number of Text Segments exceeds 32, 8. The number of DES exceeds 10.

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Table 2-1 NITF 2.1 Compliance Criteria Summary* (cont'd.)

Feature	Complexity Level			
	3	5	6	7
VQ 8-bit color (RGB/LUT)	Single Band 8 Bits per pixel (NBPP) 4x4 Kernel organized in 4 tables With LUT IC = C4, M4 IMODE = B			
Multispectral (MULTI) Individual Band JPEG Compression	1 to 9 bands 8, 12-bits per pixel per band No LUT IMODE = B, S IC = C3, M3	1 to 255 bands 8, 12-bits per pixel per band No LUT IMODE = B, S IC = C3, M3		1 to 999 bands 8, 12-bits per pixel per band No LUT IMODE = B, S IC = C3, M3
Multispectral (MULTI) Multi-Component Compression	2 to 9 bands 8, 12-bits per pixel per band No LUT IMODE = B, P, S IC = C6, M6 (This feature is optional for implementation.)	2 to 255 bands 8, 12-bits per pixel per band No LUT IMODE = B, P, S IC = C6, M6 (This feature is optional for implementation.)		2 to 999 bands 8, 12-bits per pixel per band No LUT IMODE = B, P, S IC = C6, M6 (This feature is optional for implementation.)
Elevation Data (NODISPLY)	Single Band 8, 12, 16, 32 and 64-Bits per pixel (NBPP) No LUT IC = NC IMODE = B ICAT = DTEM, ISUBCATn code from DIGEST Part 3, Annex B (or BCS spaces (0x20)) Applicable TREs: Geospatial Support Data Extensions (GeoSDEs), DIGEST Part 2 Annex D (This feature is optional for implementation.)			
Location Grid (NODISPLY)	Two Bands 8, 12, 16, 32 and 64 -Bits per pixel (NBPP) No LUT IC = NC IMODE = B, P ICAT = LOCG, ISUBCATn = CGX, CGY or GGX, GGY Applicable TREs: Geospatial Support Data Extensions (GeoSDEs), DIGEST Part 2 Annex D (This feature is optional for implementation.)			
Matrix Data (NODISPLY)	2 to 9 Bands 8, 16, 32, and 64-bits per Pixel per Band, No LUT in any Band IMODE = B,P,R,S (This feature is optional for implementation.)	2 to 255 Bands 8, 16, 32, and 64-bits per Pixel per Band, No LUT in any Band IMODE = B,P,R,S (This feature is optional for implementation.)		2 to 999 Bands 8, 16, 32, and 64-bits per Pixel per Band, No LUT in any Band IMODE = B,P,R,S (This feature is optional for implementation.)
Number of Image Segments Per File	0 to 20 Segments	0 to 100 Segments		

*Note: This table only provides an overview summary of compliance criteria. Proper interpretation of the table is specified in the text of this chapter and associated appendices.

Note: (The following information on CLEVEL 09 is in the coordination/approval cycle.) CLEVEL 09 is used to designate NITF 2.1 files that exceed the CLEVEL 07 constraints in Table A-10 but remain within the bounds of the standard. CLEVEL 09 designates that the file exceeds at least one of the CLEVEL 07 constraints: 1. Maximum File Size (greater than 10 Gbytes), 2. Image segments with the block size exceeding 8192 pixels per row or column, (see paragraph 5.4.2.2 d for additional implementation guidance). 3. More than 999 Bands, 4. More than 100 images, 5. More than 100 graphics segments, 6. Graphic aggregate size exceeds 2 Mbytes, 7. Number of Text Segments exceeds 32, 8. The number of DES exceeds 10.

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Table 2-1 NITF 2.1 Compliance Criteria Summary* (cont'd.)

Feature	Complexity Level			
	3	5	6	7
Number of CGM Graphic Segments Per File	0 to 100 Segments			
Aggregate Size of Graphic Segments Per File	1 Mbyte maximum	2 Mbyte maximum		
CGM Graphic Profile	MIL-STD-2301A			
Number of Text Segments Per File	0 to 32 Segments			
Text Format Codes Supported	STA, UT1, MTF, U8S			
Text Data Per Segment	00001 to 99999 bytes			
Tagged Record Extensions (TREs)	Tagged Record Extensions may appear in the UDHD, XHD, UDID, IXSHD, SXSHD, TXSHD fields and in the "TRE_OVERFLOW" DES regardless of CLEVEL.			
Number of Data Extension Segments (DESs) Per File	0 to 10			
Currently Approved DESs	TRE_OVERFLOW STREAMING_FILE_HEADER			
Number of Reserved Extension Segments (RESs) Per File	None			
Currently Approved RESs	None			
NITF 2.0	All unpack capable implementations must properly interpret any compliant NITF 2.0 file of all comparable CLEVEL(s) as implemented for NITF 2.1. Implementations capable of packing NITF 2.0 files must be able to create NITF 2.0 formatted files within the NITF 2.0 constraints for the comparable CLEVEL(s) as implemented for NITF 2.1. NITF 2.1 CLEVEL — NITF 2.0 CLEVEL 7 — N/A 6 — 6 5 — 5, 4 3 — 3, 2, 1			
NITF 1.1	All unpack capable implementations must properly interpret any compliant NITF 1.1 file.			

*Note: This table only provides an overview summary of compliance criteria. Proper interpretation of the table is specified in the text of this chapter and associated appendices.

Note: (The following information on CLEVEL 09 is in the coordination/approval cycle.) CLEVEL 09 is used to designate NITF 2.1 files that exceed the CLEVEL 07 constraints in Table A-10 but remain within the bounds of the standard. CLEVEL 09 designates that the file exceeds at least one of the CLEVEL 07 constraints: 1. Maximum File Size (greater than 10 Gbytes), 2. Image segments with the block size exceeding 8192 pixels per row or column, (see paragraph 5.4.2.2 d for additional implementation guidance). 3. More than 999 Bands, 4. More than 100 images, 5. More than 100 graphics segments, 6. Graphic aggregate size exceeds 2 Mbytes, 7. Number of Text Segments exceeds 32, 8. The number of DES exceeds 10.

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Table 2-1 NITF 2.1 Compliance Criteria Summary* (cont'd.)

Feature	Complexity Level			
	3	5	6	7
TACO2	Tactical systems, and those systems with requirements to interface with tactical systems.			

2.4 NITFS Compliance Basic Functional Requirements

2.4.1 NITF Pack

2.4.1.1 An implementation must be able to pack NITF compliant files within the constraints of the CLEVEL file types for which compliance is desired. An implementation must at least support packing the NITFS CLEVEL attributes corresponding with those available in its native mode of operation. For example, if the native mode supports graphical annotations, the implementation must support graphical annotation according to the NITFS.

2.4.1.2 If a system has an image capture or input device, the implementation must support the CLEVELs of the image size(s) that can be captured. Additionally, it must support the boundary conditions for the supported CLEVEL.

2.4.1.3 An implementation is not required to implement all NITF attributes available at any particular CLEVEL. The set of pack features implemented is somewhat at the discretion of the system sponsor. It is the responsibility of those acquiring or intending to use a particular implementation to ensure that the needed packing features are present. Whatever set of features are implemented; they must be done within the constraints of the appropriate CLEVEL and will be thoroughly tested.

2.4.1.4 An implementation that packs an NITF file must have a means to ensure that the file meets the specific complexity level intended and does not exceed the boundary conditions for that CLEVEL file type.

2.4.2 NITF Unpack

2.4.2.1 An implementation must be able to unpack any NITF compliant file at the CLEVEL for which compliance is being tested. The capability for unpack must be

*Note: This table only provides an overview summary of compliance criteria. Proper interpretation of the table is specified in the text of this chapter and associated appendices.

Note: (The following information on CLEVEL 09 is in the coordination/approval cycle.) CLEVEL 09 is used to designate NITF 2.1 files that exceed the CLEVEL 07 constraints in Table A-10 but remain within the bounds of the standard. CLEVEL 09 designates that the file exceeds at least one of the CLEVEL 07 constraints: 1. Maximum File Size (greater than 10 Gbytes), 2. Image segments with the block size exceeding 8192 pixels per row or column, (see paragraph 5.4.2.2 d for additional implementation guidance). 3. More than 999 Bands, 4. More than 100 images, 5. More than 100 graphics segments, 6. Graphic aggregate size exceeds 2 Mbytes, 7. Number of Text Segments exceeds 32, 8. The number of DES exceeds 10.

equal to or greater than the CLEVEL capability for packing. It must also unpack any NITF file packed at a lesser CLEVEL. Hence, there is a stringent requirement for an unpacker to be robust enough to handle all NITF file features (even if it can't pack the feature) that may be invoked by any packing implementation of equal CLEVEL or below.

2.4.2.2 An implementation attempting to unpack a file packed at a higher CLEVEL may do its best to properly interpret and use the file. Upon detecting the unsupported CLEVEL of the file, the implementation must at least alert the system operator of the event and provide the option to abort continuation of the unpack process. This must be done without adversely disrupting the system operation (such as requiring a re-boot or re-initialization of the system). If the application allows the operator the option to proceed with the unpack operation, the operator must be alerted of the potential for disruption of operation and potential incompleteness of any resulting presentation.

2.4.2.3 As long as the segment offset lengths in the file header are accurate, the implementation must be able to skip past erred segments and any segments containing non-supported optional features or attributes. The implementation must otherwise properly interpret remaining file segments. The operator must be notified about segments that cannot be properly interpreted.

2.4.3 Nested CLEVELs

All NITF implementations must be capable of performing the basic NITFS file processing functions associated with each lower CLEVEL below that to which it is being tested/registered. All unpack implementations must be able to unpack any lower level compliant NITF file. All pack implementations must mark NITF files at the lowest CLEVEL that supports unpacking of the file, regardless of the maximum CLEVEL capability of the packing implementation. Generally, pack implementations should be able to pack NITF files of each CLEVEL below which it is capable in order to interchange files with other implementations of lower CLEVELs. When so required by the system sponsor, the system must be able to pack NITF files at each lower CLEVEL with contents that do not exceed the boundary conditions for each respective CLEVEL.

2.4.4 Common Coordinate System (CCS)

One of the differences between CLEVELs in Table 2-1 is the CCS size constraint. These constraints define the boundary rectangle of the combined displayable elements (image and graphic segments) contained within an NITF file for each respective CLEVEL. All pack capable implementations must constrain the size and location of displayable elements within the boundary of the respective CLEVEL of the file being packed. All unpack capable implementations must support the full extent of the Common Coordinate System size of the CLEVELs for which

compliance is sought and apply the background color as specified by the originator of the file.

2.4.5 JPEG 2000 Compression

All unpack capable implementations must support JPEG 2000 decompression. Decoders are required to fully decode any JPEG 2000 Part-1, Profile-1 file produced within the constraints of the complexity level implemented by the NSIF decoder.

All pack capable implementations with requirements to support JPEG 2000 must correctly encode image arrays into J2K codestreams according to the J2K codestream syntax, marker segment definitions, filtering process and coding algorithms in the BIIF Profile for JPEG 2000 and its references.

2.4.6 JPEG Discrete Cosine Transform (DCT) Compression

All unpack capable implementations must support JPEG decompression using the DCT, Huffman Entropy Encoding, and 8-bit and 12-bit precision mode of operation. All pack capable implementations with requirements to support JPEG compression must implement JPEG DCT using the specifications and guidance contained within MIL-STD-188-198A and do so within the bounds of the criteria established for unpacking. Implementations must support the use of restart markers in the compressed data.

2.4.7 Downsampled JPEG

All unpack capable implementations must support all features of Downsampled JPEG decompression. Pack capable implementations with requirements to support Downsampled JPEG compression must only pack this type of image segments within the bounds of the compliance criteria established for unpacking. All Downsampled JPEG image segments will be single band and single block; no larger than 2048 pixels per row and per column. (Note: These are constraints imposed by the Downsampled JPEG specification).

2.4.8 Lossless JPEG

Unpack capable systems may optionally support Lossless JPEG decompression. Pack capable implementations, with requirements to support Lossless JPEG compression, must only pack these type of image segments within the bounds of the compliance criteria established for unpacking.

2.4.9 Bi-Level Compression

The use of Bi-Level Compression (Group III Facsimile) within the NITFS is being phased out. Future needs for compression of bi-level data are to be met using JPEG 2000 compression technology. Until the transition to JPEG 2000 is well

underway, all unpack capable implementations must support Bi-Level decompression using the Huffman Entropy Encoding. They must support unpacking in all three modes: One-Dimensional coding, Two-Dimensional coding with standard vertical resolution, and Two-Dimensional coding with high vertical resolution. Pack capable implementations with requirements to support Bi-Level compression must do so within the bounds of the criteria established for unpacking. All Bi-Level image segments will be single band and single blocked.

2.4.10 Vector Quantization (VQ) Compression

All unpack capable implementations must support VQ decompression and must comply with the specifications and guidance contained within Mil-Std-188-199 and the criteria established for unpacking. Pack capable implementations with requirements to support VQ compression must only pack VQ compressed image segments within the bounds of the criteria established for unpacking. Producers of VQ compressed image segments are solely responsible for the means of generating code tables resulting in appropriate quality of the decompressed imagery.

2.4.11 ARIDPCM Compression

The use of ARIDPCM compression was used in NITF 1.1-formatted files. Unpack capable implementations that have an operational need to read legacy NITF 1.1 files may continue to support decompression of ARIDPCM compressed image segments. Any pack capable implementations with mission requirements to support NITF 1.1 with ARIDPCM compression must do so within the bounds of the established criteria.

2.4.12 CGM Graphics

All implementations must support unpacking NITF files that contain CGM graphic segments. Those implementations that support annotation using graphics in their native mode must support packing of CGM graphic segments. The applicable profile of CGM for NITF 2.1 is that described by MIL-STD-2301A. The applicable profile of CGM for NITF 2.0 is that described by MIL-STD-2301.

2.4.13 Bit-Mapped Symbols

The use of bit-mapped symbols is limited to legacy NITF 1.1 and 2.0 formatted files. All unpack capable implementations must support the unpacking and display of NITF version 1.1 and 2.0 files that contain bit-mapped symbols (graphic segments). NITF 2.1 pack capable implementations supporting graphics must only use CGM formatted graphics unless they are re-packing (into NITF 2.0) legacy NITF 2.0 files with existing bit-mapped symbols.

2.4.14 Monochrome

All unpack implementations must support unpacking monochrome image segments with the following NBPP pixel depths: 1, 8, 12, 16, 32, and 64 bits per pixel with ABPP pixel depths of 1, 8, 12, 11-16, 32, and 64 bits per pixel. All pack capable implementations with the requirement to pack monochrome image data must do so within the bounds of the criteria established for unpacking.

2.4.15 Color

All unpack capable implementations must support the unpacking and display of color image segments. (The display device does not necessarily need to be a color display.) Both single band (NBPP = 1 or 8) with look-up-table (LUT), and three band (NBPP = 8 for each band, total of 24 bits) must be supported. All pack capable implementations with the requirement to pack color image data must do so within the bounds of the criteria established for unpacking.

2.4.16 Multiband

All unpack capable implementations must support the unpacking and display of multiband image segments containing up to nine bands for CLEVEL 3 implementations, 256 bands for CLEVEL 5 and 6, and 999 bands for CLEVEL 7 implementations. All pack capable implementations, with requirements to pack multispectral image data, must do so within the bounds of the criteria established for unpacking.

2.4.17 Nodisplay Image Representation

Unpack capable implementations may optionally support image segments with matrix data having an Image Representation (IREP) of NODISPLY. When supported, the implementation must pass the data field content to the appropriate matrix data application according to the ICAT value for further processing. Implementations without a requirement to support no display matrix data must not be adversely affected when image segments containing such data are encountered. At the very least, the operator must be notified about segments that cannot be properly interpreted. Pack capable implementations with requirements to support the no display representation of matrix data must do so within the bounds of the criteria established for unpacking.

2.4.17.1 Elevation Data

Unpack capable implementations may optionally support exploitation of elevation matrix data contained within an image segment. Those systems that choose to implement this feature must do so in accordance with the criteria detailed in DIGEST 2.0, Annex D. In general, when a file contains an image segment with pixel data, a corresponding image segment with elevation matrix data and the appropriate Geospatial Support Data Extensions (GeoSDEs), the implementation

must be able to indicate the elevation for all pixels within the image pixel array that have elevation data associated with them. The implementation must also present the associated accuracy information given in the GeoSDE. All pack capable implementations with the requirement to pack elevation matrix data must do so within the bounds of the criteria established for unpacking.

2.4.17.2 Location Grid Data

Unpack capable implementations may optionally support exploitation of location grid data contained within an image segment. Those systems that choose to implement this feature must do so in accordance with the criteria detailed in DIGEST 2.0, Annex D. In general, if a file contains an image segment with pixel data, a corresponding image segment with location grid data and the appropriate GeoSDE, the implementation must be able to indicate the location coordinates for all pixels within the image pixel array that have location data associated with them. The implementation must also present the associated accuracy information given in the GeoSDE. All pack capable implementations with the requirement to pack location grid data must do so within the bounds of the criteria established for unpacking.

2.4.18 Masked Tables

All unpack capable implementations must properly interpret and use block and pixel mask tables. Unpack capable implementations must interpret and properly use the pad pixel value when defined in masked tables. A pad pixel value of zero must be treated as transparent. Pack capable implementations that insert block and/or pixel mask tables must populate them with accurate offset and related values.

2.4.19 Tagged Record Extensions (TREs)

TREs may appear in the following fields: UDHD, XHD, UDID, IXSHD, SXSHD, TXSHD, and the “TRE_OVERFLOW” DES regardless of CLEVEL. Only G/ISMC approved Tagged Record Extensions are allowed as shown in the TRE portion of the NITFS Tagged Extension Registry. As a minimum, unpack capable implementations must at least ignore TREs and properly unpack the segment in which the TRE exists. If the implementation supports the interpretation of TREs, it must also do so when the TREs happen to be located in a TRE_OVERFLOW DES.

2.4.20 Data Extension Segments (DESs)

Only G/ISMC approved DESs are allowed as shown in the DES portion of the NITFS Tagged Extension Registry. All unpack capable implementations must be able to interpret NITF files containing the STREAMING_FILE_HEADER DES. If the implementation supports the interpretation of TREs, it must also support the TRE_OVERFLOW DES. As a minimum, unpack capable implementations must at least ignore other DESs and properly unpack other supported file segments.

2.4.21 Reserved Extension Segments (RESs)

Only G/ISMC approved RESs are allowed as shown in the RES portion of the NITFS Tagged Extension Registry. As a minimum, unpack capable implementations must at least ignore RESs and properly unpack other supported file segments.

2.4.22 TACO2

All tactical systems, and those systems with requirements to interface with tactical systems, must provide a means for exchanging files. If TACO2 is chosen as a communications protocol, the IUT must demonstrate the capability to configure TACO2 parameter settings. TACO2 supporting systems may support and if so demonstrate point-to-point and Secure Telephone Unit-3rd Generation (STU-III) capability.

2.4.23 Communications Channels

All systems, and/or components within a system, must support the exchange of NITF files across whatever standard (ANSI, ISO, FIPS, Commercial, etc.) communication channel/protocol that is provided with the system/component. The file exchange capability must be supported between components within the system as well as between systems.

2.4.24 Physical Exchange Media

Systems with exchangeable media capability intended for distribution or exchange of imagery products, (e.g., magnetic disk, tape, optical disk, etc.) must be able to exchange NITF files via the media. All systems must provide some means to exchange NITF files for compliance test purposes. Most systems have some type of media peripheral(s) to at least support system operation and maintenance that can be used for this purpose. Alternative arrangements to complete compliance testing must be coordinated with the JITC Test and Evaluation Facility personnel when this is not the case.

2.4.25 NITF 1.1 Files

All NITF 2.1 unpack capable implementations may elect to support the unpack and interpretation of NITF version 1.1 files if the concept of operations calls for such support. All NITF 2.1 implementations are discouraged from packing NITF 1.1 files in order to allow the eventual elimination of legacy 1.1 files through attrition.

2.4.26 NITF 2.0 Files

All NITF 2.1 unpack capable implementations must be able to unpack any NITF version 2.0 compliant file as defined in the N-0105. All pack capable implementations may optionally support the capability to pack NITF files within the

constraints of NITF version 2.0 as defined in N-0105. See Appendix K, Constraints for NITF 2.0 compliance.

2.4.27 Date Handling

Implementers must provide a statement summarizing their approach for resolving date handling associated issues. The summary must cover the NITF application, the operating system, and the platform upon which the product resides.

2.4.27.1 The following are some primary examples of date usage:

- Calculate the duration between two dates
- Calculate date based on starting date and plus or minus duration
- Calculate day of week, day of month, week of year, and month of year
- Evaluate Leap Year correctly
- Compare two dates
- Convert between various date representations
- Reference same date data addressed with different variables
- Store, retrieve, and display date data
- Move date data into memory
- Move date data across all interfaces

2.4.27.2 NITFS Form CTR-5, Date Handling System Awareness Checklist, in Appendix B provides the developer with questions that will assist in assembling the summary statement.

2.5 NITF 2.0 Criteria

2.5.1 CLEVELS 1 through 6

The NITFS Test Program Plan, N-0105, defines the NITF 2.0 compliance criteria for digital imagery products. The following table provides a summary of NITF 2.0 compliance test criteria. This table, extracted from N-0105, is provided here for convenience of the reader. Refer to the latest revision of N-0105 for the authoritative version of this table.

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Table 2-2. NITF 2.0 Compliance Criteria Summary

Compliance Level	* 1	2	3	4	5	6
Common Coordinate System Size (Pixels)	0064-1024 V X 0064-1024 H	0064-1024 V X 0064-1024 H	0064-2048 V X 0064-2048 H	0064-4096 V X 0064-4096 H	0064-8192 V X 0064-8192 H	0064-65536 V X 0064-65536 H
Image Blocking	Single	Single	Single and Multiple 32^2, 64^2, 128^2, 256^2, 512^2, 1024^2	Single and Multiple 32^2, 64^2, 128^2, 256^2, 512^2, 1024^2	Single and Multiple 32^2, 64^2, 128^2, 256^2, 512^2, 1024^2	Multiple 32^2, 64^2, 128^2, 256^2, 512^2,1024^2
Monochrome (uncomp)	8 Bits\Pixel With & w/o LUT IMODE = B	8 Bits\Pixel With & w/o LUT IMODE = B	8 Bits\Pixel With & w/o LUT IMODE = B	8 & 16 Bits\Pixel With & w/o LUT IMODE = B	8 & 16 Bits\Pixel With & w/o LUT IMODE = B	8 & 16 Bits\Pixel With & w/o LUT IMODE = B
JPEG (mono)	8 Bit sample IMODE B	8 Bit sample IMODE B	8 Bit sample IMODE B	8 & 12 Bit sample IMODE B	8 & 12 Bit sample IMODE B	8 & 12 Bit sample IMODE B
Color 8 Bit (RGB/LUT) No Compression	No	Single Band W/LUT IMODE = B	Single Band W/LUT IMODE = B	Single Band W/LUT IMODE = B	Single Band W/LUT IMODE = B	Single Band W/LUT IMODE = B
Color 24 Bit (RGB) uncomp	No	Three Bands No LUT IMODE = B,P	Three Bands No LUT IMODE = B,P,S	Three Bands No LUT IMODE = B,P,S	Three Bands No LUT IMODE = B,P,S	Three Bands No LUT IMODE = B,P,S
JPEG (color RGB)	No	8 Bit Sample IMODE = P	8 Bit Sample IMODE = P	8 Bit Sample IMODE = P	8 Bit Sample IMODE = P	8 Bit Sample IMODE = P

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Table 2-2 NITF 2.0 Compliance Criteria Summary (cont'd.)

Compliance Level	* 1	2	3	4	5	6
JPEG (YCbCr)	No	8 Bit Sample IMODE = P	8 Bit Sample IMODE = P	8 Bit Sample IMODE = P	8 Bit Sample IMODE = P	8 Bit Sample IMODE = P
Bi-Level Image	1bpp image w/wo LUT	1bpp image w/wo LUT	1bpp image w/wo LUT	1bpp image w/wo LUT	1bpp image w/wo LUT	1bpp image w/wo LUT
Bi-LEVEL Compression	COMRAT = 1D,2DS,2DH IMODE = B	COMRAT = 1D,2DS,2DH IMODE = B	COMRAT = 1D,2DS,2DH IMODE = B	COMRAT = 1D,2DS,2DH IMODE = B	COMRAT = 1D,2DS,2DH IMODE = B	COMRAT = 1D,2DS,2DH IMODE = B
Inset Image Overlays	0-4	0-4	0-19	0-19	0-19	0-19
Symbols	0-100	0-100	0-100	0-100	0-100	0-100
Aggregate Size	128 Kbyte max	128 Kbyte max	0.5 Mbyte max	1 Mbyte max	1 Mbyte max	1 Mbyte max
Bit Map Symbol Colors (1 BPP)	N,K,W	N,K,W, R,O,B,Y	N,K,W, R,O,B,Y	N,K,W, R,O,B,Y	N,K,W, R,O,B,Y	N,K,W, R,O,B,Y
Object Symbols	Not Allowed	Not Allowed	Not Allowed	Not Allowed	Not Allowed	Not Allowed
CGM SYMBOLS	PREFERRED	PREFERRED	PREFERRED	PREFERRED	PREFERRED	PREFERRED
Labels 1-320 characters each; color options same as for Bit-map Symbols	0-100 2,048 char max	0-100 2,048 char max	0-100 2,048 char max	0-100 2,048 char max	0-100 2,048 char max	0-100 2,048 char max
Text	0-5 Files 100,000 chars max. aggregate	0-5 Files 100,000 chars max. aggregate	0-32 Files 100,000 chars max. aggregate	0-32 Files 100,000 chars max. aggregate	0-32 Files 100,000 chars max. aggregate	0-32 Files 100,000 chars max. aggregate
Controlled Tags	Controlled tags may appear in the following fields: XHD, IXSHD, SXSHD, LXSHD, TXSHD, and 'Controlled Extensions' DES regardless of CLEVEL.					
Registered Tags	Registered tags may appear in the following fields: UDHD, UDID, and 'Registered Extensions' DES regardless of CLEVEL.					
Data Extension Segment	FUTURE USE Only for Systems that require use.	FUTURE USE Only for Systems, that require use.	FUTURE USE Only for Systems, that require use.	FUTURE USE Only for Systems, that require use.	FUTURE USE Only for Systems, that require use.	FUTURE USE Only for Systems, that require use.
Reserved Segment	FUTURE USE Only for Systems, that require use.	FUTURE USE Only for Systems, that require use.	FUTURE USE Only for Systems, that require use.	FUTURE USE Only for Systems, that require use.	FUTURE USE Only for Systems, that require use.	FUTURE USE Only for Systems, that require use.
VQ Compression	4x4 Kernel 4 table w/wo masking	4x4 Kernel 4 table w/wo masking	4x4 Kernel 4 table w/wo masking	4x4 Kernel 4 table w/wo masking	4x4 Kernel 4 table w/wo masking	4x4 Kernel 4 table w/wo masking
VQ Monochrome	w/wo LUT IMODE = B	w/wo LUT IMODE = B	w/wo LUT IMODE = B	w/wo LUT IMODE = B	w/wo LUT IMODE = B	w/wo LUT IMODE = B

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Table 2-2 NITF 2.0 Compliance Criteria Summary (cont'd.)

Compliance Level	* 1	2	3	4	5	6
VQ 8-bit color	No	with LUT IMODE = B	with LUT IMODE = B	with LUT IMODE = B	with LUT IMODE = B	with LUT IMODE = B
TACO2	ALL SYSTEMS MUST SUPPORT NITF FILE EXCHANGE USING TACO2 PROTOCOL					

* 01 File < 1,213,000 bytes so that it fits on a 3.5" or 5.25" floppy disk.

Note: This table only provides an overview summary of certification criteria. Proper interpretation of the table is specified in the text of this chapter. CLEVEL "99" is used to designate an NITF 2.0 file not within the 1 to 6 CLEVEL definition.

2.5.2 STREAMING FILE HEADER DES

There is no known producer of the Streaming File Header DES and as such, there is no requirement to generate or interpret it. The original concept was as follows for NITF 2.0 and 2.1 and is provided as information:

NITF 2.0 (CLEVEL 7) Notice 2 to MIL-STD 2500A added CLEVEL 07 to mark NITF 2.0 files that use STREAMING_FILE_HEADER DES. In some operational circumstances (e.g., those with critical time or storage constraints) all the information (incomplete length fields) needed to populate the header fields may not be available at the start of file creation and transfer. STREAMING_FILE_HEADER, Data Extension Segment shall be used to provide the data needed to complete the file header. Incomplete length fields shall be populated with the character "9" (0x39) as a placeholder. Systems receiving a file with an incomplete header shall locate the DES and interpret the data in the DES as though it is actually located at the beginning of the file. The system may restore the file header fragment from the DES to populate the header. Any modification of this file shall result in the file being stored with a fully compliant and complete header and the Streaming File header DES removed. The STREAMING_FILE_HEADER DES for NITF 2.1 files is non-CLEVEL dependent. Each of the four NITF 2.1 CLEVELs (03, 05, 06 and 07) may make use of the STREAMING_FILE_HEADER DES in NITF 2.1.

2.6 NITF 1.1 Compliance Criteria

2.6.1 Minimum Compliant NITF Field Values and Ranges

The following subset of NITF capabilities has been prescribed to ensure a common level of functionality with systems using NITF version 1.1. Related message parameters are described below.

1. Image/Sub-image Parameters. Imagery will be gray scale and may be from 8 x 8 to 512 x 512 pixels, 8 bits-per-pixel. Images may be either uncompressed or compressed using ARIDPCM. Since sub-images may be overlaid on a base image, there may be from 0 to 5 images per message. The size of the

largest image in the message may be up to 512 columns by 512 rows. The aggregate size of all remaining images within a message must not exceed 50 percent of the base image.

2. Symbol Parameters. Symbols will be bit-mapped and may be 1 to 512 lines of 1 to 512 pixels per line, 1 bit-per-pixel, in white foreground on black background (N), black foreground on transparent background (K), or white foreground on transparent background (W). There may be 0 to 100 symbols per message. The maximum aggregate size of all symbols within a message must not exceed 262,144 bits.

3. Label Parameters. Labels will be in STA between 0 and 320 characters long. They may be white foreground (text) on transparent background, white on black, black on transparent or black on white. There may be 0 to 100 labels per message. The aggregate size of all labels within a message must not exceed 2,000 STA characters.

4. Text Parameters. Text files will be composed of STA characters. There may be 0 to 5 text files per message. The aggregate size of all text files within a message must not exceed 10,000 STA characters.

5. Display and Attachment levels. Although NITF 1.1 included display and attachment levels, there is one significant difference when compared to how NITF 2.0 and 2.1 implement them. NITF 1.1 allowed a display level of 0 (Zero). A zero display level is not allowed in NITF 2.0 and 2.1. Therefore, care must be taken when converting between these formats to adjust logically Display levels and their associated attachment levels.

2.6.2 Minimum Compliance Capabilities:

2.6.2.1 Receive/Interpret (Unpack) Capabilities. An NITF compliant Receive (unpack) capable system must be able to receive and unpack any minimum compliant NITF file.

2.6.2.2 Transmit/Generate (Pack) Capabilities. An NITF compliant Transmit (Pack) system must be able to pack and transmit a minimum compliant NITF file that will include selected combinations of:

- 0 images per message (Note: in NITF 1.1 “files” were referred to as “messages."
- At least 1 image per message
- Compressing imagery with ARIDPCM using at least 1 rate (optional)
- 0 symbols per message

- At least 1 symbol per message, if there is no symbol waiver
- 0 labels per message
- At least 1 label per message, if there is no label waiver
- 0 text files per message
- At least 1 text file per message, if there is no text waiver

2.7 Date Handling Compliance Criteria:

2.7.1 Although most date handling related issues resulting from the year 2000 transition have been resolved through the update of applications and operating systems, some specific date handling issues will remain for some time. The most significant issue remaining is converting between legacy formatted files (1.1 and 2.0) and NITF 2.1.

2.7.2 All presentation to users of dates will use four-digit year regardless of the internal or NITF file representation of the date. In some instances, where the century of the date is ambiguous, the first two characters of the year may be shown as hyphens. See the discussion about birth dates in paragraph 2.7.4.

2.7.3 All date sensitive manipulation or calculations will be done with due consideration for the appropriate century.

2.7.4 For NITF 2.0 and NITF 1.1 formatted files, the implementation must associate century according to the Window Date Rule established by NGA. It must be noted, however, that the application of the window date rule must be logically applied and not arbitrarily. For example, Dates of Birth found in some TREs cannot be interpreted using the Window Date Rule as it may result in improper interpretation; i.e., someone born in 1946 would be interpreted as not born yet or having a negative birth date. Table 2-3 identifies Date and Time Fields and recommended NGA date rule application.

2.8 Use of CLEVEL 99:

CLEVEL 99 was introduced in NITF version 2.0 to accommodate certain systems/programs that needed to produce compliant NITF files using features outside the constraints of the existing CLEVEL definitions. The use of this CLEVEL is discouraged and should not be used, as most NITFS systems will not be able to interpret the file. The predominant use of CLEVEL 99 is for NITF 2.0 files that exceed the 2-gigabyte file size constraint of CLEVEL 06.

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Table 2-3. Applying NGA Date Rule To NITF and TREs

FIELD	NAME	SIZE	VALUE RANGE	DESCRIPTION	Apply NGA Date Rule
NITF 2.0 & NITF 2.1					
NITF Main Header					
FDT	File Date & Time	14	DDHHMMSSZMONYY	(NITF2.0) This field contains the time (Zulu) of the files origination in the format … YY is the last two digits of the year.	YES
Image Subheader					
IDATIM	Image Date & Time	14	DDHHMMSSZMONYY	(NITF2.0) This field contains the time (Zulu) of acquisition of the image in the format … YY is the last two digits of the year.	YES
ISDWNG (This includes all NITF segments)	Image Security Downgrade	6	Alphanumeric	(NITF2.0) This field contains a time indicator at which a declassification or downgrading action is to take place. (1) The valid values are the calendar date in the format YYMMDD, and (2) the code “999999” when the originating agency’s determination is required (OADR), and the code “999998” when a specific event determines at what point in time declassification or downgrading is to take place. (3) If this field is all spaces, it shall imply that no image security downgrade condition applies.	YES

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Table 2-3. Applying NGA Date Rule To NITF and TREs (cont'd)

FIELD	NAME	SIZE	VALUE RANGE	DESCRIPTION	Apply NGA Date Rule
Test Data Subheader					
TXTDT	Text Date & Time	14	DDHHMMSSZMONYY	(NITF2.0) This fields contains the time (Zulu) of origination of the text in the format DDHHMMSSZMONYY where DD is the date of the month (01-31), HH is the hour (00-23), MM is the minute (00-59), SS is the second (00-59), the character Z is required, MON is the first three characters of the month, and YY is the last two digits of the year.	YES
Profile for Imagery Archives Person Identification Extension (PIAPEA)					
DOB	Birth Date	6	MMDDYY	(NITF2.0) Identifies the birth date of the individual captured in the image.	NO
Additional Image ID Extension Format (AIMIDA)					
MISSION_DATE	Aircraft T.O. Date	7	DDMMMYY	(NITF2.1) The date of the collection mission (date of aircraft takeoff). In the format, DD is the day of the month, MMM is the first three characters of the month, and YY is the last two digits of the year (00-99).	YES
CREATION_DATE	Creation Date	7	DDMMMYY	(NITF2.1) This field contains the collection date of the first line of the image in the format … YY is the last two digits of the year (00-99).	YES
Aircraft Information Extension Format (ACFTA)					
PDATE	Processing Date	7	DDMMMYY	(NITF2.1) SAR: when raw data is converted to imagery. EO-IR: when image file is created. DD is the day of the month … YY contains the two least significant digits of the year.	YES
Profile for Imagery Archives Product Support Extension – Version C (PIAPRC)					
PRODCRTIME	Product Create Time	14	DDHHMMSSZMONYY	(NITF2.0) Identifies the date or the date and time that the product was created or last modified.	YES

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Table 2-3. Applying NGA Date Rule To NITF and TREs (cont'd)

FIELD	NAME	SIZE	VALUE RANGE	DESCRIPTION	Apply NGA Date Rule
MIL-PRF-89034 PERFORMANCE SPECIFICATION Digital Point Positioning Data Base (DPPDB)					
1. Master Product File Header 2. Overview Segment Image File Header Definition 3. Segment Image Full Resolution File Header Definition					
FDT	File Date & Time	14	DDHHMMSSZMONYY	This field contains the time (Zulu) of origination of the file in the format … YY is the last two digits of the year.	YES
1. Master Product Footprint Vectors Text File Subheader 2. Master Product Segment Image IDs and Footprint Vectors Text File Subheader 3. Master Product Accuracy Limitations Text File Subheade 4. Master Product Adverse Areas Text File Subheader 5. Master Product Void Areas Text File Subheader 6. Master Product Accuracy Evaluation (Absolute) Text File Subheader 7. Master Product Accuracy Evaluation (Relative) Text File Subheader 8. Master Product Accuracy Evaluation (Shear) Text File Subheader 9. Master Product General Information Text File Subheader					
TXTDT	Text Date & Time	14	DDHHMMSSZMONYY	This field contains the time (Zulu) of origination of the text in the format … YY is the last two digits of the year.	YES
1. Overview Segment Image Subheader Definition 2. Segment Image Subheader Definition					
IDATIM	Image Date & Time	14	DDHHMMSSZMONYY	This field contains the time (Zulu) of acquisition of the image in the format … YY is the last two digits of the year.	YES

NOTE: Refer to page 60 in STDI-0002 for validation of using two digits as "… 00 through 59 indicate the years 2000 through 2059, and 60 through 99 indicate 1960 through 1999. As affected extensions evolve, the fields will be expanded to support standard date formats with four digits for the year."

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3 COMMON NITFS IMPLEMENTATION PRACTICES & GUIDELINES

3.1 General

The NITFS is designed to provide standardization while allowing flexibility to meet varied missions within the NSGI. To support interoperability, consideration must be given to identifying the functionality desired within and across user communities. Given the wide range of available metadata within the NITFS, interoperability can best be achieved by working to understand the purpose of metadata and how it applies across the enterprise and within user communities. NITFS and imagery when combined with various metadata can support different functional requirements such as precision targeting, Battle Damage Assessment, Battlefield Preparation activities, mensuration and many other intelligence related support functions.

This section is intended to assist imagery system Program Managers, developers and users by documenting the implementation choices and approaches commonly used across the NITFS community. Practices for specific user groups and specific to various sets of metadata (TREs) are addressed in other sections.

3.2 Originating Station Identification (OSTAID)

Each NITF file contains a place (field) where the Originating Station of the file can be identified. The OSTAID is a required alphanumeric field in the NITF file header that contains the identification code or name of the organization, system, or station. This field may not contain all BCS-A spaces (0x20). Generally, the user can populate this field either at file creation time or through some default (header) setting depending on the CONOPS of the station.

The operational intent of the OSTAID is to provide a place to identify in human readable form what entity was the generation source of a given NITF file. The NITFS does not otherwise dictate how this field is used. It is left to the community of interest to determine its use given its general purpose. When determining its use consideration should be given to the conventions in use and the expected movement of the imagery throughout the affected architecture. For example if the imagery is being moved in a very closed community of users, then each originating station or entity may be identified in the OSTAID. Decisions must be made if the field is auto populated or manually populated, some applications allow a default to be set or at least for the operator to edit this field. If the information is variable, then possibly a drop down menu approach may be used if provided for by the application. If the OSTAID is fixed based on the physical system, then perhaps a hard coded value may be used. Most applications/systems apply a default OSTAID to ensure a compliant file is generated as spaces are not allowed in this field. This may be fine for some CONOPS but may be inadequate for others.

The recommended practice is to apply information that will have meaning to the recipient such that they can know the facility/station creating the NITF file. The

usage of default values that merely specify what software product produced the file is discouraged.

Consideration should be given to when altering the OSTAID is appropriate, generally when a file has changes made to it that are significant enough that the changing station/operator takes on "ownership" of the resulting file. This can be an objective decision but generally, any significant alteration in the file should result in a change in the OSTAID.

The following are the practices as generally used.

ELTs: All will default to a set value usually the Application Name unless the operator edits the field. Some systems provide a mechanism to configure a local default.

Libraries: Both the NL and IPL will leave the OSTAID as originally populated upon ingest. When converting a Non-NITF file to NITF a default value is used prior to export.

3.3 Product Identification and File Naming

Within the NITF community there are "formal" and sometimes “informal” conventions practiced for file naming and product identification. It is important that, within communities of users, these conventions are known and dealt with accordingly as they often add increased usability to imaging operations. Appendix D provides additional information.

3.4 Date and Time Fields

There are numerous places to indicate Dates and Times within NITF files. Locations include the file header, image segment subheaders, graphic and text segment subheaders and within the metadata vehicles such as TREs.

3.4.1 The File Date and Time (FDT) field contains the UTC time (Zulu) of the origination of the file. The value in this field is updated each time the file is modified and saved.

3.4.2 The Image Date and Time (IDATIM) field contains the date and time of the image acquisition. Once populated, the content of this field is never changed. The importance of this field is often over-looked or misunderstood. Image analysts often compare images of a given area to determine changes over time. If the IDATIM is changed to anything other than the actual acquisition time, it is obvious what kind of problem that could create. Libraries use this field to catalogue an image for discovery and retrieval by users, so again, it is important that it maintain the actual acquisition date and time.

The definition of IDATIM in the NITFS does not define what is considered to be the acquisition time of an image for the various types of imagery that are collected. The design of the system should determine the most appropriate point in time to declare as acquisition time (e.g., first line of a scanned image, shutter time of a frame image, etc.).

3.4.3 The Text Date and Time (TXTDT) field contains the time of the text origination. The field value is updated any time the text content is modified and saved.

3.4.4 There may be times when only a portion of a date and time field is known. Hyphens should be used for unknown components of the date and time field. There may be legacy systems that used unique methods for handling the generation of date and time information prior to establishing the practice of using hyphens.

3.5 Security Fields

3.5.1 General

3.5.1.1 The NITFS provides a mechanism for internally recording security markings and handling instructions for the overall file as well as individual data segments within the file. Generally, the same capability available for marking portions of a hard copy document can be applied when marking an NITF file. Each Image, Graphic, Textual, and Metadata segment within an NITF file can be independently marked and the overall NITF file can be marked to represent the accumulative classification of the individual segments within the file.

3.5.1.2 The NITFS does not specify security policy or concept of operations for secure handling of imagery and related data. The standard simply provides the means (security fields) for including security markings in NITFS formatted data files. System sponsors, developers, and users should work together at the community and imagery system level to apply a combination of technical and procedural practices to address security. This section provides information and guidance to support this process. Sponsors and Developers can assist users and security managers by considering and making implementation choices that facilitate achieving proper security handling of NITF files. A brief description of how security marking is handled in the NITFS is as follows.

- NITF 2.1: The concept in NITF 2.1 for security handling is similar to that traditionally used for hard copy documents based on the Controlled Access Program Coordination Office (CAPCO) guidelines and Executive Order (EO) #12958. The NITF 2.1 data fields for security directly correlates to the security elements of information defined in EO #12958.

- NITF 2.0: NITF 2.0 also has a robust marking capability but were defined before the publishing of EO #12958. Legacy data production centers

continue to produce and disseminate data with security marking conventions that pre-date EO #12958. Even so, the security data field values can be interpreted and used within the guidelines of current security policy established at individual facilities or operations centers based on CAPCO guidelines. Recommended practice for correlating NITF 2.0 security fields with the EO #12958-based NITF 2.1 security fields is provided in appendix G.

- NITF 1.1 (Legacy): A limited capability existed for NITF 1.1 security marking which although unique, has evolved and been improved upon in later versions of the NITFS.

3.5.1.3 Common Security Related Implementation Considerations

3.5.1.3.1 File type conversions. When systems convert file types (formats) that do not have internal security information to NITF, a method may be required to ensure operator/human intervention is accomplished to ensure the NITF security fields are properly populated when a new file is generated from an external format; i.e., TIFF, GIF, TFRD.

Converting security field information between NITF 2.1 to 2.0 may not be a one-for-one conversion depending on the specific situation. To provide a common practice for conversion, a transliteration scheme is provided in appendix G for use within the NITFS community.

3.5.1.3.2 Security marking preservation. Some imagery applications convert NITF to an internal format for data processing, exploitation, etc. purposes. The modified imagery data may then be exported in NITFS format. Care must be taken that proper security marking of the data is maintained throughout the process. Consideration must be given that adding "value" to the data may also increase the required security marking for the value-added product.

3.5.1.3.3 Security information alteration. Since each segment in an NITF file has its own set of security fields, care must be taken when an NITF file is altered to ensure that security information is also logically altered. For example if a “(S) SECRET” file is being changed to include a “TOP SECRET” segment the overall file classification must altered to “(TS) TOP SECRET” accordingly. As with hard copy documents, human intervention should be considered a must when this occurs. Implementers can assist users by incorporating user-alerts into the interface when such changes occur.

3.5.1.3.4 NITFS Data Integrity/Security. The NITFS provides a mechanism to allow Digital Signatures to be applied to NITF file with PKI compatible Tagged Record Extensions. (NOTE: The NTB has not fully validated and approved these TREs).

3.5.1.4 Community/System Implementation Considerations

3.5.1.4.1 Primary NITF data producers. Primary producers of NITFS files should ensure the security fields are properly populated before dissemination at the time of production, as failure to do so will create security issues for downstream users of the data.

3.5.1.4.2 ELT/Workstations. ELT Graphical User Interface (GUI) should be developed in a manner that ensures the operator is made fully aware of the security values located in the security field set in an NITF file being interpreted/viewed. Unless the interface is developed to read, interpret, and make the information available in human readable form for both viewing and in some cases editing by the operator, full advantage of the security fields cannot be realized. It is important for the GUI to prominently display the overall NITF file classification using an “always on top” banner type label.

Incorporating features such as drop-down menus, user alerts, and access controlled configurable default field values can be beneficial to facilitating proper security.

3.5.1.4.3 Image Libraries. Sponsors and developers of image libraries should consider the security marking and handling of NITF files when ingesting, converting and disseminating them. A combination of automated and human intervention procedures may be required to ensure proper security marking and handling is accomplished.

3.5.1.4.4 Image Guards. Applications with a primary function to provide some level of automatic downgrading of NITF files or movement between classification levels; i.e., Radiant Mercury and ISSE Guard. These applications are generally required to undergo formal security accreditation in addition to achieving NITFS compliance before fielding.

3.5.2 Background

For a US File Security Classification System, the following documents will provide information assisting in the population of the security group fields.

- Executive Order 12958, Classified National Security Information, 17 April 1995.
- DCID 1/7, Security Controls and Dissemination of Intelligence Information, 30 June 1998. (U/FOUO)
- Controlled Access Program Coordination Office (CAPCO), Intelligence Community Classification and Control Markings Implementation Manual and Register.
- IC Chief Information Officer, Intelligence Community Inter-Domain Transfer Policy, 9 November 1999, Draft. (U/FOUO)

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

3.5.3 File Generation/Packing Guidelines

3.5.3.1 General

3.5.3.1.1 Ability to establish default settings in imagery application software for security field population. Developers should consider how to assist users in properly handling security of NITF files by building in ways for them to easily access view and if necessary modify security information in the headers. There is always a danger in having the software do some things automatically without user knowledge or input. For example, the operator should always be involved in the changing of security information in an NITF file.

3.5.3.1.2 One way to assist users and help ensure proper population of security information is to provide 'drop down menu lists' for content selection vice unaided free text entry. This reduces or eliminates the chance of unapproved security terms/words/codes being used.

3.5.3.1.3 GUI may provide lists to show 'human' understandable selection along with actual code value; i.e., Digraphs and Trigraphs may be spelled out completely for operator and, when selected, the application applies the appropriate Digraph/Trigraph:

- Allowance for operator to override list selection with free text entry
- Maintenance/editing of drop down list entries
- Master lists and pared down short lists
- For NITF 2.1 fields
- For NITF 2.0 fields

3.5.4 File Unpack/Interpret Guidelines

3.5.4.1 Banner presentation of security markings for human view per CAPCO guidelines.

- Map NITF 2.1 field values/codes to CAPCO banner presentation
- Map NITF 2.0 field values/codes to CAPCO banner presentation
- When presenting actual security field content:
    - Show actual code/value in the field, and

- Show the expanded presentation of the field code/value for human view

3.5.4.2 Country Codes. There has been confusing and often conflicting guidance being issued as to the use of two character country codes or three character country codes. Developers should continue to use FIPS 10-4 2-character codes.

3.6 File Background Color (FBKGC)

The concept of file background color was introduced during the NITF 2.0 era (2500A, Change Notice 2). An interoperability problem was discovered in the field when the receiver's default background color (color of the 'canvas area' established by the extent of the Common Coordinate System) was different from the originator's background color. This mismatch created the potential for the originator's symbol/text annotations to not be visible on the receiver's screen. To allow the designation of FBKGC without disrupting the integrity of the format, the first three bytes of the ONAME field were redesignated as the FBKGC field for use in specifying the file background color. The values placed in the FBKGC field are interpreted as three 8-bit binary RGB values in Red, Green, and Blue order. The use of the FBKGC field continues in NITF 2.1.

Per the ISO BIIF standard, the fields within the NITF headers are constrained to be UTF-8 encoded characters. Unfortunately, the use of the binary RGB value in the FBKGC field deviates from this constraint of the ISO standard, a fact for which awareness only came after a large number of systems had already implemented the feature. Consequently, NITFS will continue to use the FBKGC field as currently specified while acknowledging the minor deviation from the BIIF standard. Implementers are cautioned that values placed in this field may adversely disrupt the logical sequence of a UTF-8 encoded text stream if/when attempting to read this field as a character field.

Implementers need to accommodate the dual use of the FBKGC/ONAME field in NITF 2.0 files due to the possibility of older files not having a FBKGC value in the first three characters of what was the ONAME field. The following logic is a recommended practice for NITF 2.0 FBKGC interpret, discover, display and conversion to NITF 2.1 file format.

3.6.1 Converting NITF 2.0 to 2.1 format. For applications that wish to convert NITF 2.0 files into NITF 2.1 file format or incorporate the FBKGC into an NITF 2.0 formatted file should consider the following:

- When any of the three characters (8-byte values) following the ENCRYP field are outside the BCS-A values range, the probability that the file employs FBKGC is high. Maintain the field values as received when converting from NITF 2.0 to 2.1.

- When the three characters following the ENCRYP field are within the BCS-A value range and are of the same value, the probability of the file employing FBKGC is high. Maintain the field byte values as received when converting from NITF 2.0 to 2.1.

- When the three characters following the ENCRYP field are within the BCS-A value range and are not the same value, the probability of the file employing FBKGC is low. An application wishing to convert this NITF 2.0 file to NITF 2.1 format may consider the following:

  - Check the number of BCS-A spaces that follow the originators name in the ONAME field. Shift the originators name three space to the right and add a tilde "~" value three times for the FBKGC field entry.

    For example

    An NITF 2.0 file not employing FBKGC:

Field Name	Byte Size	Value
ENCRYP	1	0
ONAME	27	NIMA (NSES) followed by 16 BCS spaces

    Employing FBKGC to the file header, shift the ONAME value 3 bytes to the right and insert 3 BCS-A Tilde characters in front of the ONAME value.

Field Name	Byte Size	Value
ENCRYP	1	0
FBKGC	3	3 unsigned binary integer tilde characters (0x7E, 0x7E, 0x7E)
ONAME	24	NIMA (NSES) followed by 13 BCS spaces

  - In the case where there are no BCS-A spaces available to shift into, recommend the application duplicate the first three bytes of the ONAME for the FBKGC field value shifting the ONAME field byte values to the right and truncating right most characters as needed.

3.6.2 Displaying NITF 2.0 file format. Recommend practice for displaying NITF 2.0 files with or without FBKGC implemented.

- In all cases, user the three bytes following the ENCRYP field to define the background color.

- When displaying content of the ONAME field; when the three characters (8-byte values) following the ENCRYP field are outside the BCS-A values range, the probability that the file employs FBKGC is high. Display the 24-character ONAME field.

- When the three characters following the ENCRYP field are within the BCS-A value range and are of the same value, the probability of the file employing FBKGC is high. Display the 24-character ONAME field.

- When the three characters following the ENCRYP field are within the BCS-A value range and are not the same value, the probability of the file employing FBKGC is low. Display both the 3-character FBKGC field and the 24-character ONAME field as if it were a 27-character field.

3.7 Originator's Name and Phone Number (ONAME, OPHONE)

Historically the use of the ONAME and OPHONE fields has varied from system to system. In some cases direct operator action must/may be taken to populate these fields while some systems may provide default values that can be changed by the operator. The use of these fields should be considered by the CONOPS at all points/times in the lifecycle of an NITF file. It is difficult to establish steadfast rules as is it may not be possible in the evolving imagery architecture to assume a file will be confined to a particular user community. Given that, an operator's name and phone is essentially “perishable” information. The Application Summaries contained in this document provide the information on how particular systems are populating these fields. The following is a general guideline:

Producer: Imagery sources populate with general source if classification level allows it. NOTE: There are TREs where sensors/producers provide origination type information.

Dissemination Point; i.e., ground station: Imagery simply passing through a ground system would not alter the information as it comes from the producer.

Exploitation Workstation: Probably the first point of replacing the value where the primary analyst should apply the information.

Follow-on exploitation: When further exploitation is made, the analyst should update the ONAME and OPHONE with their information.

Archiving: Upon ingest into and export out of an image library, the fields should retain the incoming information.

3.8 Image Representation

The IREP field provides information to indicate how the image data is to be represented. For example, an image where each pixel is represented based on a

Red, Green, and Blue color value would be RGB. This field should be used in conjunction with the ICAT, ISUBCAT and IREPBAND fields to interpret the significance of each band in the image.

A known case of IREP MULTI used today for NITF version 2.0 imagery is for a four band commercial product structured where the first three bands are in BGR order and the fourth band is a Near Infra-Red band. The IREPBANDn fields for each band are populated with B, G, R, and N respectively to expressly identify which band has a specified representation. The representation associated with IREPBANDn values of R, G, and B is Red, Green, and Blue. However, there is no defined representation for IREPBANDn = N. This is a legacy practice in NITF 2.0 that continues into the NITF 2.1 era so that these specific NITF 2.0 products can bee expressed in NITF 2.1 with similar characteristics. The N-value has been formally registered as an allowed value for IREPBANDn as provided for in the NITF 2.1 standard. The value N is to be treated in the same manner as the "space" value defined for IREPBANDn.

3.9 Image Category and Product Discovery Attributes

The intent of the ICAT field in the image subheader is to provide a general category of the image segment. For example, a Synthetic Aperture Radar would have an ICAT of SAR and Raster Map would have an ICAT of MAP. Generally, this field is not intended for use in making processing decisions regarding the image segment.

Processing information needed by a system can be found in the other image subheader fields. This field can be useful for discovery and retrieval for image archives; i.e., a user may want to retrieve all the SAR images tied to a geographical area.

3.10 ICORDS/IGEOLO

3.10.1 When populated, the NITFS image subheader ICORDS/IGEOLO fields provide a bounding polygon (four points) for the coverage of the image data on the earth. The coordinates in these fields are intended to provide general orientation/coverage only, and are not intended for any interpretation other than to establish the approximate location on the earth (e.g., for data discovery/retrieval purposes within libraries, etc.). For applications that require precise and accurate location information, the use of support data from appropriate TREs is required. Image products that are void of support data for precise measurements should only be considered useful for regional visual familiarization and/or registration to trusted reference products such as NGA's Controlled Image Base (CIB) and Digital Point Positioning Data Base (DPPDB).

3.10.2 It should also be noted that to help meet tight production and dissemination timelines, some imagery collection and production systems are known to populate IGEOLO with rough approximations of the corner points even when the actual imagery products have support data (TREs) that allows more accurate and precise

determination of the corner point geographical locations. This practice can result in exploitation/mensuration tools getting different geographical location values for the corner points when using the support data as compared to those populated in the IGEOLO field.

3.10.3 Another reason to avoid IGEOLO data for positioning is when four corner points are included in the image segment and the "visual ground coverage" of the image is not inclusive of the entire image pixel space. The ground coverage may not be represented by "well defined corners" and therefore may not be coincident with the pixel space array corner points. In these cases, the producer of the image segment should populate the IGEOLO values with values that provide the most appropriate values for data discovery/retrieval of the ground coverage that is available in the image array. For example, where a horizon is in the image array, corner points can not represent the points in the sky, but perhaps the points on the ground nearest the Earth-horizon juncture. The most appropriate values may have even less coverage than the horizon juncture, to better describe the useful coverage of image data in the segment for discovery/retrieval purposes. Note that this situation can cause interpreting applications difficulties if they are attempting to perform certain mensuration functions using only the IGEOLO data. Figure 3-1 presents examples of this situation.

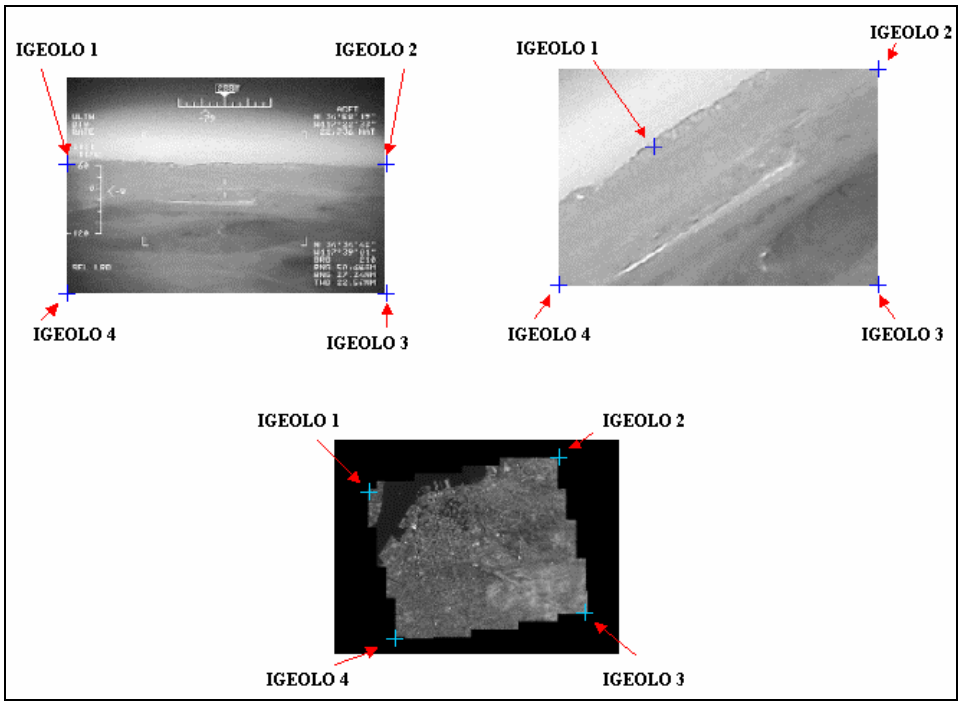

Figure 3-1. IGEOLO examples

3.10.4 Short of actual "degree of accuracy" statements associated with measurement data, applications/tools that present geographical coordinates and measurements to the user need to have, at a minimum, some readily apparent

means to identify the source of data and means for calculating positional values. E.g., state that results were derived from linear interpolation from IGEOLO corner point values, grid point matrices, RPC equations, camera model parameters, replacement camera model, with or without use of elevation data, etc. This allows the operator receiving the measurement information to make informed decisions as to the accuracy and reliability of the data being provided by the application.

3.10.5 In NITF version 2.0, the recording of IGEOLO information there were in the past some non-standard or confusing uses of the terms Geodetic and Geocentric

Unclear descriptions in the fields of ICORDS and IGEOLO have caused confusion about what to input into these fields. Misunderstanding the differences between Geodetic (Geographic) and Geocentric coordinate systems, due to unclear descriptions in the IGEOLO field, may result in a product that is not accurately represented. The following paragraphs attempt to explain the difference between the coordinate systems and why making the correct choice is important.

Coordinate systems are based off of different datum; which can be defined as a point, line, or surface selected as the origin or reference for measurements. The Geodetic coordinate system is referenced to an ellipsoid. The coordinates obtained from this system are normally in decimal degrees or degrees-minutes-seconds. Figure 3-2 is an illustration of how the *latitude* is found:

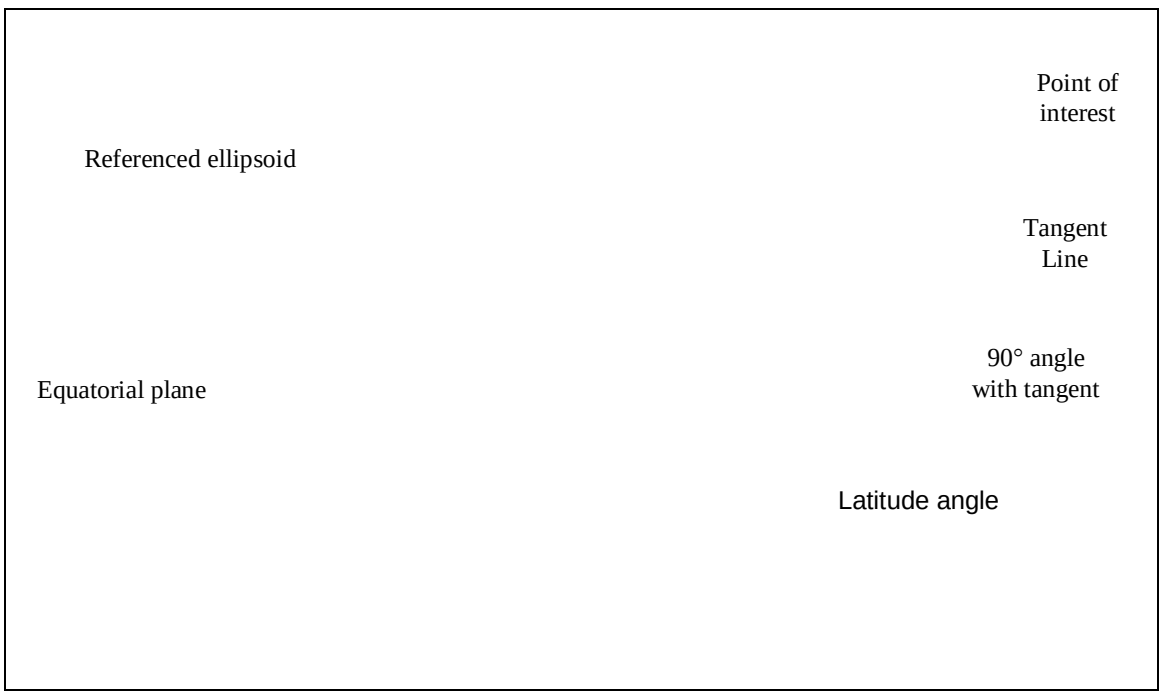

Figure 3-2. Finding Geodetic latitude

A tangent line is drawn through the point of interest, and a 90° angle is made with the tangent line. The angle made between the 90° angle line and the equatorial

plane is the latitude of the point. Notice the 90° angle line does not pass through the center of the Earth.

The Geocentric coordinate system uses a sphere as the referenced datum. The coordinates obtained from the geocentric system are based on X, Y, and Z axes and are measured in meters. Below is a diagram of how geocentric *latitude* is acquired:

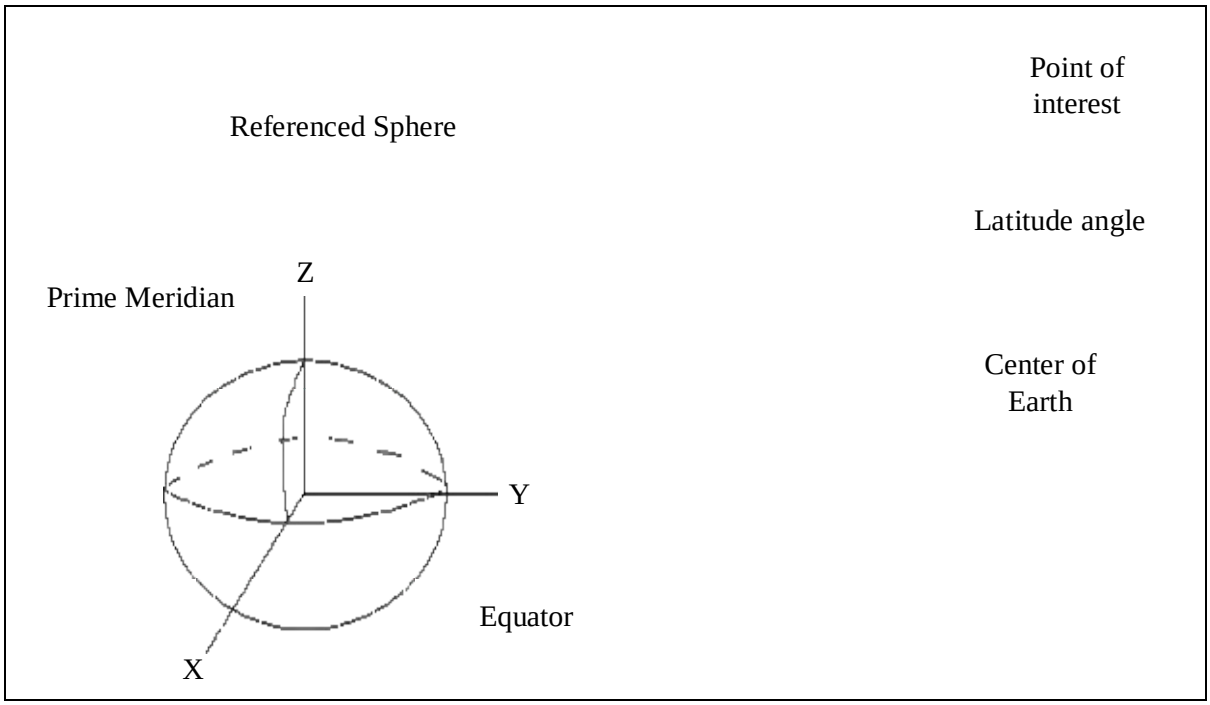

Figure 3-3. Finding Geocentric latitude

The latitude for a Geocentric coordinate is established by drawing a straight line from the center of the earth to the point of interest. The angle made between this line and the equatorial plane is the latitude of the point.

The longitude will remain equal in both systems; it is only the latitude that is affected by different types of coordinate systems.

If the geocentric selection is used for the input of the field ICORDS and the selection should be geodetic, depending on what the latitude is, there can be an offset from 0 to 11.5 minutes of latitude. Each minute in a degree is equal to approximately one mile, therefore, an error of 11.5 miles can occur in the final product (see figure and table below).

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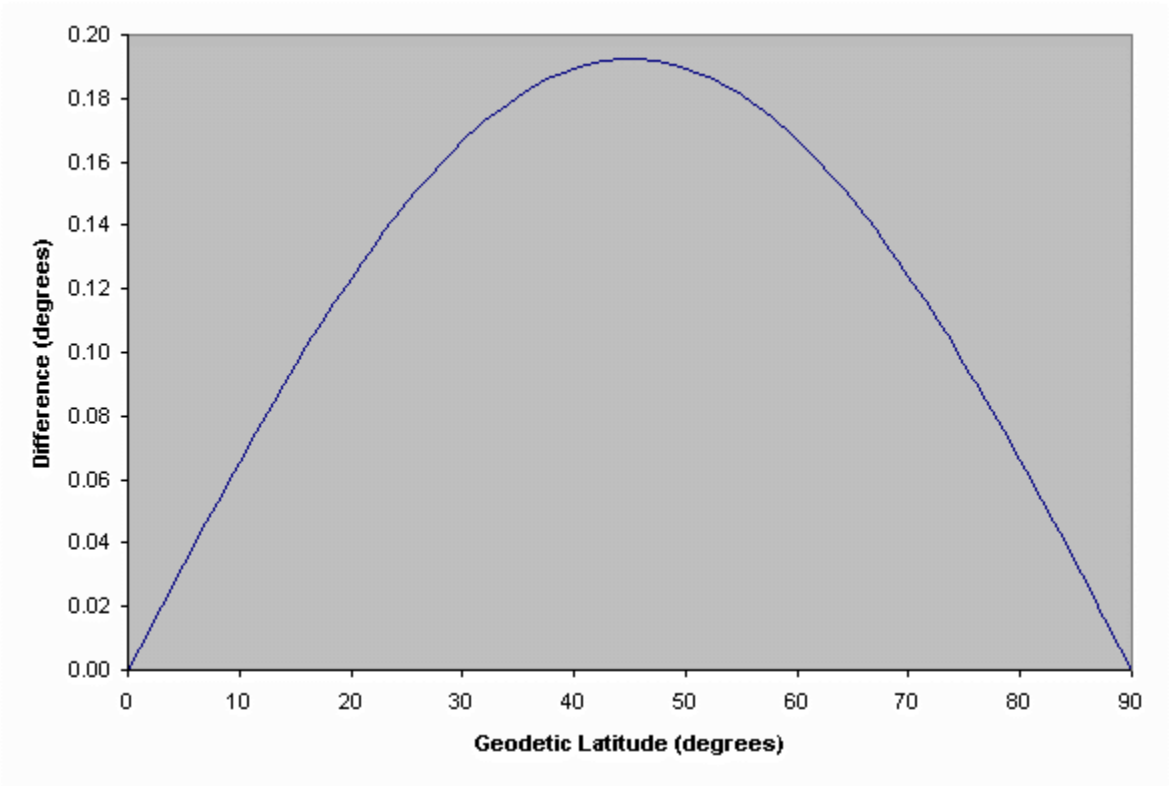
Geocentric vs. Geodetic Latitude:

Geodetic Latitude	Geocentric Latitude	Difference (Minutes)
0.000	0.000	0
15	14.904	5.8
30	29.834	10
45	44.808	11.5
60	59.833	10
75	74.904	5.8
89	88.993	0.4
90	90	0



The type of datum used in the product needs to be known in order to determine the difference between Geodetic and Geocentric systems. *Geocentric* implies a *spherical* Earth model while *Geodetic* implies an *ellipsoidal* Earth model. Most of the datum that is commonly used today are based from an ellipsoidal model, which means many of the coordinate systems used are Geodetic. An example of a common datum used in the U.S. today is the WGS84. Coordinates from this datum

would be considered Geodetic, meaning the output will be latitude and longitude in degrees. A list of different types of datum considered to be Geodetic used around the world can be found at:

http://www.colorado.edu/geography/gcraft/notes/datum/edlist.html

3.11 Image and Data Compression

3.11.1 The NITFS over the years has incorporated the use of various image compression algorithms to facilitate different operational requirements. The types of image compression supported within the NITFS are listed below. Presently there is a transition underway to use JPEG 2000. JPEG 2000 provides a significant increase in capability over previous compression methods and is the preferred method of compression for the near future. As this transition occurs and legacy compression types are phased out, additional phase-out guidance will be issued by the NTB for future implementations.

3.11.2 JPEG Lossy and Lossless compression. The legacy form of JPEG (DCT and Lossless) used for continuous tone types of imagery such as photographic images. It is expected that systems will have to continue to interpret legacy JPEG for an indeterminate time into the future. Some libraries may offer conversion services for migrating legacy JPEG to JPEG 2000.

3.11.3 Vector Quantization. This compression is used primarily by NGA to compress maps into the Compressed ARC Digitized Raster Map (CADRG) product. For this reason NITFS applications are only required to decompress and display VQ compressed NITFS image segments.

3.11.4 Bi-Level or Facsimile compression. This compression algorithm is used for two color images of one bit-per-pixel and complies with the category 3 Facsimile standard to allow for interoperability with facsimile images. The actual use of Bi-Level compression has been very limited and, therefore, it is expected that BI-level decompression will no longer be required depending on the Conops of the system.

3.11.5 ARIDPCM. Used in NITF version 1.1, ARIDPCM was the compression used before the incorporation of JPEG. Creation of ARIDPCM is not allowed in NITF 2.0 or 2.1. Systems that may encounter NITF 1.1 files should allow for the decompression of legacy ARIDPCM NITF 1.1 files.

3.11.6 JPEG 2000 (J2K). Within the last few years a new version of JPEG, called J2K, has emerged. J2K uses much improved methods of repackaging compressed data that enables significant improvements in its utility. NITF 2.1 incorporates the use of J2K, and has developed a profile to the ISO/IEC 12087-5. Information is also available in NGA document N-0106-97, NITFS Bandwidth Compression Standards and Guidelines.

3.12 Reduced Resolutions

Proper marking, identification and use of the image magnification/reduction factor value in the Image Magnification (IMAG) field of the Image Subheader are critical to a variety of image exploitation processes. This is particularly true, for example, when TREs containing support data referenced to the original source image row/column grid are preserved/copied into reduced (or enlarged) resolution image segments. To make proper use of the original (unmodified) support data, it is essential to maintain the correlation of the pixel value row/column indices in the magnified/reduced image array to their original row/column grid positions upon which the support data is based.

3.12.1 Unpack

3.12.1.1 Presentation of the pixel values in each image segment are aligned with the row/column reference grid of the Common Coordinate System (CSS) regardless of the individual image resolution as expressed in the IMAG field of each image segment. The first pixel of each image segment is located in the CSS at the row/column point indicated in the ILOC field relative to the attachment level reference point.

3.12.1.2 When using image support data (e.g., TREs) for image exploitation functions, the magnification (or reduction) factor, relative to the original source image resolution upon which the support data is based, must be included in the exploitation process.

3.12.1.3 When the IMAG field is populated with the designated default value, 1.0 (or 1.00), the image support data is interpreted as being directly correlated with the pixel array data in the image segment.

3.12.1.4 When decimal values (vice the /2, /4, /8, etc. convention) appear in the IMAG field to indicate the magnification (or reduction) factor, the potential impact of the available precision in the field must be considered in the 'error budget' of exploitation processes using the value.

3.12.1.5 When an ICHIPx TRE is available for the image segment, the reduction/magnification value in the SCALE_FACTOR field takes precedence over the corresponding, but potentially less precise, magnification/reduction value in the IMAG field. (NOTE: It is recommended that the implementation provide a means to alert the user if the values in the SCALE_FACTOR and IMAG fields are inconsistent when performing exploitation functions involving resolution considerations.

3.12.1.6 When exploiting JPEG 2000 compressed image data, multiple resolutions of the image data may be available for extraction from the compressed data stream. Some compressed data streams may not include all the data (code blocks) needed to extract the full resolution upon which the support data is based. The correlation of the pixel value row/column indices in the magnified/reduced image array to the

row/column grid positions upon which the support data is based must be maintained regardless of which available resolution of the image data is extracted from the compressed data stream.

3.12.2 Pack

3.12.2.1 An NITF file may be packed with multiple image segments, some of which have different resolutions (different IMAG values). When doing so, the image segments are placed in the NITF Common Coordinate System (CCS) using the ILOC field values to identify the row/column position (relative to the attachment level reference point) of the first pixel of each image array in the CCS regardless of individual image segment resolution.

3.12.2.2 The value in the IMAG field of each image segment represents the resolution magnification (or reduction) factor of the segments pixel array data as compared with the original source resolution of the image data upon which the image segment's support data is based.

3.12.2.3 When the resolution of the image pixel array data and associated support data directly correlate, the IMAG field is populated with the designated default value, 1.0 (followed by a space character), or alternatively, 1.00.

3.12.2.4 For reductions that are reciprocals of non-negative powers of two (2), the IMAG field is populated using the /2 (for 1/2), /4 (for 1/4), etc. convention. Otherwise, decimal values are used to indicate the magnification (or reduction) factor.

3.12.2.5 When the precision available in the IMAG field is not adequate to support the intended exploitation of the image and its support data, the ICHIPx TRE (SCALE_FACTOR field) is used to contain the increased precision reduction/magnification value. The values placed in the IMAG and SCALE_FACTOR fields must be consistent with one another, varying only in representation and precision. (NOTE: The factor value representation in the SCALE_FACTOR field is the reciprocal of the value representation approach used in the IMAG field.)

3.12.2.6 When the image data is JPEG 2000 compressed, the IMAG field value is populated with the highest resolution available for extraction from the compressed image data stream relative to the original source image data upon which the image segments support data is based.

3.13 Image Data Mask Tables

The Image Data Mask is a mechanism within the NITF structure, which helps to describe images containing empty and special pixels. There are two sets of offsets provided by the Image Data Mask, one identifies the non-recorded blocks (mask

blocks), and the other identifies blocks containing pad. When pad is present, there is a flag in the Image Data Mask that can be used to indicate the pad should be treated as transparent. Otherwise pad can be treated as any user-defined color. Some of the uses for an Image Data Mask are:

- Identification of pad pixels existing as a result of blocking (blocks around the edges of the image may not be full of significant pixels)
- Identification of non-recorded blocks, i.e. mask blocks
- Flagging of pixels to be treated as transparent so underlining pixels display instead
- Use of block masks as an offset to the beginning of each block (not used by any known product, but is allowed)

There are currently three known NITFS products using the Image Data Mask. Each product and its specific implementation are briefly described below.

Controlled Image Base (CIB). CIB is a dataset of orthophotos, made from rectified grayscale images and is always blocked six by six, resulting in thirty-six blocks. CIB uses a combination of both mask block and pad pixel offsets in the Image Data Mask. The mask block offsets identify non-recorded blocks and the pad pixel offsets identify the blocks that have pad in them. The pad is a result of the image mosacing and rectification process, which causes an amalgamation of images leaving some areas of the minimum bounding rectangle empty. Furthermore, CIB always uses the pixel value of 216 to identify pad pixels, which means the pad can be treated as any user-defined color.

Compressed Arc-Digitized Raster Graphics. CADRG is a dataset of digital maps and charts. It uses the Image Data Mask in the same manner as CIB.

Shuttle Radar Topography Mission (SRTM). SRTM consists of four data types: Digital Terrain Elevation Data (DTED), Terrain Height Error Data (THED), Orthorectified Image Mosaic (OIM), and Seam Hole Composite Map (SHCM). THED, OIM, and SHCM are in NITF, whereas DTED has its own format. All three of the NITF products use the Image Data Mask.

- THED describes the random accuracy of the DTED. It is an array of accuracy postings, which correspond to each DTED posting. THED does not use mask blocks, but does use pad pixels to identify postings that do not have a corresponding DTED posting.
- OIM is a Synthetic Aperture Radar magnitude image. OIM does not use mask blocks, but does use pad pixels, specifically transparent pixels. Cells of data that are partial are identified in the Image Data Mask and

any pixels not having an actual value are assigned a pad value of 0. By definition, 0 is a flag that requires the pixel to be treated as transparent.

- SHCM is a color-coded raster map that is used to overlay the OIM to show the location of radar seams, holes in the dataset, and the voids that have been filled. SHCM uses the Image Data Mask in the same manner as OIM, where 0 is used to indicate which pixels should be treated a transparent pad. With this product, the majority of the pixels are assigned 0, and only the seams, holes, and voids are assigned actual values. This allows the SHCM to overlay an OIM, resulting in an overall display of the seams, holes, and voids on top of the OIM.

3.14 NITFS Common Coordinate System (CCS)

A basic concept employed by the NITF is that of the CCS. The concept is simply that all of the displayable elements in an NITF file fall within a virtual bounding rectangle of those elements. It is that resulting bounding rectangle that is identified as the CCS for a particular NITF file. The primary impact is that the CCS has an impact on the CLEVEL of the file. The CCS is independent of the display device but some means such as panning must be available to allow the operator visual access to all of the CCS.

3.15 Image, Graphic/Symbol, and Text Overlays

3.15.1 NITF allows the non-destructive overlaying of graphic data within the CCS of an NITF file. This is a significant feature of the NITF. The factors that impact the use of this capability are Display and Attachment levels as well as relative locations of overlays within the CCS.

3.15.2 Implementers should consider the impact on overlays when performing functions such as rotating and zooming. For example, if an image is rotated that has an overlaid graphic the graphics meaning and significance may change if it is not rotated with the image. Generally, there are three ways to handle this situation. First the overlay can be rotated with the image maintaining its relative position and then “Burned in” to the image. Second, the overlay is automatically removed from the rotated image. The third and preferred method is to rotate the overlay in a manner that allows it to remain as a nondestructive graphic.

3.16 Text Segments

The NITFS provides for the inclusion of textual segments within an NITF file. The purpose of the text segments is to provide information related to the file or other file segments. Generally, text segments are created with an editor that can be launched from the imagery application or through an import function.

Text Segments can be one of four different types:

Standard (STA): The implementation must unpack and display text data in all text segments marked with the text format code for STA. STA can be displayed using most "English-language based" editors.

For text segments formatted as STA:

1. Contents are composed of none other than the following BCS characters: Line Feed (0x0A), Form Feed (0x0C), Carriage Return (0x0D), and space (0x20) through tilde (0x7E).

2. All lines are separated by carriage return/line feed (CR/LF) pairs, where the first character of the next line (if present) immediately follows the line feed character.

3. Text data is presented as a contiguous file, with each permitted BCS character immediately following the other.

4. Text data begins with the first, or left-most character of the text, followed by subsequent characters, as read from left to right.

5. No field delimiters or special characters are used to designate the end of the text data.

If more than one text segment is included in the NITF file, the last character of the first segment is followed by the first character of the next segment's subheader.

The following editors are able to interpret and display STA formatted test files:

1. Microsoft Notepad

2. Microsoft Wordpad

3. Microsoft Explorer

4. Netscape

5. UNIX Text editor (openWin)

UCS Transformation Format 1 (UT1): The implementation must unpack and display text data in all text segments marked with the text format code UT1 (single octet).

For text segments formatted as UT1:

1. Contents are composed of none other than the following characters: Line Feed (0x0A), Form Feed (0x0C), Carriage Return (0x0D), and space (0x20) through tilde (0x7E) and No break space (0xA0) through small "y" with diaeresis (0xFF).

2. All lines are separated by carriage return/line feed (CR/LF) pairs, where the first character of the next line (if present) immediately follows the line feed character.

3. Text data is presented as a contiguous file, with each permitted character immediately following the other.

4. Text data begins with the first, or left-most character of the text, followed by subsequent characters, as read from left to right.

5. No field delimiters or special characters are used to designate the end of the text data.

6. If more than one text segment is included in the NITF file, the last character of the first segment is followed by the first character of the next segment's subheader.

The following editors are able to interpret and display UT1 formatted test files:

1. Microsoft Notepad

2. Microsoft Wordpad

3. Microsoft Explorer

4. Netscape

5. UNIX Text editor (openWin)

Message Text Format (MTF): MTF is based on MIL-STD-6040. For text segments identified by the text format code for MTF, the implementation must be able to unpack and display the text data. MTF is a specific Text Format designed for military use, and includes unique formating codes based on the 69 character lines used in military message traffic over the years. To interpret and display MTF properly, an MTF capable interpreter must be used. The implementation may optionally pass the text data to an MTF capable application for further processing in accordance with MIL-STD-6040.

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For proper display of text files formatted as MTF:

1. Contents are composed of none other than the following characters: Line Feed (0x0A), Form Feed (0x0C) and space (0x20) through tilde (0x7E).

2. Line endings are identified by either a sixty nine character count or the use of double solious (0x2F), (// (end of set marker) may identifying CR/LF) , where the first character of the next line (if present) immediately follows the line feed character.

3. Text data is presented as a contiguous file, with each permitted character immediately following the other.

4. Text data begins with the first, or left-most character of the text, followed by subsequent characters, as read from left to right.

5. No field delimiters or special characters are used to designate the end of the text data, however, the // end of set marker is always present at the end of the text data.

6. If more than one text segment is included in the NITF file, the last character of the first segment is followed by the first character of the next segment's subheader.

<u>UCS Transformation Format 8 (UTF-8) Subset (U8S)</u>: For text segments identified by the text format code for U8S (either 1-byte or 2-byte encoded), the implementation must be able to unpack and display the text data. Certain Web browsers are capable of displaying U8S.

1. Contents are composed of none other than the following BCS characters: Line Feed (0x0A), Form Feed (0x0C) Carriage Return (0x0D), and space (0x20) through tilde (0x7E), No break space (0xA0) through small "y" with diaeresis (0xFF), and Inverted exclamation mark (0xC2 A1) through small "y" with diaeresis (0x C3 BF).

2. All lines are separated by carriage return/line feed (CR/LF) pairs, where the first character of the next line (if present) immediately follows the line feed character.

3. Text data is presented as a contiguous file, with each permitted character immediately following the other.

4. Text data begins with the first, or left-most character of the text, followed by subsequent characters, as read from left to right.

5. No field delimiters or special characters are used to designate the end of the text data.

6. If more than one text segment is included in the NITF file, the last character of the first segment is followed by the first character of the next segment's subheader.

3.17 Tagged Record Extensions

3.17.1 Within NITF 2.1, the primary method of packaging metadata is through the application of TREs. TREs represent a set of configuration managed data segments that may contain a variety of information related to the entire NITF file or a portion of the NITF file. The following principles or concepts are applicable to TREs:

1. They generally are configuration controlled and published to avail themselves to the NITF community.

2. They are uniquely named and registered to ensure their integrity is preserved and controlled.

3. The last character is generally used to "version" the TRE so that as it is changed/updated its root name will still indicate its relationship with previous versions.

4. TREs are usually grouped on the "register" by user groups; i.e., airborne related TREs.

5. Anyone may nominate a new TRE. Generally, the concept is to use an existing TRE if it will accomplish the objective or create a new version if only minor modifications are needed so the resulting new TRE will be of use to the target users.

3.18 Data Extension Segments

In addition to TREs, another mechanism for packaging metadata are DESs. A DES allows the NITF to include other data types not already accommodated by other segment types. An additional function of the DES area is to include storing large quantities of TREs that may not fit in their associated user-defined or extended header segments, due to volume or design. This situation is known as Overflow.

3.18.1 Special data types. Uses other than overflow and streaming file header must be registered and approved by the NITFS Technical Board (NTB). Although there are currently no other implementations in approved, video clips, moving target indicator information, animations, and other uses are currently being considered for DES structures.

3.18.2 Streaming File Header. The streaming file header capability has evolved into a solution seeking a problem. Originally intended for image captures "on-the-fly" where specifics about size and duration of a imaging operation was not known when the initial NITF structure was established to hold the image data, this capability has not been implemented by any collector or imagery program.

3.18.3 TRE Overflow. The DES structure's utility becomes readily apparent when it comes to storing large amounts of metadata in a single, confined area. Until recently, the using the DES to store "overflowed" TREs from other segments within the NITF file was rare. However, future imaging systems that will be collecting large volumes of support information will make overflow a common, every day practice. TRE overflow is supported in both NITF 2.0 and 2.1, but in practice, only NITF 2.1 will see it employed on a regular basis.

3.18.3.1 One-to-One DES overflow implementations. Traditionally, there has been a one-overflow-DES-to-one-overflowed-area relationship within the NITF file, and typically, the overflow was from an image segment. This one-to-one relationship will continue to be practiced in NITF versions 2.0 and 2.1, but new image and information products are evolving, necessitating new implementation methods for storing large amounts of TRE data that is common to one or more NITF segments, primarily those of the imagery variety.

3.18.3.2 Many-to-One DES overflow implementations. As a result of new collection systems generating NITF files with (1) a single, large imaging operation, spanning multiple 10GB NITF image (IM) segments, (2) a common set of support data/TREs, (3) all within a single file, the many-to-one DES overflow concept evolved. Under the legacy paradigm, a TRE overflow DES would have had to be present in the file for each IM segment member of the collective operation and each would contain the same TREs. This would result in the unnecessary duplication of a massive amount of information. Under the many-to-one DES overflow concept, only a single DES is necessary to carry the TRE information that is common to the entire operation and the NITF segments (typically the IMs) from which the overflow occurs. Practice of the many-to-one DES overflow is limited to NITF 2.1 only and implementation details can be found in the forthcoming MIL-STD 2500C.

3.19 NITFS Usability

3.19.1 Usability Guidelines

The NITFS documents do not currently identify requirements for the usability of systems that implement NITFS. A system can be in technical compliance with the standards, yet not be well suited for use in its targeted user environment. The following usability factors are based upon observations made during past NITFS compliance tests. The purpose is to raise awareness of human factor considerations when developing a system. Implementers are encouraged to identify

additional usability factors pertinent to the fielding objectives of the NITFS system being developed.

3.19.2 Target Audience Description

The developer has prepared a target audience description for the system and used it in the design and development of the system. An appropriate Human Factors Engineering (HFE) and Safety evaluation has been conducted.

3.19.3 Operator's Manual

An up-to-date operator's manual for the system was available at the time of compliance testing.

3.19.4 Consistent User Interface

The system has a consistent user interface with the appearance of a single integrated application. There is no perception of needing to exit and enter multiple routines to handle NITF operations. There is no need to enter commands at the operating system prompt once the application is started.

3.19.5 Header/Subheader Defaults

The system does not require an operator entry for each and every NITF file header or subheader field value. It provides some mechanism for establishing default values and automatic calculation of values where appropriate.

3.19.6 Header/Subheader Edit

The system does not use hard coded header/subheader defaults that cannot be changed without re-coding and recompiling the program. The system provides edit capabilities for header/subheader values in a controlled manner depending on the access privilege of different levels of users.

3.19.7 Screen and Imagery Board Correspondence

A method is provided to handle the circumstance when the screen or other rendering device does not have the same pixel display capacity as the imagery processing board. There are clear procedures for setting up the appropriate parameters for proper image display. There is some means to alert the operator that the rendered image may be cropped because the display device does not handle the full image size as received (when no roaming or panning capability is provided).

3.19.8 Automatic Rendering

NITF file components are automatically displayed according to the NITF file header values without operator intervention; i.e., the operator is not required to read NITF header values and manually place components of the file for display.

3.19.9 Direct Text Entry

The system allows for the entry of text without the operator needing to be aware of special procedures for insuring only the NITFS STA, UT1, U8S and MTF set of characters (without special word processing control codes, but with proper CR/LF line terminators) are entered into the NITF file.

3.19.10 User Alerts

There is some method to alert the operator that text or image comment fields are included within the NITF file being viewed and there is a convenient means to view the contents. The operator is alerted to other aspects regarding the file being viewed that are not readily apparent from the image display (such things as: user defined or extended data is included in the file; the image has color components but has been modified for display on a monochrome system; the file is in NITF 1.1, 2.0 or 2.1 format; security code words are included in the file headers; particular components could not be properly parsed or interpreted, etc.).

3.19.11 Automatic Assist

The implementation assists the operator in preparing NITF files that do not exceed the established boundary conditions for a specific CLEVEL. There is no excessive dependence on operator knowledge or procedures to insure only compliant files are packed.

4 ARCHITECTURE-RELATED NITFS IMPLEMENTATION GUIDELINES

4.1 General

Within the NSGI architecture there has evolved separate communities or sub architectures each with unique requirements; i.e., National, Airborne/Tactical. At the same time the objective NSGI architecture provides a homogeneous environment where data can easily be accessed and used between these individual communities, across the Global Information Grid (GIG). The NITFS has been designed to provide sufficient functionality to serve the entire NSGI community. In doing so the features supported by the NITFS fall into two significant areas, required and optional. This allows the acquisition community to properly size NITFS capable systems such that program cost are reduced while still affording a baseline level of interoperability across the NSGI. Full interoperability at the user level can only be achieved, however, if the optional NITF features are properly selected for support during the acquisition process. This encompasses understanding the data flow and interfaces involved with the subject system.

4.2 Product Summaries and Archetypes

This release of the IPON provides NITFS implementation summaries for a number of systems and applications. Appendices M, N, O, P, and Q contain product summaries for NITFS formatted products produced by NTM, Airborne sources, G1 sources, Commercial sources, and Tactical sources. These product summaries should help implementors of the NITFS better understand how NITFS has been applied in the past.

In a forthcoming release of the IPON, analysis will be made of past implementation practice. "Archetypes" will be developed to provide preferred practice for implementing NITFS within the architectural realms of the NSGI. The objective of these "archetypes" is to identify best practice from "lessons-learned" and to promote more consistant application of the NITFS within the applicable architectural realms of the NSGI.

4.3 Source Production Systems

Generally, these sources generate imagery. The platform type can vary. The following are known NITF related systems (Note: Existence in this section/list does not assume active NITFS compliance, or that the application is currently in the field, please consult the NITFS registry http://jitc.fhu.disa.mil/nitf/nitf.htm):

4.3.1 National Technical Means (NTM)

4.3.2 National Production Systems

1. Enhanced Production System (EPS). The EPS produces compressed and uncompressed, unexploited, single segment NTM images in NITF version 2.0 format files.

2. Low Cost Media (LCM). The LCM system produces compressed and uncompressed, unexploited, single segment NTM images in National Imagery Transmission Format (NITF) version 2.0 format files.

3. Dissemination Element (DE). The DE is a system that is designed to provide users with National Imagery on a near-real-time basis.

4. Front End Processing Environment (FPE). An image geopositioning and data extraction system used primarily for National Technical Means (NTM) image assessment, geopositioning, and imagery based production. Typical outputs are refined image metadata (AMSD (1) and USMSD) along with image orthomosaics. New capabilities include the production of Controlled Image Base (CIB) and Digital Point Positioning Data Base (DPPDB) products.

4.3.3 NGA In-house Production Products (DPPDB, CIB, CADRG)

4.3.4 NGA Out-sourced DPPDB Producers. The DPPDB provides the Warfighter with a deployable resource, in a computer workstation environment, that can quickly and accurately derive latitude, longitude, and elevation. The DPPDB is a digital product historically produced by NGA. It replaced the hardcopy Point Positioning Data Base product. The DPPDB provides the warfighter with a deployable resource, in a computer workstation environment from which latitude, longitude, and elevation can be quickly and accurately derived. The DPPDB product is an all-digital product consisting of three main components:

- imagery support data
- a map graphic for reference
- stereo imagery

The production of the DPPDB has recently been contracted (out-sourced) to various vendors. The following lists the currently identified outsource producers of the DPPDB file format and within the guidelines of MIL-PRF-89034.

1. Raytheon DPPDB Production System (RDPS).

2. Orbital DPPDB System (ODPS)

3. Harris Geospatial Information Production System (GIPS)

4.3.5 NGA Outsourced Controlled Image Base (CIB) Producers. CIB is a dataset of orthophotos, made from rectified grayscale aerial images. CIB supports various weapons, C3I theater battle management, mission planning, digital moving map, terrain analysis, simulation, and intelligence systems. The following lists the currently identified outsource producers of the CIB file format.

1. Orbital Image CIB Production System

2. Raytheon CIB Production System

3. Harris CIB Production System

4.3.6 Airborne Producers

1. Global Hawk. The Global Hawk is an ACTD Advanced Concept Technology Demonstration (ACTD) Theater Level UAV program that produces NITF imagery.

2. Common Imagery Processor (CIP) Ground Station. The CIP is intended to accept input from several image/sensor sources and from them produce NITF 2.1 and 2.0 compliant files.

3. Tactical Unmanned Aerial Vehicle (UAV). The TUAV system provides intelligence collection and targeting capability as a direct support asset to the Brigade Commander and his staff.

4. Senior-Year Electro-Optical Reconnaissance System (SYERS)

5. Joint Surveillance Target Attack Radar System (Joint STARS) Common Ground Station (CGS) Group. The Joint STARS CGS is a mobile multi-sensor Command, Control, Communications, Computers, and Intelligence (C4I) Imagery Intelligence tactical data processing and evaluation center.

6. SHAred Reconnaissance Pod (SHARP)

7. ASARS 2 Improvement Program (AIP)

4.3.6.1 Distributed Common Ground/Surface System (DCGS) Instances

1. Army

a. Tactical Exploitation System (TES). TES is the U.S. Army's objective Tactical Exploitation of National Capabilities (TENCAP) system for the 21st century. TES replaces the Advanced Electronic Processing and Dissemination System, Enhanced Tactical Radar Correlator, and Modernized Imagery Exploitation

System. TES combines all TENCAP functionality into a single, integrated, scaleable system specifically designed for split-based operations as Forward or Main elements. TES serves as an interface between national systems and in-theater tactical forces and directly receives data from theater and tactical assets. TES receives, processes, exploits, and disseminates imagery data from direct downlinks and from ground stations for national and theater platforms. TES serves as the preprocessor of the All Source Analysis System, Common Ground Station, and the Digital Topographic Support System.

2. Navy

b. Joint Service Imagery Processing System-Navy (JSIPS-N). JSIPS-N, the Navy's implementation of the Joint Service Imagery Processing System (JSIPS) program, is employed both shipboard, and, in some cases, at land-based facilities. JSIPS-N supports the needs of the embarked air wing and flag staff by providing a capability to receive, process, exploit, and disseminate national and theater imagery. The primary function of the JSIPS-N is to provide a means to develop accurate target coordinates and support tactical air Naval strike operations based on near-real-time image receipt, exploitation, and available databases.

3. Air Force (AF)

a. AF Distributed Common Ground System (DCGS). AF DCGS is a "system of systems" that connects geographically separated fixed and deployed intelligence, surveillance, and reconnaissance ground stations via wide and campus area networks. AF DCGS will be responsive to the intelligence requirements of the unified commands, their delegated representatives, or the Joint Forces Air Combat Command.

b. Common Imagery Exploitation System (CIES). CIES is a United States Air Force (USAF) DCGS-I system that combines the functionality of Deployable Shelterized System and Deployable Transit System into a common imagery exploitation system. CIES is a multi-segment, multi-intelligence (multi-INT) system that enables users to receive, transfer, process, exploit, archive, produce, and disseminate imagery and formatted messages from tactical and national reconnaissance imagery assets via direct feeds or downlinks.

c. Korean Combat Operations Intelligence Center (KCOIC). KCOIC is a combined USAF and Republic of Korea Air Force multi-INT Reconnaissance Ground Station. Two fusion centers coordinate their efforts to develop detailed signals intelligence templating and provide automated aids to assist in near-real-time multi-INT, multi-sensor processing, exploitation, and dissemination of intelligence data. Intelligence collection focuses on critical command and control (C2) nodes, guiding collection systems to enemy C2 nodes, correlating databases, and sharing information with other intelligence entities.

4. Marines

a. United States Marine Corps (USMC) JSIPS-National. USMC JSIPS-National supports USMC national imagery requirements by processing and screening imagery received from the Defense Dissemination System and performing imagery exploitation on selected target imagery. USMC JSIPS-National disseminates reconnaissance reports and exploited secondary imagery to tactical Marine sites.

b. Tactical Exploitation Group (TEG). TEG is a Marine Expeditionary Force (MEF) asset. TEG processes and screens F/A-18 Tactical Reconnaissance imagery received from mission tapes or data links. TEG performs imagery exploitation on selected target imagery, disseminates reconnaissance reports, and exports secondary imagery to the MEF Intelligence Analysis System (IAS) via digital tactical backbone communication systems, including subordinate IASs and USMC JSIPS-National.

4.4 Exploitation Applications

4.4.1 Government Developed Explotation Systems

1. Integrated Exploitation Capability. The Integrated Exploitation Capability provides users with an imagery exploitation suite of capabilities focused on the specific varieties of NITF version 2.0 products available from National sources.

2. Global Command and Control System (GCCS). The Global Command and Control System (GCCS) is our national command and control system. By developing an integrated Command, Control, Communications, Computer, and Intelligence (C4I) system, GCCS will meet the C4I requirements of the National Command Authorities (NCAs) through the Joint Task Force component commanders to include supported and supporting Commanders in Chief (CINCs) and their components. GCCS will support the C4I For The Warrior (C4IFTW) Concept by hosting all Command and Control (C2) systems for all services throughout the Department of Defense (DoD) for missions ranging from Deliberate Planning to Crisis Action and Execution Planning, as well as Follow-on and Peacetime Operations.

Implementation of GCCS has been downward directed by the Joint Chiefs of Staff, and the Commander of the Air Mobility Command (AMC). The scope of GCCS includes the implementation of the "Information-For-The-Warrior" concept-a single, global C2 system from foxhole to command post for all services. This is made possible by the Common Operating Environment (COE), which will act as the software interface between these C2 applications and the varied hardware platforms currently utilized and accepted for the primary DoD C2 systems. When used in this respect, the COE acts as the medium, which all applications will talk to, and it, in turn, will perform the necessary translation in order to receive the desired response from whichever hardware platform it happens to be running on at that time. The

COE is essentially a software foundation which allows mission applications to be selected and loaded on any COE-standard hardware platform, based on mission requirements, thus, promoting interoperability with the same look and feel regardless of which platform or service environment the customer may be required to operate within at that time.

GCCS provides the warrior a fused, real-time, true picture of the battlespace and the ability to order, respond, and coordinate horizontally and vertically to the degree necessary to successfully prosecute the warfighting mission in that battlespace.

3. Commercial Application Work Station (CAWS) (Comprised of MATRIX and MET)

4. Multisource Automatic Target Recognition with Interactive Exploitation (MATRIX). The MATRIX is a softcopy image and analysis, support data processing and display system designed to support imagery exploitation requirements, such as Indications & Warning, target monitoring, and dynamic targeting. MATRIX is scheduled to be replaced by the VITEC ELT.

5. MET

4.4.2 Commercial Exploitation Products

1. ERDAS IMAGINE. ERDAS IMAGINE is an image, mapping, and visualization product. IMAGINE enables a user to combine different types of geographic data with imagery and organize the data into a mapping project. IMAGINE provides map composition tools, image rectification and re-projection services, a Global Positioning System receiver live link capability, mosaicing tools, color balancing and image interpretation functions, ortho-rectification capabilities, image classification tools, graphical spatial modeling, and other means for analyzing imagery and geographic data. The IMAGINE software runs on a variety of processing platforms and operating systems. The IMAGINE product was developed by Leica Geosystems GIS and Mapping, LLC, , of Atlanta, Georgia. Only the NITF-related functions were the subject of this test.

IMAGINE provides the capability to import and export imagery and/or map compositions to and from the National Imagery Transmission Format Standard (NITFS) via an optional add-on software module, the NITF Import/Export module. Likewise, the RPF_Exporter module provides the ability to export Controlled Image Base (CIB) and Compressed ARC Digitized Raster Graphics (CADRG) files according to their respective data product format specifications.

The IMAGINE NITF Import/Export module provides a means to utilize NITF data by combining imagery, annotation, text and a limited amount of support data. IMAGINE integrates all of this data into a map composition. The NITF module

supports NITF version 2.0 and 2.1, and North Atlantic Treaty Organisation (NATO) Secondary Imagery Format (NSIF) Version 1.0.

The IMAGINE RPF_Exporter module provides a means to export NITF data in accordance with the CADRG and CIB Military Specifications (MIL-C-89038 and MIL-C-89041 respectively). Note that the product names "CADRG" and "CIB" are registered trademarks. Only NGA authorized producers generate "CADRG" and "CIB." This test only assessed the ability of the IMAGINE RPF_Exporter module to produce data products according to the CIB and CADRG product specifications and related standards. Completion of this NITFS test does not grant authorization to produce NGA "CIB" and "CADRG" products.

2. PARAGON family of imagery applications. Paragon Imaging, Inc. Electronic Light Table (ELT) products provide image processing and exploitation capability or, in some cases, limited display and exploitation functionality for a wide variety of users.

3. Digital Imagery Exploitation Production System (DIEPS).

4. Geo*View Geo*View was developed by the Multi-Sensor Exploitation Branch of the Air Force Research Laboratory (AFRL). The Geo*View is a JAVA©-based, platform independent, geospatial imagery data viewer, and a National Imagery Transmission Format (NITF) viewing and metadata editing tool. The Geo*View is designed for use by the warfighter as well as the imagery analyst. Originally designed to support viewing and editing NITF data, Geo*View has since been augmented with tools supporting imagery and video exploitation. The Geo*View allows the user to view and edit existing NITF, North Atlantic Treaty Organisation (NATO) Secondary Imagery Format (NSIF), and a number of commercial product formats. Additionally, the users are able to add annotations and text to images, edit headers, and delete or add informational Tag Record Extensions (TREs).

5. PhotoTelesis Image & Communication Environment (ICE). ICE 4.0 provides imagery capture and tactical communication functions to the Lightweight Video Reconnaissance (LVRS) Army program and the Over-The-Horizon (OTH) Airborne Sensor Information Systems Navy program.

6. RemoteView RemoteView Professional version 2.36 Electronic Light Table (UNIX) provides tools for displaying, parsing, and analyzing National Imagery Transmission Format Standard (NITFS) imagery.

RemoteView interprets NITF 2.1 and 2.0 Visible Imagery, Synthetic Aperture Radar, Electro-Optical, Infrared, and Multispectral imagery, as well as, convert Tagged Image File Format (TIFF) and Tape Image Format Requirements Document (TFRD) imagery into NITF. The default ingest setting (Auto Detect Format) allows

the application to automatically detect the image format and configure the application accordingly. This includes NITF.

RemoteView provides customers with commercial-off-the-shelf interpretation and generation of NITFS compliant imagery for image navigation, visualization, mensuration using RULER version 12.0 (government-owned software). The RemoteView Pro 2.36 integrates a plug-in mensuration interface, which makes available a method to calculate measurements such as, distance, area, and geodetic position in national imagery using the National Geospatial-Intelligence Agency's (NGA) RULER mensuration engine. Additionally, the RemoteView NTM Module U2.4

- Provides TFRD file format reading capability.
- Reads TFRD files in 4.3 Differential Pulse Code Modulation, 2.3 Discrete Cosine Transform, and 1.3 Discrete Cosine Transform, as well as, all pertinent metadata contained in the first FAF block of the TFRD data file or from a separate image support data file.
- Converts the TFRD metadata into NITF metadata. This conversion is done to support chipping TFRD files to NITF files.
- Provides the RULER daemon interface. The RemoteView NTM module creates a TCP/IP socket connection to a running RULER daemon on a local area network. The TFRD metadata is converted to RULER Interface Format (RIF) data structures and sent to RULER to initialize a mensuration session. The text results returned by RULER are parsed and displayed in a RemoteView mensuration dialog box.

RemoteView provides NITF support of the Profile for Imagery Archives Extensions (PIAE). The operator may view, add, modify or delete PIAE tags. In the tag editor, RemoteView there is an option to load the PIAE default values specified by the operator or the System Administrator.

Graphics support includes the common drawing tools for CGM graphics and annotations in support of Computer Graphics Metafile (CGM) Implementation Standards, MIL-STD 2301 and MIL-STD-2301A.

For image geo-positioning, RemoteView Pro provides a suite of tools for generating image chips and generates an ICHIPB TRE. RULER mensuration uses the line and sample indexing scheme of the original image to determine various geospatial measurements and position within an image, be it the original image or a chip of the original image. ICHIPB captures image chip corner point coordinate information that is mapped to the original image coordinate system

RemoteView Pro supports multiband imagery up to 999 bands. When the bands are marked, RemoteView Pro 2.36 will automatically display the marked

bands. Additionally, the application exports all of the bands in the image segment not just those selected for display.

7. Visual Information Technology (VITec). This commercial software product provides users with the capability to display, parse, and exploit NITF files. The VITecPC, version 4.1.1 provides tools for displaying, parsing, exploiting, and analyzing National Imagery Transmission Format (NITF) versions 2.1, 2.0, 1.1 (interpret) and North Atlantic Treaty Organisation (NATO) Secondary Imagery Format (NSIF) 1.0 digital imagery. The VITecPC supports National and Commercial Support Data Extensions (SDEs) and Profile for Imagery Archives Extensions (PIAEs).

8. Common Spectral Measurement and Signature Intelligence (MASINT) Exploitation Capability (COSMEC). The COSMEC is a spectral processing software package focusing on analysis and interpretation of spectral data. The COSMEC is an imagery processing software package mainly focusing on analysis and interpretation of spectral data. It provides the capability to develop and generate intelligence information products from spectral data. COSMEC is developed to interpret data formats from HYDICE, HYMAP, Landsat, SPOT, TRIPS, IKONOS, SINDRI, and NITF 2.0 and 2.1. COSMEC is capable of converting the pixel cube data and limited support data information from the spectral formats into NITF 2.1 format. It is also capable of limited modification and repacking (adding Computer Graphic Metafile (CGM) annotations and text segment data) of NITF files.

4.5 Archive and Dissemination Applications

1. Image Product Library (IPL). The IPL plays a significant role in the NSGI Architecture providing for the storage, cataloging, discovery, retrieval, and delivery of imagery products to users of the NSGI.

2. NGA Library (NL). The NL plays a significant role in the NSGI Architecture by providing for the storage, cataloging, discovery, retrieval, and delivery of imagery products to NSGI users.

3. Information Access Service (IAS)

4. Harris Common Client (CC) 2000

5. Digital Products Data Warehouse (DPDW)

4.6 Management Applications

1. Imagery Exploitation Support System (IESS)

2. Air Force Mission Support System (AFMSS)

3. National Exploitation System (NES)

4. Enhanced Integration Tool (EIT)

5. Project for Information System Management (PRISM). A web based set of applications fielded to the theaters and commands. It operates on both JWICS and SIPRNet and provides numberous tools for the theater/JTF collection and exploitation managers.

4.7 Commercial Imagery Providers

1. Space Imaging. Space Imaging's IKONOS earth imaging satellite provides a reliable stream of image data for commercial high-resolution satellite data products. IKONOS produces 1-meter black-and-white (panchromatic) and 4-meter multispectral (red, green, blue, near infrared) imagery that can be combined in a variety of ways to accommodate a wide range of high-resolution imagery applications. All Space Imaging imagery products are either processed at the Ground Station in Thornton, Colorado and/or at the Regional Operational Centers at various locations around the world. The Ground Station software used to process all Space Imaging System products is developed and maintained by Raytheon System Company.

The Ground Station Software can output a number of file formats including NITF 2.0. When requested, the Ground Station Software will process imagery and produce data files conforming to MIL-STD-2500A Change Notice 3, National Imagery Transmission Format (Version 2.0). The same Ground Station Software is used by all regional affiliates.

2. DigitalGlobe Quickbird 02 (QB02). The QB02 is a collection and production system that produces high-resolution earth images in a variety of processing levels. The lowest available processing level above raw data, Level 1, is divided into two sub-levels termed 1A considered Raw and 1B which is called Basic. 1A imagery is delivered in individual Detector Chip Array (DCA) files that can be ordered with or without radiometric correction and with or without non-responsive detector fill. 1B images are virtual linear arrays which have been generated from the DCA strips and are radiometrically and geometrically corrected. 1B images have been resampled to a map grid but not projected onto the Earth. 1A data is geometrically raw, whereas 1B data will include "sensor corrections," accounting for image artifacts due to optical distortion and detector geometry. The level 2A or Rectified product is rectified product to a customer selectable map projection and datum.

The QuickBird sensor is a pushbroom imager and therefore acquires image data one line at a time by sweeping across the earth’s surface. The QuickBird platform supports 12 detector chip assemblies (DCAs) or detector arrays. There are 6 DCAs for the panchromatic (PAN) band, and 6 DCAs for the multispectral (MS) bands. Each PAN DCA contains 1 linear detector array. Each MS DCA contains 4 linear arrays representing the colors blue, green, red, and near infrared.

3. Orbital Image

4.8 Specialized Applications and Code Libraries

1. NITF Services Library (NSL). The NSL is a set of Application Program Interfaces (APIs) that will be used to provide NITF and imaging capabilities for the latest release of DII COE software. This is in support of the Joint Department of Defense (DOD) community and specifically the Defense Information Systems Agency. Application developers will use the public APIs provided by the NSL to process, display, and create NITF products. The NSL is being included in the Defense Information Infrastructure (DII) Common Operating Environment (COE) as a COE Component of the Imagery Toolkit (IMTK). The NSL will eventually become the mandated set of APIs to use when processing NITF, North Atlantic Treaty Organisation (NATO) Secondary Imagery Format (NSIF), and Basic Image Interchange Format (BIIF) imagery in the DII COE.

2. KODAK NITF Services Library. The Kodak Libraries (KL) NITFLib Version 1.2 is a library that provides National Imagery Transmission Format (NITF) support for NITF version 21,2.0, 1.1 files, as well as NATO Standard Imagery Format (NSIF) 1.0 files. While NITF 2.1, 2.0, and NSIF 1.0 are supported for both generate and interpret and NITF 1.1 is an interpret only process. The library supports full interpret capability including all compression types as well as all data segments types. TRE support is gained through XML files, which can be added by the user. Currently the generate write support is limited to one image segment with the following compressions, JPEG DCT for NITF 2.0 files, and JPEG DCT and JPEG 2000 for NITF 2.1 files.

3. KODAK NITF Services Library with the ENVI interface. The KL was configured with the Environment for Visualizing Images (ENVI) which provides a hyperspectral image data analysis package used by industry, government, and academia for multispectral and hyperspectral data analysis. ENVI includes multithreading processing, wizard-based spectral tools, automated map composition tools, extensive data access functionality, 3D terrain tools, classification and post classification routines, registration and georeferencing tools, mosaicking tools, and integrated Geospatial Information System (GIS) and vector processing capabilities. ENVI can be used for radar, panchromatic, multispectral, hyperspectral, thermal and other types of digital image and vector GIS data. The KL NITFLib has been integrated into the ENVI Version 3.6 NITF 1.0 module to process NITF imagery.

4. Case Executive A user environment that supports the analysis of Synthetic Aperture Radar (SAR) complex data. It provides a Graphical User Interface (GUI) for a collection of tools, algorithms, and other services for complex data exploitation. The algorithms operate upon complex images to produce output reports in the form of text, plots or derived complex images. CASE Executive provides a set of viewers that allow the analyst to examine these outputs in

whichever form they take. CASE Executive is also structured to allow individual users to easily integrate and configure their own local algorithms into the GUI.

5. Synthetic Imagery Generation System (SIGS). The SIGS is a computer-based system that provides rapid generation of photorealistic synthetic imagery. The SIGS is a computer-based system that provides rapid generation of photorealistic synthetic imagery. A user selects a background terrain image and manually inputs (or receives inputs from a simulator) the geographic location, number and status of Order-of-Battle equipment (i.e., vehicles, aircraft, ships), location of fixed objects (i.e., buildings), and basic reconnaissance platform attributes such as viewing angle and resolution. SIGS uses these inputs to generate synthetic imagery that is utilized in military exercises and training events when "live" imagery is not available. The integration of imagery enhances the realism of the training activities and validates prototype secondary image dissemination networks. SIGS has the limited ability to input background terrain imagery in National Imagery Transmission Format (NITF) format (first image in an NITF file) and output the generated images up to 1024x1024 pixels in the NITF format. Several enhancements have been added to SIGS version 5.5 affecting NITF file processing. The user interface was converted from C++ to Java, while most of the image file processing remained in existing C++ libraries. This required the implementation of a Java Native Interface (JNI) layer between the Java user interface and C++ libraries for both import and export of images. The native background format for SIGS was migrated to NITF file format instead of the SIGS-unique format of earlier versions. Additionally, the capability was added to import large NITF CLEVEL 6 images along with an enhanced ability to maintain the bit depth of background images through the import, generation, and export processes.

e. NITF Imagery Management System (NIMS). NIMS was designed as a standard library for the development of NITF based applications. It has been distributed to several organizations. Only one of those organizations is known to have used NIMS in an application. They have also been sharing code updates. It currently has been compiled and used in an application on a SUN Sparc. It has not been completely tested. An application is being developed under Windows to allow for easier testing of features that have not been tested and to test the portability of the code between UNIX and Windows. NIMS requires Rogue Wave's Tools.h++. This allows it to be ported more easily to a variety of platforms.

Prior to the development or acquistion of a NITFS related system full consideration should be given the test strategy, whether it is a single explotation package or major system. Additional information on this subject, to include many resources, can be found at http://jitc.fhu.disa.mil.

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Appendix A – List of Acronyms

ACCESSID	Access ID
AIS	Automated Information System
ANSI	American National Standards Institute
ARIDPCM	Adaptive Recursive Interpolated Differential Pulse Code Modulation
ASCII	American Standard Code for Information Interchange
ASD/C^3I	Assistant Secretary of Defense for Command, Control, Communications, and Intelligence
BCS	Basic Character Set
BCS-A	Basic Character Set - Alphanumeric
BCS-N	Basic Character Set - Numeric
BERT	Bit Error Rate Test
BIIF	Basic Image Interchange Format
BIT	Binary Digit
BPP	Bits-per-pixel
BPS	Bits Per Second
BWC	Bandwidth Compression
C^3I	Command, Control, Communications, and Intelligence
C^4I	Command, Control, Communications, Computers, and Intelligence
CADRG	Compressed ARC Digitized Raster Graphic
CCE	Continuous Comprehensive Evaluation
CCITT	Consultative Committee for International Telegraph and Telephone
CCS	Common Coordinate System
CEDATA	Controlled Extension Data
CEL	Controlled Extension Length
CETAG	Controlled Extension Tag
CEW	Common Exploitation Workstation
CFHD	Corrected File Header
CFS	Center For Standards
CGM	Computer Graphics Metafile
CIB	Controlled Image Base
CII	Compatibility, Interoperability, and Integration
CINC	Commander In Chief
CINCS	Commanders In Chief
CIO	Central Imagery Office
CIP	Common Imagery Processor
CJCSI	Chairman, Joint Chiefs of Staff Instruction
CLEVEL	Compliance Level (for NITF 2.0) Complexity Level (for NITF 2.1)
CMY	Cyan, Magenta, Yellow
COMSEC	Communications Security
COMRAT	Compression Rate Code

C/S/A	CINCs/Services/Agencies
CR	Carriage Return
CR/LF	Carriage Return/Line Feed
CTE	Compliance Test and Evaluation
CTS	Clear to Send
CY	Calendar Year
DATA	Data Buffer Sequence
DBMS	Database Management System
DCD	Data Carrier Detect
DCI	Director, Central Intelligence
DCT	Discrete Cosine Transform
DDN	Defense Data Network
DE	Dissemination Element
DES	Data Extension Segment
DIA	Defense Intelligence Agency
DIRINT	Director of Intelligence
DIS	Draft International Standard
DISA	Defense Information Systems Agency
DMA	Defense Mapping Agency
DOD	Department of Defense
DPPDB	Digital Point Positioning Data Base
DPS	Digital Production System
DQT	Define Q-Table
DSPO	Defense Support Project Office
DTR	Data Terminal Ready
EHD	Extended Header Data
EIA	Electronic Industries Association
FDCT	Forward Discrete Cosine Transform
FDX	Full Duplex
FEC	Forward Error Correction
FBKGC	File Background Color
FIPS	Federal Information Processing Standard
FPU	Floating Point Unit
FTP	File Transfer Protocol
GBS	Global Broadcast System
GeoSDE	Geospatial Support Data Extension
GIAS	Geospatial and Imagery Access Specification
G/ISMC	GSMC and ISMC
GOSIP	Government OSI Profile
GSMC	Geospatial Standards Management Committee
GUI	Graphical User Interface

H-TABLE	Huffman Table
HDLC	High-Level Data Link Control
HDX	Half Duplex
HFE	Human Factors Engineering
HUFFVALS	Huffman Values
IAMP	Imagery Acquisition Management Plan
IAS	Imagery Access Specification
IC	Image Compression
ICAT	Image Category
ICMP	Internet Control Message Protocol
ICS	Intelligence Community Standard
IDEX	Image Data Exploitation System
IEC	International Electrotechnical Commission
I/O	Input/Output
IFDCT	Inverse Forward Discrete Cosine Transform
IITSMP	Imagery Information Technology Standards Management Plan
IMODE	Image Mode
IP	Internet Protocol
IPA	Image Product Archive
IPL	Image Product Library
IR	Infra red
IREP	Image Representation
ISMC	Imagery Standards Management Committee
ISO	International Organization for Standards
ISP	International Standardized Profile
IUT	Implementation Under Test
JIEO	Joint Interoperability and Engineering Organization
JINTACCS	Joint Interoperability Tactical Command and Control System
JITC	Joint Interoperability Test Command
JPEG	Joint Photographic Experts Group
JTA	Joint Technical Architecture
LAN	Local Area Network
LBC	Label Background Color
LDATA	Last Data (packet of every buffer)
LF	Line Feed
LTC	Label Text Color
LUT	Look-up Table
MBZ	Must Be Zero
MIL-HDBK	Military Handbook
MIL-STD	Military Standard

MMU	Memory Management Unit
MOA	Memoranda of Agreement
MOT	Means of Testing
MRTFB	Major Range and Test Facility Base
MTF	Message Text Format
NATO	North Atlantic Treaty Organisation
NBPP	Number of Bits Per Pixel
NCCB	NITF Configuration Control Board
NETBLT	Network Block Transfer
NGA	National Geospatial-Intelligence Agency (formerly NIMA)
NSGI	National Systems for Geospatial Intelligence
NIIEE	NIMA Imagery Information Exploitation Environment
NIMA	National Imagery and Mapping Agency
NITF	National Imagery Transmission Format
NITFS	National Imagery Transmission Format Standard
NSA	National Security Agency
NSIF	NATO Secondary Imagery Format
NTB	NITFS Technical Board
NUMDES	Number of Data Extension Segments
NUMRES	Number of Reserved Extension Segments
OASD/C^3I	Office of the Assistant Secretary of Defense for C^3I
ODASD/I	Office of the Deputy Assistant Secretary of Defense for Intelligence
ODCSINT	Office of the Deputy Chief of Staff for Intelligence
ODNI	Office of the Director of Naval Intelligence
OJCS	Organization of the Joint Chiefs of Staff
OSI	Open Systems Interconnection
PIAE	Profile for Imagery Archive Extensions
POC	Point of Contact
PPBS	Planning, Programming, and Budgeting System
PEM	Program Element Monitor
POSIX	Portable Operating System Interface for Computer Environments
PPPS	Point Positioning Production System
PRISM	???Planning Tool for Resource Integration, Synchronization, and Management???
PRISM	???Project for Information System Management???
Q-Table	Quantization Table
RAM	Random Access Memory
REDATA	Registered Extension Data
REL	Registered Extension Length
RES	Reserved Extension Segment

RETAG	Registered Extension Tag
RFC	Request for Change
RGB	Red Green Blue
RST	Re-Start Marker
RTS	Request To Send
SAMI	Symbology and Annotation for Mapping and Imagery
SAR	Synthetic Aperture Radar
SDE	Support Data Extension
SIDS	Secondary Imagery Dissemination System
SLIP	Serial Line Internet Protocol
SPIA	Standards Profile for Imagery Archives
STA	Standard ASCII
STANAG	Standardized NATO Agreement
STU-III	Secure Telephone Unit-3rd Generation
SUT	System Under Test
TACO2	Tactical Communications Protocol 2
TBD	To Be Determined
TBR	To Be Researched
TBP	To Be Published
TCP	Transmission Control Protocol
TD	Transmit Data
TIS	Technical Interface Specification
TMDE	Test, Measurement and Diagnostic Equipment
TRE	Tagged Record Extension
UAF	USIGS Architecture Framework
UCS	Universal Multiple Octet Coded Character Set
UDHD	User Defined Header Data
UDID	User Defined Image Data
UIP	USIGS Interoperability Profile
USA	United States Army
USAF	United States Air Force
USIGS	United States Imagery and Geospatial System
USMC	United States Marine Corps
USN	United States Navy
UTC	Coordinated Universal Time (i.e., ZULU)
VIMAS	Visible, Infrared, and Multispectral Airborne Sensor
VQ	Vector Quantization
WAN	Wide Area Network

YCbCr	Y=Brightness of signal, Cb=Chrominance (blue), Cr=Chrominance (red).
YCM	Yellow, Cyan, Magenta
YIQ	Intensity, Inphase, Quadratu

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Appendix B – NITFS Abstract Collection Model

B.1 INTRODUCTION

B.1.1 Purpose. This appendix describes the abstract imaging models that form the foundation for the proper use and application of National Imagery Transmission Format Standard (NITFS) products that contain prominent groups of Support Data Extensions (SDEs). The purpose is to specify a common basis of understanding for those involved in the specification, implementation, validation testing, and eventual compliance testing of systems that use NITF products containing SDEs. This appendix also addresses the implications of extracting (chipping) portions of image products while maintaining the integrity of the associated support data.

B.1.2 Scope. The abstract models described in this appendix address the following groups of NITF Tagged Record Extensions:

- National Technical Means Support Data Extensions (NSDEs)
- Airborne Support Data Extensions (ASDEs)
- Raster Product Format Support Data Extensions (RPFSDEs)
- Digital Point Positioning Data Base Support Data Extensions (DPPDBSDEs)
- Geospatial Support Data Extensions (GeoSDEs)

B.1.3 Background. (TBD001)

B.1.4 References

STDI-0002	The Compendium of Controlled Extensions (CE) for the National Imagery Transmission Format Version 2.1, 16 November 2000
STDI-0001	National Support Data Extension (SDE) (Version 1.3) for the National Imagery Transmission Format Standard (NITFS), 2 October 1998
	NITF Implementation Requirements Document (NITFIRD)
MIL-STD-2411	Raster Product Format, 6 October 1994, Change Notice 1 17 January 1995, Change Notice 2 16 August 2001
MIL-STD-2411-1	Registered Data Values for Raster Product Format, 30 August 1994, Change Notice 1 16 August 2001

MIL-STD-2411-2	Integration of Raster Product Files into the National Imagery Transmission Format, 26 August 1994
MIL-PRF-89041A	Controlled Image Base (CIB), 28 March 2000
MIL-PRF-89038	Compressed ARC Digitized Raster Graphics (CADRG), 6 October 1994, Amendment 1 27 April 1999, Amendment 2 28 March 2000
MIL-PRF-89034	Digital Point Positioning Data Base (DPPDB), 23 March 1999, Amendment 1 27 June 2000

B.1.5 Definitions

1. Bar (WAMTI). A portion (strip) of a WAMTI frame.

2. Block, NITF. An indexed (row/column) structural unit of pixels (sub-array) within an NITF file, often referred to as a 'tile'.

3. Block, Coverage. A defined coverage area of pixel values for which the attributes and parameters within a TRE(s) are applicable, sometimes referred to as a 'scan block.'

4. Canted Search Scene. A series of search mode scenes where the direction of each scene center line varies. For example, a series of short scans along a winding canyon conducted as a single planned imaging operation.

5. Frame. An image collected from a framing sensor, point sensor, or a spot sensor. An imaging operation (scene) may consist of collecting one or more frames (images).

6. Frame (WAMTI). A unit of SAR data when operating in the Wide Area Moving Target Indicator (WAMTI) mode. The WAMTI Frame data may be subdivided into 'Bars'.

7. Image. A row/column (line/sample) array of pixel values (imagery data) the mission planner has identified for collection within a collection scene. The imagery data that results from an imaging operation of a sensor. An image is often subdivided into indexed rows/columns of blocks/tiles. One or more images may comprise a scene.

8. Look. A mechanism for identifying/grouping related imagings of a Multi-image Scene (MiS). A Look has roughly the same footprint/coverage as the MiS.

9. Mission Identifier / Mission Number. An identification of the specific collection mission that identifies the imagery collection mission to automated management systems and their users.

10. Moving Target Search Mode(s). An imaging operation mode wherein the detected information is moving targets instead of pixels.

11. Operation Number. Within a collection mission, there may be numerous collection tasks or objectives to collect data for specific areas of interest. Each task/objective for an area of interest results in an imaging operation. One or more images can be collected during an imaging operation. A unique operation number (index value or count) is assigned to each imaging operation to differentiate among separate imaging operations. The operation number is part of the information used by external systems to track products that result from the imaging operation task/objective.

12. Point Mode(s). Some framing or point sensors have multiple modes of operation, that is, different parameters of operation for which the sensor may be tasked for image collection. For example, a sensor with narrow, medium, and wide modes of operation may provide options for small, medium, and wide area fields of view for collected image frames.

13. Scene. A planning concept used somewhat differently depending on the context of the planned collection. An imaging scene is a single image, or a collection of images that provides contiguous coverage of an area of interest. This term is often used interchangeably with ‘imaging operation’ and ‘image’. A collection scene may be initiated by three types of planning processes: (1) Collection Plan; (2) Re-Tasking; and (3) Unplanned/Immediate.

14. Scene Number vs. Operation Number. There are several conventions for assigning scene and operation numbers. Generally, for airborne collection systems, the scene number and operation number are the same thing. See the discussion on "Multi-Image Table of Content" elsewhere in this document for details on handling multi-image scenes.

Other practices do exist. For example, presume a mission is planned to collect imagery over three areas of interest. The first area can be satisfied with a single image collection (first imaging operation, 1 image/scene); the second area requires 4 images (second imaging operation, 4 images/scenes); the third area requires 1 image (third imaging operation, 1 image/scene). In this example, one means of indexing is to re-initializing the scene number index for each new Operation number (i.e., Op1, Sc1; Op2, Sc1, Sc2, Sc3, Sc4; Op3, Sc1).

Some collection systems internally manage imaging operations by a simple indexing of each instance of single image collection, whether or not there are more than one image being collected for the scene. This indexing approach uses the first scene number of the imaging operation as the Operation Number (i.e., Op1, Sc1; Op2, Sc2, Sc3, Sc4, Sc5; Op6, Sc6).

There is no right or wrong approach. The objective is to establish a unique means of tracking/managing imaging operations. (The second approach does greatly reduce the number of actual imaging operations that can be tracked in a single mission because it precludes the re-initialization of scene numbers for each imaging operation).

15. Search Mode(s). Generally a mode of continuous imaging. It may consist of continuous line scanning or a series of frame shots, a series of Spot collections, etc. May be called "scan mode."

16. Spot Mode(s). A SAR imaging operation mode similar to frame modes for electro-optical cameras. The detected image is of a specific size (vice continuous scan) aimed at a center point.

B.2 ABSTRACT COLLECTION MODEL

B.2.1 Model Overview. The model focuses on the following inter-related aspects of imagery collection and production:

a. The planning means (model) for describing how the data is to be collected.

b. The image model for orienting, ordering and structuring the actual collected data to correlate with the collection-planning model.

c. The model for packing the collected data (abstract image model) into physical NITF files while maintaining association with the abstract imaging operation.

d. The means of clearly associating pixels in NITF files with their original position in the initial collection imaging operation and the associated attributes and parameters from the original collection.

e. The means for mission planning systems, imagery product management systems, archive and dissemination systems, exploitation systems, etc. to correlate physical NITF files with the original product tasking, imaging, and production attributes.

B.2.2 Planning Model. The planning part of the model attempts to generalize how system operators describe what is to be collected. The main objective is to create a common understanding of how ‘data elements’ used in the file header, image subheader and SDE fields correlate to the collection planning processes. Automated process management systems desire to track the workflow from imagery requirement initiation, to planning the collection, executing the collection, processing the collected data, exploiting the collection, all the way through product(s) delivery, archive and dissemination. Consequently, the ‘data element’

terms applicable to the planning process must be used consistently throughout the entire process.

B.2.3 Image Data Collection Model. The collected pixel data is eventually stored in NITF formatted files, either by on-board processing or processing at the ground station. The sensor produces the imagery data using (and constrained by) its available modes of collection based on its view of the image/scene to be captured as described by the collection plan. Regardless of the physical sensor processes used to collect the image data, there is an implied (abstract) image/scene structure that makes up the imaging operation. This 'abstract image scene' may be of a nature or size that all of it never gets realized in a physical sense as a single entity (e.g., a single computer file). It is therefore useful to have an abstract model of the row/column (line/sample) matrix/grid of the data as originally collected by the sensor as described in the collection plan. This abstract image has attributes and parameters associated with each pixel based on sensor outputs and navigational aids associated with the collection process. Some aspects of exploitation processing of the physical NITF files may require mapping pixels in the NITF files to their 'as collected' position within the original collection grid (abstract image) to make better use of the support data associated with the image.

B.2.3.1 Abstract Image Model. The abstract image consists of the row/column array(s) of pixels collected by a single imaging operation of the sensor (as inherently defined for that specific type of sensor). The array(s) of pixels may be blocked (tiled). Each block is given a reference row/column number beginning with row 1, column 1: 1,1; 1,2, ... 1,C; 2,1; 2,2; ...2,C; ..... R,1; R,2 ... R,C. Each contiguous row/column array can be conceived of as a single NITF image segment (IM) that is not constrained by field size constraints or other physical constraints imposed by current state of computer operating systems. The bounds are determined by the sensor's mode of operation. Some of these abstract images may be physically stored as single NITF IM segments. Or, for various reasons, the abstract image may be 'segmented' (i.e., divided) into multiple NITF IM segments.

B.2.3.2 Image attributes and parameters. There are support data associated with the abstract image that describe the attributes and parameters about the image collection. In some instances, the area of coverage (scope) of the data is the entire set of pixels in the abstract image. In other instances, the parameters/attributes are different for various portions of the abstract image. Therefore, a means must exist to identify the 'coverage' of parameters and attributes with respect to the entire abstract image.

B.2.3.3 Image Segmentation. An imaging scene may be logically segmented (e.g., segment AA, segment AB, etc.) There are two circumstances for 'segmenting' an abstract image:

- The single image scene is so large, that it needs to be logically divided into portions to ease physical storage and indexing constraints (e.g., row/column pixel counts; block number counts, etc.).

- To treat the multi-image scene collection scenario as if it were a single image entity. For this case, each image (sub-scene) in the imaging operation scene is designated as a segment (AA, AB, AC, etc.) of the overall abstract image.

Note: For legacy National Technical Means (NTM) data, the concept of "segmentation" is independent from the row/col indexing of Fast Access Format (FAF) blocks. the FAF block indexing does not re-initialize at segment boundaries.

B.2.3.4 Image Attribute Coverage Blocks. Each image segment (AA, AB, AC, etc) may be virtually subdivided into ‘Coverage Blocks’. When the attributes and parameters about the pixels within an image segment varies across the segment, ‘Coverage Blocks’ shall be defined to associate attribute and parameter data (e.g., SDE data) with the appropriate pixels within the segment to which the data is applicable. Some systems refer to this concept as ‘Scan Blocks’.

B.2.3.5 Patches. Patches are an example of parameters/attributes varying across the pixels of an abstract image. Consider a continuous SAR search scene. As ‘batches’ of SAR phase history data are processed into pixels, the resulting set of pixels (Patch) has parameters/attributes unique to that process. The correlation of the support data with the appropriate pixels (area of coverage) must be maintained when packing the abstract image into NITF file structures. The potential exists for the set of pixels within a patch to be physically stored in a single NITF IM segment, across several NITF IM segments, or for multiple patches to be stored within a single NITF IM segment. Additionally there could be a single IM segment or multiple IM segments stored within a single NITF file.

B.2.3.6 Processing Image Data into NITF Files. There are four principle scenarios available when processing the collected image data and its associated support data into physical NITF files based on the ‘abstract image structure’ of the original imaging operation. The four scenarios are:

- Single Abstract Image Packed into a Single NITF IM Segment.

- Multiple Abstract Images Packed into a Single NITF IM Segment.

- Single Abstract Image Packed into Multiple NITF IM Segments.

- Multiple Abstract Images Packed into Multiple NITF IM Segments.

B.2.3.6.1 Single Abstract Image Packed into a Single NITF IM Segment. This is the most straightforward approach for storing the original imaging operation into NITF. Care must still be taken to assure the support data is properly associated with the

appropriate pixel coverage. For example, a SAR search scene could potentially be stored in a single NITF IM segment, but would likely have multiple PATCH extensions in the IM segment subheader to identify varying coverage parameters as the along-scan pixel index increases.

B.2.3.6.2 Multiple Abstract Images Packed into a Single NITF IM Segment. This approach results in a ‘mosaic’ of the multiple image collection scenes pieced together into a single NITF image segment (IM). When the ‘support data’ varies for each of the original ‘pieces’, the BLOCK TRE or another means is needed to correlate multiple sets of support data to the applicable ‘coverage’ areas within the IM segment.

B.2.3.6.3 Single Abstract Image into multiple NITF IM Segments. Several circumstances drive this approach. Perhaps production timeliness objectives force an asynchronous multiprocessing approach wherein the abstract image needs to be divided into multiple data bundles for processing as individual NITF files. Or perhaps multiple small files, rather than a few huge files, better serve limited processing capacity at the product user location. Several options need to be considered:

B.2.3.6.3.1 Single IM Segment per NITF File. A single abstract image could be stored as multiple NITF files, each NITF file having a single IM segment. For this case, there must be some means provided to associate where the pixel coverage of each file relates to the overall abstract image. There must be a means to associate support data coverage with applicable pixel data coverage. The proper local/global application of support data parameters and attributes must be clearly discernable.

B.2.3.6.3.2 Multiple IM Segments per NITF file. A single abstract image could be stored as multiple NITF files, each NITF file having multiple IM segments. In the past, this option was avoided since the Libraries, Mission Planning, and Exploitation Management systems didn’t deal well with multiple IM segments in a single NITF file. See the discussion on "multi-Image Table of Contents" elsewhere in this document for details on handling multiple image scenes.

B.2.3.6.4 Multiple Abstract Images Packed into Multiple NITF IM Segments. This case is just a combination of the previously described three cases. Each of the multiple abstract images can be packed into individual NITF IM segments. Selected groupings of the abstract images could be packed into individual NITF IM segments. Finally, individual instances of the abstract images could be packed into multiple NITF IM segments.

B.2.4 Image Array and Pixel Geometry. The organization of pixel values into arrays, the definition of pixel shape, and the correlation of pixel position with the geometry of the sensor collection arc integral to the proper interpretation of the image support data. Appendix C lays a foundation for understanding key concepts

for correlating support data coverage with pixel arrays. Appendix D provides standard IDs, naming conventions, and product identifiers.

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Appendix C – Image Array and Pixel Geometry

C.1 General

The purpose of this section is to define, clarify, document, and attempt to establish consistency in the interpretation of Pixel Geometry and Pixel-Support Data Extension (SDE) Grid Associations with regard to positioning, mensuration, and image chipping as used in National Imagery Transmission Format (NITF). The goal of this effort is to capture, quantify, and document these complex, but typically undefined, concepts such that NITF applications now and in the future will possess consistent implementations of these concepts.

C.2 Background

Recent testing and experimentation with National Imagery files, various Electronic Light Tables (ELTs), and RULER, has uncovered inconsistent, and sometimes gross, results in simple geographical point extractions from a controlled set of imagery files. Contributing to these aberrations are apparently different interpretations and applications of the following concepts:

- How to associate desired pixel indices/location in the NITF image data value array with the pixel's actual location in SDE Coverage Grid Space ("Pixel-SDE Grid Association"),

- Determining the appropriate geometric/grid reference for the area within a desired pixel ("Sub-Pixel Geometry"),

- Relationship between the terms "LINE and SAMPLE" and "ROW and COLUMN" and their associated indexing conventions as used in the National Imagery Transmission Format Standard (NITFS) suite of standards and support data specifications.

- Addressing pixel accumulation associated with reduced resolution data sets (RRDSs) and the related accuracy "losses."

C.3 Discussion

C.3.1 Pixels and Grid Interrelationships

There appears to be little, if any, definition in place for some of the terms and/or concepts previously mentioned. To provide a better understanding of the concepts and problems addressed in this paper, an attempt will be made here to provide substance in these areas. *Pixel-SDE Grid Association* is the concept whereby an ELT must be capable of accurately and consistently identifying ROW and COLUMN index values from the ordered NITF image array. This action answers the "WHICH pixel?" question. Specifically, the ELT must be able to account for interrelationships of, and the affects associated with, image display rotation, alternate resolutions, and derived image product ("chip" or "full" imaging operation) in determining where the

pixel "of interest" actually lies in a grid space upon which the associated support data is based. In simpler terms, when an operator selects a single pixel in a rotated, Fast Access Format (FAF)-based or ICHIP-based chip, R5 IMP, etc., can the ELT discern exactly where the selected pixel is in the grid space of the original, unrotated, full, R0 image's support data?

A step-by-step discussion is necessary to identify the theoretical process involved with selecting a pixel of interest and obtaining a geo-point to which it is associated.

In figure C-1, the graphic presented can be thought of as an NITF image rendered for display. The ordered ROW and COLUMN (a.k.a. LINE and SAMPLE) pair of "1,2" correctly identifies the NITF indices of the shaded pixel of interest. (Note: The NITF image array indices are "Zero-based," IAW MIL-STD 2500A, paragraph 5.5.1.1). The identification of this pixel can be thought of as the "pointer and mouse click" action typically performed on an ELT, or other similar device, when attempting to derive a geo-point for a feature/location on a given image.

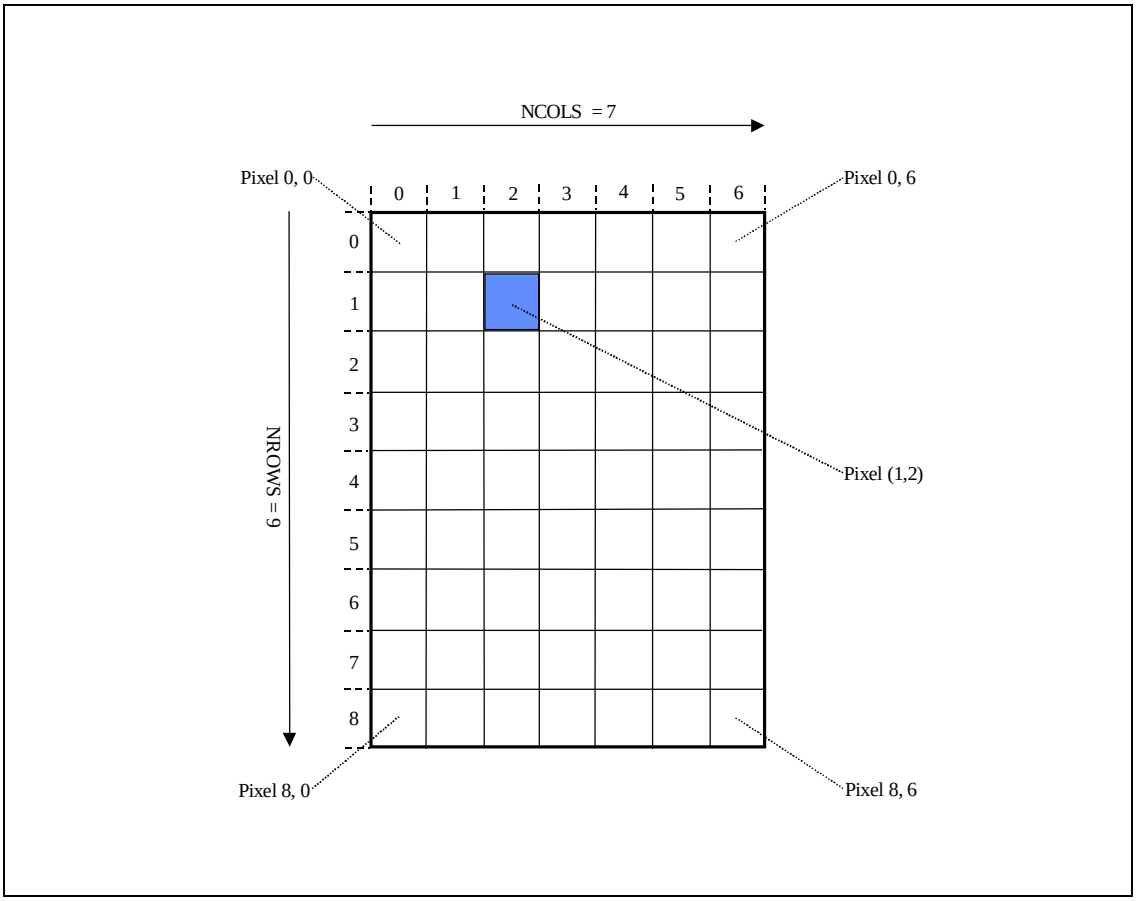

Figure C-1. Storage Array Grid

After the pixel location indices have been determined within the *Storage Array Grid*, a means to refer the pixel of interest to a *Spatial Grid* or physical grid must be established. For this discussion, *Pixel Geometry* will be used to define the process

of identifying or establishing a pixel reference index *point* that can be used to represent the physical area covered by the pixel. (Note: In some legacy implementations and documentation, there is the concept of "sub-pixel notation" (for the lack of a better terminology) whereby a pixel is not really a single point but a grid of many points within itself. That is a subject not to be addressed here – but reserved for future discussion. This paper limits discussion to the total area represented by a single pixel in an image array that has not been rotated).

For example, the RULER mensuration engine allows inputs of decimal LINE and SAMPLE values. Also, the ICHIPB specification allows for decimal values in its output product (OP) and full image (FI) grid point references. Considering the existence of decimal pixels, a means must exist to uniformly refer the "collective" pixel to its space within the support data. For imagery that has not been rotated, this means the mid-point of the pixel of interest is centered upon its respective location in SDE space. Continuing with this logic, and using the following figure as an example, one would expect the pixel of interest (1,2) in the image *Storage Array Grid* to be referred to in RULER as LINE (1.5) and SAMPLE (2.5) in the *Spatial Grid*.

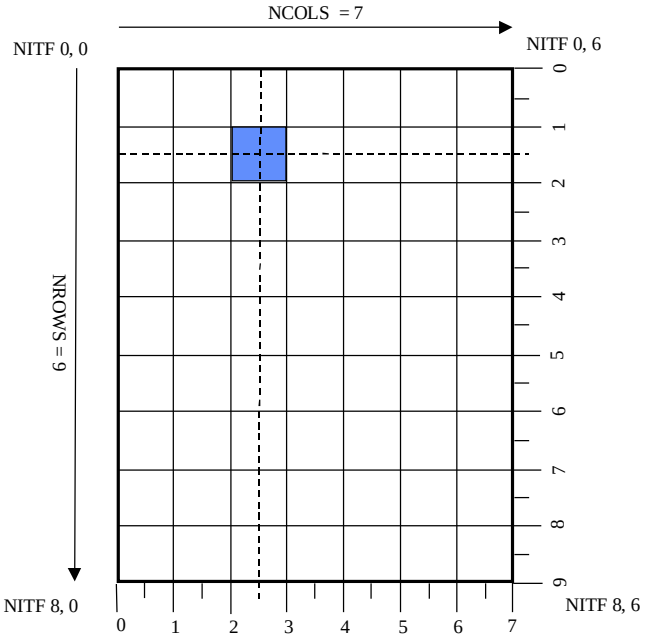

Figure C-2. Spatial Grid

In reality, however, different conventions appear to be employed by ELTs and are just as logical. Using the same example, an ELT might submit LINE and SAMPLE

pair (2,3), from a "unit counting" notation rather than the aforementioned "centered-index" notation. Unfortunately, while these conventions are perfectly logical, it is easy to see that dissimilar implementations will yield dissimilar results. And what happens when image rotation or resolution changes? The previous paragraph introduced the subject of *LINE and SAMPLE Assignments,* and some of the confusion and ambiguity that exists within this area. In simple terms, one might think that it would just be "the ordered X-Y pair that represents the pixel of interest." In reality, that is true, but what comprises that ordered pair? As previously stated, two different "ordered pairs" were derived for the same pixel of interest in figure C-2. Other conventions could also be used such as the "image array" notation (1,2), "lower right of the pixel" notation (2,3), etc. While some of these "notations" may seem unusual, and may be, the fact remains, without clear implementation guidance, they can exist.

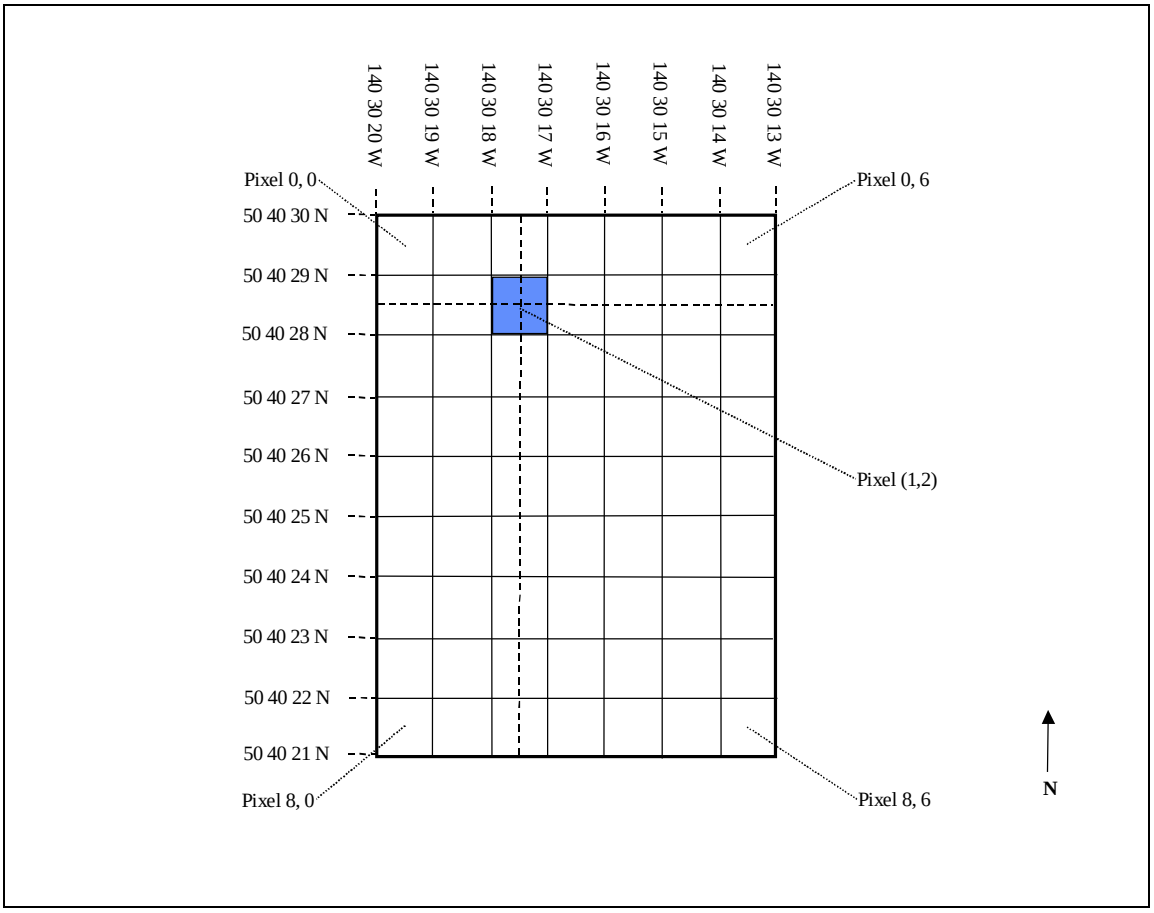

Figure C-3. Geographical Grid

Once the pixel of interest has been identified from the *Storage Array Grid* and assigned its respective position in an associated *Spatial Grid,* the spatial grid references must be applied to a *Geographical Grid* that identifies where the pixel is on the Earth. In today's digital softcopy imagery, the geographical "grid" is typically "formed" from information provided by the image's associated support data;

specifically, the information contained within the NITF SDEs. Figure C-3 provides a graphical illustration of where the original pixel of interest (1,2) lies within a (fictitious) geographical grid. For ease of explanation and illustration, the geographical values in figure C-3 are highly exaggerated, resulting in extreme ground sample distances of approximately 100 feet.

From the information offered in figure C-3, pixel (1,2) in the original Storage Array Grid theoretically covers a "1-second cell" on the Earth, of which the center-point is at 50 40 28.50N latitude, 140 30 17.50W longitude. Accordingly, these same values would be expected from the ELT (or other device) if the same pixel was selected from an image display and the device subscribed to the transform steps just outlined.

C.3.2 Image Resolution and Pixel Accumulation

With the increased use and general proliferation products that are no longer of the same size and resolution of the original imaging operation, numerous implementations of image "products" are appearing. Clear, consistent, and unambiguous guidance is lacking in many areas regarding the means to identify the true "pedigree" of the new image product. Without such information, any attempt to exploit or perform accurate geo-spatial measurements upon such imagery becomes pure folly. Recent test efforts have uncovered four areas that are in need of additional information and guidance to improve production and interpretation consistency and thereby improve interoperability. These areas are:

- Anamorphic Correction
- Reduced Resolution Data Sets
- IGEOLO, Mensuration, and Support Data
- Algorithms

C.3.2.1 Anamorphic Correction

Also known as "Asymmetrical Correction," anamorphic correction involves pixel alterations which drastically change the dimensions of the originally captured image and thus cause disharmony with the associated support data if left incorrectly or totally "undocumented" in the preferred vehicle, the ICHIPx Tagged Record Extension (TRE).

Imagery can be captured in various asymmetrical "modes" and is generally expressed in ratios of cross-scan (columns) versus along-scan (rows). For this discussion, a simple "1x2" capture will be used. In this particular mode, a pixel represents one "unit" of ground sample distance (GSD) in the cross-scan (column) direction, while representing two "units" of GSD in the along-scan (row) direction. Unless corrected, an image of this nature provides a very deceptive visual rendition to the user. For example, consider a building in this uncorrected "1x2" image, with a

GSD of 1 meter, that is portrayed with a length and width of 100 pixels. Visually, the image appears square. However, if measurements of the building were made using the given support data, one would find that it is actually rectangular, 100 meters (horizontally) by 200 meters (vertically). Correction of this aberration requires the addition of pixels in the along-scan (row) direction. In this example, an "additional" row of pixels would be included for every row currently in the image. Accordingly, the NROWS of the image doubles in the case of a "1x2" image. After correction, this same building will appear symmetrical in both visual and measurable manners.

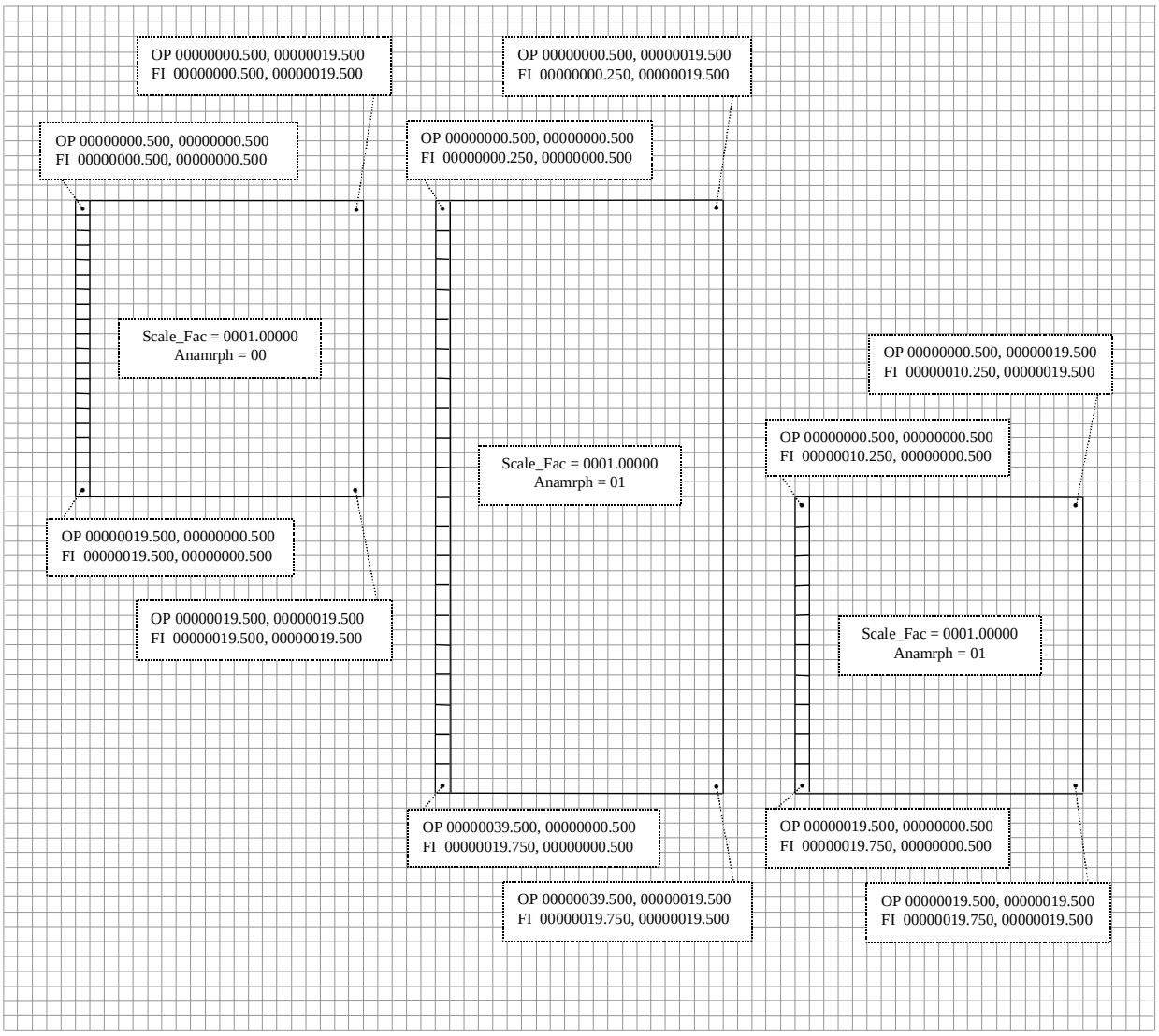

Figure C-4. Anamorphic Correction

In figure C-4, above, the anamorphic correction process is illustrated. The image is considered to be full or IMAG = "1.0 " resolution. As the practice of including the ICHIPx TRE for many products is rising, corresponding ICHIPx TRE data necessary to denote the original and subsequent dimensions resulting processing actions are also provided.

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In this figure, the theoretical original imaging operation resulted in a product that was 20 pixels by 20 pixels. Continuing across the illustration, anamorphic correction was performed on the original capture, resulting in a "corrected" image of the size NROWS = 40 and NCOLS = 20. Lastly, a chip was cut from the lower half of the corrected original image.

C.3.2.2 Reduced Resolution Data Set (RRDS)

Reduced Resolution Data Sets permit the handling of large imagery in a smaller, more manageable, scale. The geographical coverage presented in a RRDS remains unchanged, regardless of the resolution; only the physical size of the pixel array is altered. As a result of the actions to reduce the physical size of imagery, pixel accumulation becomes necessary. While there may be many ways to achieve reduced imagery resolutions, the same theoretical result occurs -- pixel accumulation takes place. In simpler terms, a single resulting pixel assumes or represents more visual and geographical space in the reduced resolution than in the full resolution image.

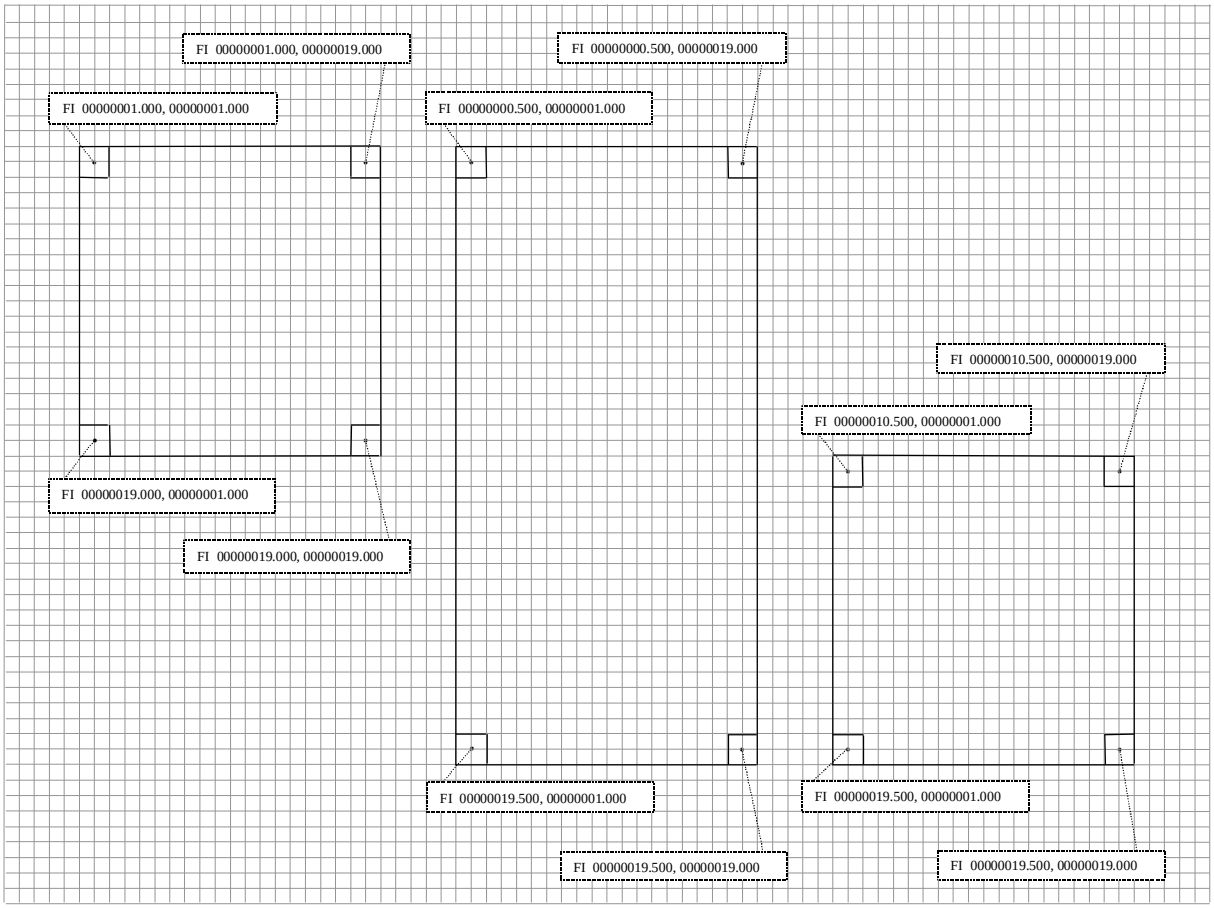

Figure C-5. Pixel Accumulation (/2)

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In figure C-5, above, the pixel accumulation process is illustrated in preparation for generation of a "half res" (IMAG = "/2 ") image. In this case, the full resolution image (a.k.a. "R0") will be reduced by a factor of 2 in both the row and column directions. Accordingly, the resultant image (a.k.a. "R1") area will be ¼ of the original image. Corresponding ICHIPx TRE data, necessary to denote the resultant aggregate pixel locations in the original, full resolution image (FI values) are provided for an asymmetrical image, its anamorphically corrected rendition, and for a chip from the corrected image.

In figure C-6, below, the resultant RRDSs for the asymmetrical image, its anamorphically corrected rendition, and "corrected" chip are illustrated. Note that one pixel now represents four in the original image's "space." Accordingly, the center of each RRDS corner pixel (OP values) corresponds to the aggregated corners (FI values) of the R0 imagery in figure C-5.

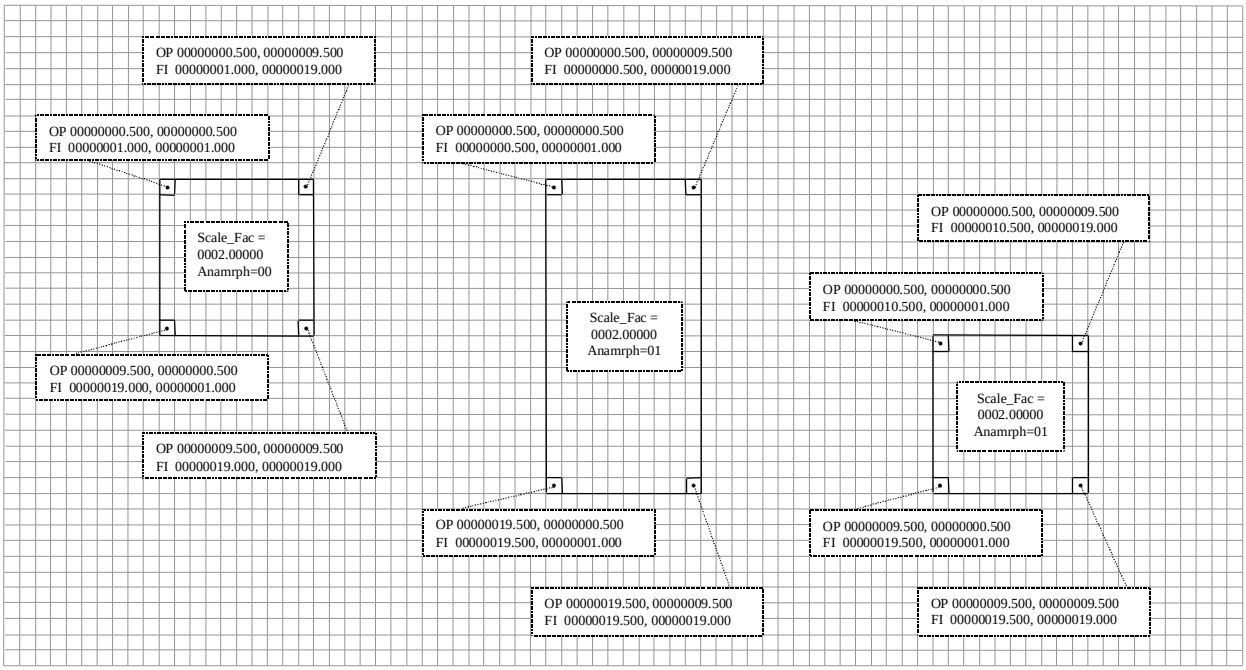

Figure C-6. R1 Reduced Resolution Data Sets

Figure C-7 takes the same original R0 image, as in figure C-5, and performs pixel accumulation in preparation for generating a "quarter res" (IMAG = "/4 ") image. In this case, the full resolution "R0" image will be reduced by a factor of 4 in both the row and column directions. Accordingly, the resultant "R2" image area will be 1/16 of the original image. Corresponding ICHIPx TRE data, necessary to denote the resultant aggregate pixel locations in the original, full resolution image (FI values) are again provided for the asymmetrical image, its anamorphically corrected rendition, and for a chip from the corrected image.

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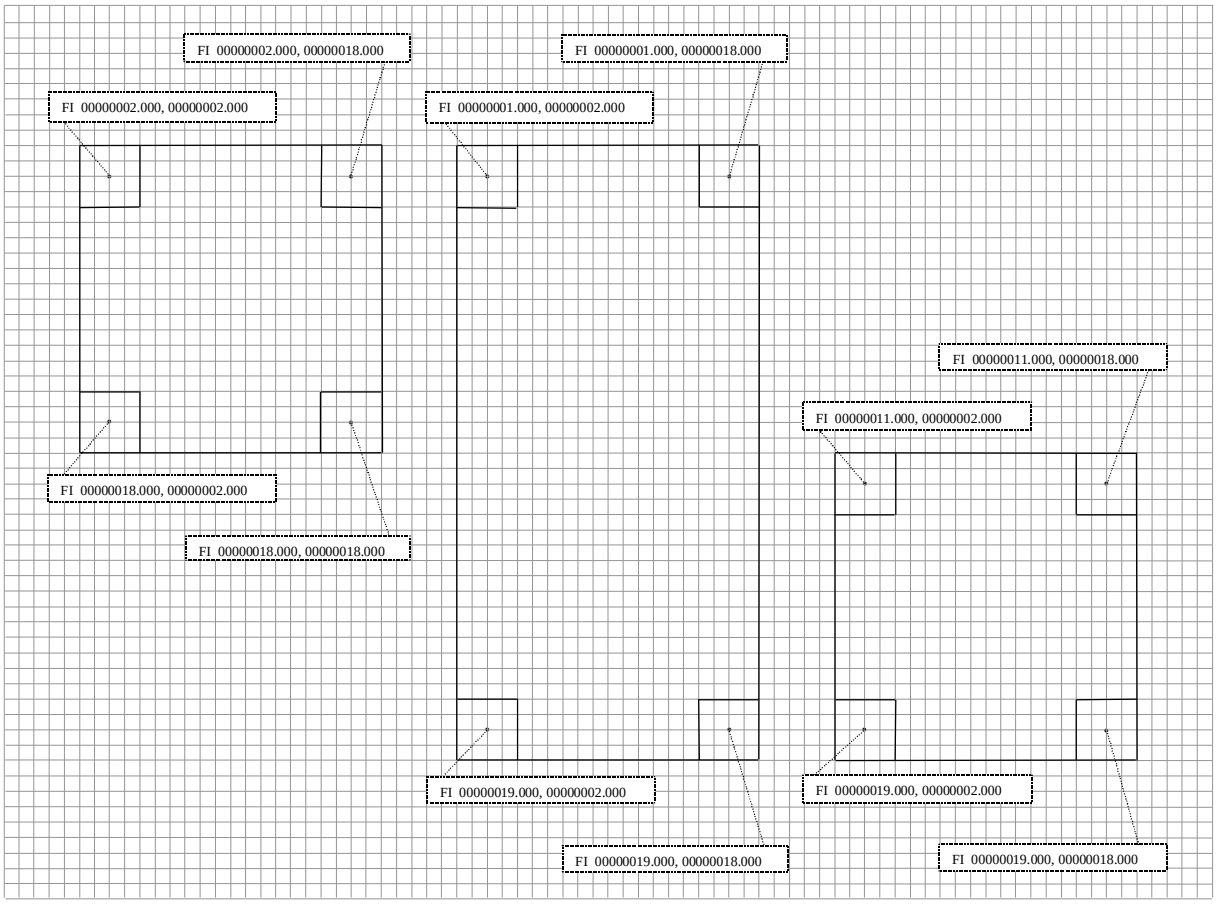

Figure C-7. Pixel Accumulation (/4)

Figure C-8, below, is similar to figure C-6, except that all values pertain to the resulting R2 imagery.

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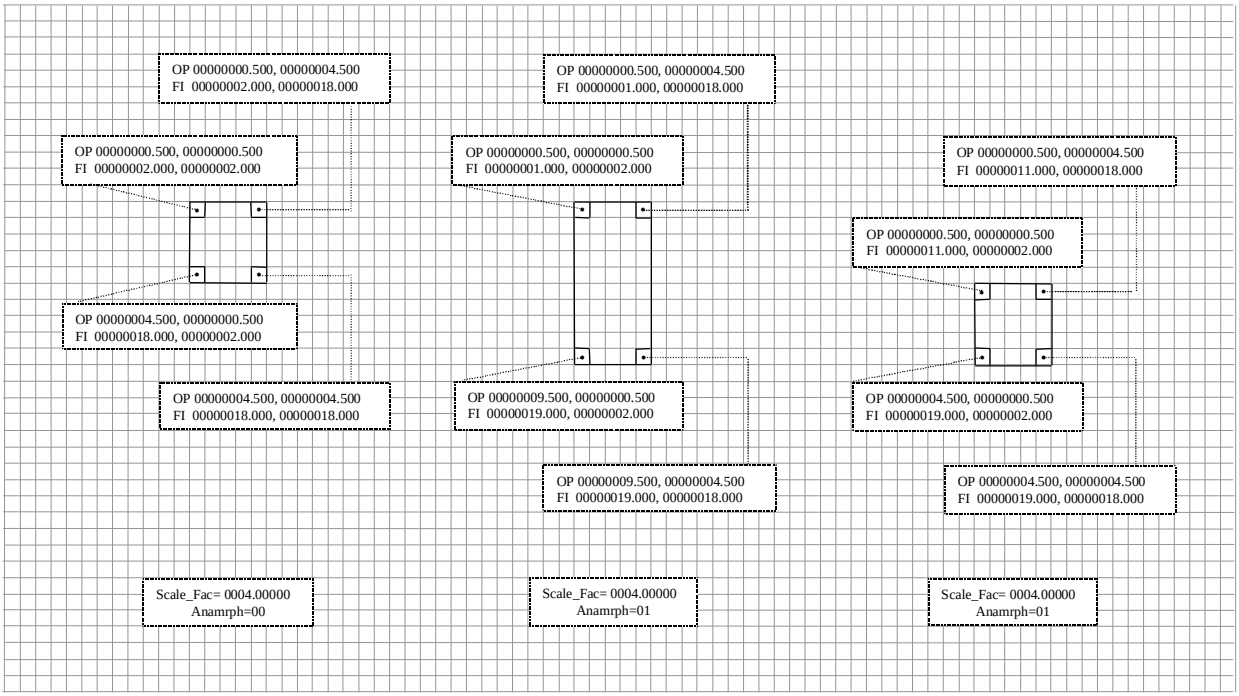

Figure C-8. R2 Reduced Resolution Data Sets

It should be noted that RRDS products can be legitimately produced in various scales. The most common is the legacy "Powers of Two" convention whereby the original image's rows and columns are reduced by a power of two, with the resulting pixel accumulation being the square of the scaling factor. Decimal conventions may also be used. Table 1, below, lists sample values for associated data from both conventions.

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Table C-1. Associated RRDS Data

Associated RRDS Data						
R-value	Numeric Scale Factor (Row/Col Divisor)	IMAG(*)	ICHIPB Scale Factor	R0-to-Rn Pixel Accumulation Ratio	Rn (0.5,0.5) Offset Location in R0	??
R0 -	1 -	"1.0 " "1.0 "	0001.00000 0001.00000	1:1 -	000.5,000.5 -	
R1 -	2 -	"/2 " ."500"	0002.00000 0002.00000	1:4 -	001.0,001.0 -	
R2 -	4 -	"/4 " ."250	0004.00000 0004.00000	1:16 -	002.0,002.0 -	
R3 -	8 -	"/8 " ."125"	0008.00000 0008.00000	1:64 -	004.0,004.0 -	
R4 -	16 -	"/16 " ."062"	0016.00000 0016.00000	1:256 -	008.0,008.0 -	
R5 -	32 -	"/32 " ."031"	0032.00000 0032.00000	1:1024 -	016.0,016.0 -	
R6 -	64 -	"/64 " ."015"	0064.00000 0064.00000	1:4096 -	032.0,032.0 -	
R7 -	128 -	"/128" ."008"	0128.00000 0128.00000	1:16384 -	064.0,064.0 -	

(*) IMAG may be in the "/" format, but only with the values listed, or in any 4-byte decimal format.

It should be noted that if decimal format is employed, precision becomes skewed around Scale Factor 16 and larger due to field size limitations. Accordingly, the ICHIPB TRE should always be included to accurately depict the true scale factor of the image.

C.3.2.3 RRDS IGEOLO, Mensuration, and Support Data

All RRDS IGEOLOs should retain the same values as those of the original full image (R0). This permits consistent, interpolated values to be obtained from the IGEOLO corner points for all image resolutions. While granularity is lost in the scaling process, as can be seen from Table 1, above, virtually no difference should be experienced between geo-spatial measurements made from either the IGEOLO interpolation or mensuration engine-generated values from the support date. The only significance between these values should be as a result of the lesser precision of the IGEOLO value coupled with rounding error during corner point generation or interpolation error during cursor "sweep." This, of course, assumes the algorithm used to generate the IGEOLO from the original image's support data was correct and the image for which it was calculated was of the appropriate size for its stated scale. These expectations become apparent when reviewing figure C-9, below.

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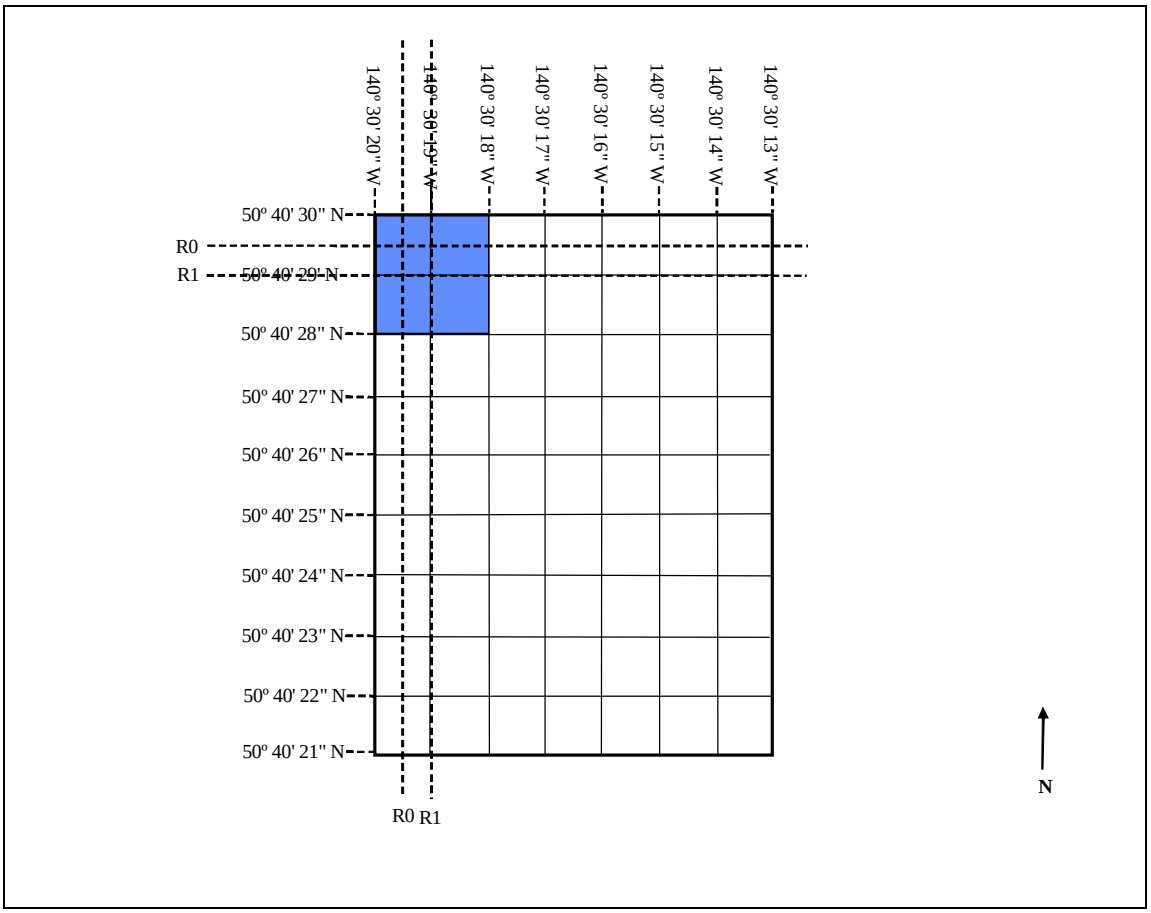

Figure C-9. Geographical Points

When attempting to obtain measurements in this example, one would expect to receive the following geo-point values from either IGEOLO interpolation or mensuration engine results for the first (0,0) pixel of the R0 image:

50º 40' 29.50" N 140º 30' 19.50" W

The shaded area in this illustration represents the first pixel (0,0) in the R1 RRDS of the same image. Expected geo-point values from either of the methodologies above are:

50º 40' 29.00" N 140º 30' 19.00" W

(Note: The theoretical IGEOLO value assumes that the interpolation process is capable of "precision" to 2 decimal places.)

NITF system developers should design their implementations in a manner to generate IGEOLO values accurately from the associated image's support data in the following manner:

UL Corner LAT: Mensurated Image Pixel Latitude + 0.5 GSD

UL Corner LON: Mensurated Image Pixel Longitude + 0.5 GSD

UR Corner LAT: Mensurated Image Pixel Latitude + 0.5 GSD
UR Corner LON: Mensurated Image Pixel Longitude - 0.5 GSD

LR Corner LAT: Mensurated Image Pixel Latitude - 0.5 GSD
LR Corner LON: Mensurated Image Pixel Longitude - 0.5 GSD

LL Corner LAT: Mensurated Image Pixel Latitude - 0.5 GSD
LL Corner LON: Mensurated Image Pixel Longitude + 0.5 GSD

(Note: The "0.5 GSD" adjustment accounts for the distance from the center of the pixel of interest to its edge in either the X or Y directions. This is based upon the aforementioned convention whereby the center ("0.5, 0.5") of a pixel is used to generate measurements for the pixel of interest. This example assumes an image in the Northern and Western Hemispheres. Imagery from other hemispheres would have to be adjusted appropriately.)

C.3.2.4 Algorithms

The following algorithms are offered to assist in calculating ICHIPB cornerpoints and were used in determining the values in the aforementioned examples.

(a) To determine ICHIPB OutputProduct cornerpoints ("center-of-pixel") an image:

OP_11_ROW = 1 - 0.5
OP_11_COL = 1 - 0.5

OP_12_ROW = 1 - 0.5
OP_12_COL = (NCOLS / SF) - 0.5

OP_21_ROW = (NROWS / SF * ACF) - 0.5
OP_21_COL = 1 - 0.5

OP_22_ROW = (NROWS / SF * ACF) - 0.5
OP_12_COL = (NCOLS / SF) - 0.5

where: ACF = Asymmetrical Correction Factor and:

1 x 1 = 1.00
1 x 2 = 2.00
2 x 3 = 1.50
etc.
(Note: ACF never applies to the COL direction)

SF = Scale Factor from IMAG and ICHIPB and:

1.0 = 0001.0000 (R0)
/2 = 0002.0000 (R1)
/4 = 0004.0000 (R2)
etc…

NROWS and NCOLS are the dimensions of the original image

(b) To determine a "corrected" and/or "reduced resolution" pixel's location in "uncorrected" and/or "full resolution" pixel grid space (e.g., ICHIPB FI_nn values):

$$UNCORRECTED_PIX_LOC = \frac{CORRECTED_PIX_LOC}{ACF} \times SF$$

(Note: When calculating a COL value, ACF is always "1")

(c) Likewise, to determine an "uncorrected" and/or "full resolution" pixel's location in "corrected" and/or "reduced resolution" pixel grid space:

$$UNCORRECTED_PIX_LOC = \frac{CORRECTED_PIX_LOC}{SF} \times ACF$$

(Note: When calculating a COL value, ACF is always "1")

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Appendix D - Standard IDs and Naming Conventions

D.0 General

This appendix identifies general issues and guidance related to Standard IDs and naming conventions. It also identifies community uses of each of them where known.

Several alternative methods for identifying imagery products and assigning file names are in use within the National Systems for Geospatial Intelligence (NSGI). The naming conventions addressed in this appendix are:

- Forty-Character File Naming Convention
- Fifty-nine Character File Naming Convention
- Moving Target Indicator (MTI) File Naming Convention
- Controlled Image Base (CIB) File Naming Convention
- Compressed ARC Digitized Raster (CADRG) File Naming Convention
- Digital Point Positioning Data Base (DPPDB) File Naming Convention
- Digital Geographic Information Exchange Standard (DIGEST) Annex E File Naming Convention

D.1 Forty-Character File Naming Convention

D.1.1 National Support Data Extension (SDE)

D.1.1.1 Forty-Character Naming Convention. This file naming structure consists of a forty-character image identifier followed by suffix extensions as follows:

FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF.
rN_PART_nn_OF_mm.NTF

Where:

FFFF…	The Forty-Character Image Identifier (see table B-1).
.NTF	An optional extension to indicate the file is formatted in NITF.
.rN	An extension to indicate the resolution of the image within the file. r0 indicates the image is of original/full resolution. Values of r1 through r9 indicate reduced resolution in factors of 2 (1/2, 1/4, 1/8, 1/16, 1/32, …).

_PART_nn_OF_mm An extension to indicate that the file is instance “nn” of “mm” total files that comprise the entire product specified by the forty-character identifier. Note: Under some circumstances, the total number of files comprising the entire product may not be known when the files are initially being produced. In that case, the mm value is set to 00 to indicate the count is unknown. Where possible, the actual count should at least be placed in the last file of the product sequence.

D.1.1.2 Forty-Character Image Identifier. The field structure of the forty-character image identifier is shown in Table B-1. The structure provides a means for uniqueness of product identification and for association of multiple files that may comprise a single product. Each NSGI image production system using the 40-character identifier convention places additional product specific constraints on the use of the 40-character identifier. The image/product identifier Tagged Record Extension (TRE) specification applicable to the producing systems (i.e., STDIDA, STDIDB, AIMIDA, and AIMIDB) specifies these additional constraints. Maintaining the proper relationships of the identifier sub-field values with the identifier’s usage in file headers, image subheaders, identification TREs, and as a file naming convention are critical to proper use and interpretation of imagery products and associated support data.

D.1.1.3 Identifier Field Value Dependency on Data Coverage. Proper population and use of field values used in the identifier depends on the data coverage to which the specific identifier applies. The values for beginning and ending image segments and those for starting and ending block numbers are populated from the perspective of the entire data coverage of the identified imaging operation. When the identifier pertains to an entire imaging operation (e.g., IID2/ITITLE), the segment and block indexes reflect the full extent of the total data coverage. When the identifier pertains to a portion of the imaging operation (e.g., FTITLE and filename), the segment and block indexes reflect the relative location in the entire data coverage of the imaging operation that is included in the identified data portion.

Table D-1. 40-Character Image Identifier (Generic)

Position	**Description**	**Range**
1-7	Image/Product Date The date representing the currency of the image product data; the date the image data was acquired. This date shall be the same as the date recorded in the NITF image subheader IDATIM field.	DDMONYY

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8-11	Mission Number, Primary An alphanumeric code that identifies the collection means for the imagery product. E.g., mission project number, DIA-assigned Project Code, aircraft identifier, etc. The allowed values are constrained to the alphanumeric value range or value list specified for the applicable collection system and its associated production system.	Mission and/or collection system specific. See the specification for the applicable product identification TRE.
12-13	Mission Number, Secondary An alphanumeric code that refines/expands the mission number by providing an 'instance' sequence. E.g., a flight number, a fly-over index/count, a re-visit number, etc.	01 – 09 A1 to A9 B1 to B9 … Z1 to Z9 00
14-16	Image Operation Number The index value (count) of the acquisition or collection task/objective that resulted in this product.	000 to 999
17 – 18	Beginning Image Segment ID A code used in conjunction with other fields in the identifier to characterize multi-segment products. For single-segment products, the value is always 'AA'. For multi-segment products, the value depends on the scope/coverage of the identifier. When the identifier refers to the entire imaging operation, the code is 'AA'. When the identifier refers to a portion of the imaging operation, the code is that of the segment to which the first pixel value in the portion belongs.	AA to ZZ
19 – 20	Reprocess Number A code to differentiate different instances of the same image product resulting from reprocessing of the source data and/or enhancement processing of the originally processed image data. The value '00' indicates the data is the originally processed image. Values in the range '01' through '99' represent subsequent instances of reprocessing or enhancement processing.	00 to 99
21 – 23	Replay Replay indicates whether the data was retransmitted or re-stored to overcome exchange errors. Its value allows differentiation among multiple transmissions or exchanges of the same image product. The value '000' indicates that the data is from the initial exchange. Values in the range 'T01' to 'T99' indicate the instance of retransmission. Values in the ranges 'P01' to 'P99' and 'G01' to 'G99' are reserved for future use.	000, G01 to G99, P01 to P99, T01 to T99
24	Reserved for System Specific Use. The default values for this field are Underscore '_' and the Space character. When using the identifier as a file name, the underscore character is used. Either may be used when the identifier is used within NITF subheader or SDE fields.	Underscore "_" Space Character

25 – 26	Starting Column Block (or Tile) Number The NITF block column index number for the first block of the image segment present in the actual data coverage to which the identifier is applicable. The column count is relative to the start of the segment specified by the Beginning Image Segment ID. The value depends on the scope/coverage of the identifier. When the identifier refers to the entire imaging segment, the code is '01'. When the identifier refers to a portion of the imaging segment, the code is the column index of the block to which the first pixel value in the data coverage belongs. For single block images this field contains 01.	01 - 99
27	Flag1 Reserved for system specific indicator flag. Default value is "0"	0
28 – 31	Starting Row Block (or Tile) Number The NITF block row index number for the first block of the image segment present in the actual data coverage to which the identifier is applicable. The row count is relative to the start of the segment specified by the Beginning Image Segment ID. The value depends on the scope/coverage of the identifier. When the identifier refers to the entire imaging segment, the code is '01'. When the identifier refers to a portion of the imaging segment, the code is the row index of the block to which the first pixel value in the product coverage belongs. For single block images this field contains 00001.	0001 - 9999
32 – 33	Ending Image Segment ID For single-segment products, the value is always 'AA'. For multi-segment products, the value depends on the scope/coverage of the identifier. When the identifier refers to the entire imaging operation, the code is that of the last segment in the imaging operation. When the identifier refers to a portion of the imaging operation, the code is that of the segment to which the last pixel value in the portion belongs.	AA to ZZ
34 – 35	Ending Column Block (or Tile) Number The NITF block column index number for the last block of the image segment present in the actual data coverage to which the identifier is applicable. The column count is relative to the start of the segment specified by the Ending Image Segment ID. The value depends on the scope/coverage of the identifier. When the identifier refers to the entire imaging segment, the code is the last column index in the entire segment. When the identifier refers to a portion of the imaging segment, the code is the column index of the block to which the last pixel value in the data coverage belongs. For single block images this field contains 01.	01 - 99
36	Flag2 Reserved for system specific indicator flag. Default value is "0"	0

37 – 40	Ending Row Block (or Tile) Number The NITF block row index number for the last block of the image segment present in the actual data coverage to which the identifier is applicable. The row count is relative to the start of the segment specified by the Ending Image Segment ID. The value depends on the scope/coverage of the identifier. When the identifier refers to the entire imaging segment, the code is the last row index in the entire segment. When the identifier refers to a portion of the imaging segment, the code is the row index of the block to which the last pixel value in the data coverage belongs. For single block images this field contains 00001.	0001 – 9999

D.2 Fifty-nine (59) Character Product Identifier

Implementation Note: When originally proposed, it was anticipated that both National Technical Means (NTM) and commercial sources would adopt this common identifier, which is derived from the STDIDC TRE. Legacy NTM has stayed with the 40-character ID; future NTM is developing an alternate ID structure. Although commercial sources populate STDIDC TRE, there is no express requirement to derive an image ID from this TRE for use in ITITLE/IID2, FTITLE, or filename. The only association for the 59-character ID as derived from STDIDC, is the use of the 59-character ID in the STREOB TRE for associating imagery pairs or sets. See NITFS Application Summaries for commercial sourced NITF data for description of current practice for commercial image identifiers.

D.2.1 Fifty-nine (59)-Character Naming Convention. This file naming structure consists of a 59-character image identifier followed by suffix extensions as follows:

FFFFFFFFFFFFFFFFFFF…..FFFFFFFFFFFFFFFFFFF.rN_PART_nn_OF_mm.NTF

Where:

FFFF…	The 59-Character Image Identifier (see table B-2).
.NTF	An optional extension to indicate the file is formatted in NITF.
.rN	An extension to indicate the resolution of the image within the file. r0 indicates the image is of original/full resolution. Values of r1 through r9 indicate reduced resolution in factors of 2 (1/2, 1/4, 1/8, 1/16, 1/32, …).
_PART_nn_OF_mm	An extension to indicate that the file is instance “nn” of “mm” total files that comprise the entire product specified by the forty-character identifier. Note: Under some circumstances, the total number of files comprising the entire product may not be known when the files are

initially being produced. In that case, the mm value is set to 00 to indicate the count is unknown. Where possible, the actual count should at least be placed in the last file of the product sequence.

D.2.2 Fifty-nine-Character Image Identifier. The field structure of the 59-character image identifier is shown in Table B-2. The structure provides a means for uniqueness of product identification and for association of multiple files that may comprise a single product. Each NSGI image production system using the 59-character identifier convention places additional product specific constraints on the use of the 59-character identifier. The image/product identifier Tagged Record Extension (TRE) specification applicable to the producing systems (i.e., STDIDC) specifies these additional constraints.

D.2.3 Identifier Field Value Dependency on Data Coverage. Proper population and use of field values used in the identifier depends on the data coverage to which the specific identifier applies. The values for beginning and ending image segments and those for starting and ending block numbers are populated from the perspective of the entire data coverage of the identified imaging operation. When the identifier pertains to an entire imaging operation (e.g., IID2/ITITLE), the segment and block indexes reflect the full extent of the data coverage. When the identifier pertains to a portion of the imaging operation (e.g., FTITLE and filename), the segment and block indexes reflect the relative location in the entire data coverage of the imaging operation that is included in the identified data portion.

Table D-2. 59-Character Image Identifier

Position	Description	Range
1 - 14	Image/Product Acquisition Date and Time The date and UTC time representing the currency of the image product data; the date/time the image data was acquired. This date and time is the same as the date recorded in the NITF image subheader IDATIM field.	YYYYMMDDhhmmss
15 - 18	Mission Number, Primary An alphanumeric code that identifies the collection means for the imagery product. E.g., mission project number, DIA-assigned Project Code, aircraft identifier, etc. The allowed values are constrained to the alphanumeric value range or value list specified for the applicable collection system and its associated production system.	Mission and/or collection system specific. See the specification for the applicable product identification TRE.
19 - 28	Mission Number, Secondary An alphanumeric code that refines/expands the primary mission number with further mission-specific identification. E.g., a mission number from an Air Tasking Order.	Mission and/or collection system specific. See the specification for the applicable product identification TRE.

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29 - 30	Mission Number, Tertiary An alphanumeric code that refines/expands the significance of the previous two mission number fields by providing an 'instance' sequence. E.g., a flight number, a fly-over index/count, a re-visit number, etc.	01 – 09 A1 to A9 B1 to B9 … Z1 to Z9 00
31 - 33	Image Operation Number The index value (count) of the acquisition or collection task/objective that resulted in this product.	000 to 999
34 - 35	Beginning Image Segment ID A code used in conjunction with other fields in the identifier to characterize multi-segment products. For single-segment products, the value is always 'AA.' For multi-segment products, the value depends on the scope/coverage of the identifier. When the identifier refers to the entire imaging operation, the code is 'AA.' When the identifier refers to a portion of the imaging operation, the code is that of the segment to which the first pixel value in the portion belongs.	AA to ZZ
36 - 37	Reprocess Number A code to differentiate different instances of the same image product resulting from reprocessing of the source data and/or enhancement processing of the originally processed image data. The value '00' indicates the data is the originally processed image. Values in the range '01' through '99' represent subsequent instances of reprocessing or enhancement processing.	00 to 99
38 - 40	Replay Replay indicates whether the data was retransmitted or re-stored to overcome exchange errors. Its value allows differentiation among multiple transmissions or exchanges of the same image product. The value '000' indicates that the data is from the initial exchange. Values in the range 'T01' to 'T99' indicate the instance of retransmission. Values in the ranges 'P01' to 'P99' and 'G01' to 'G99' are reserved for future use.	000, G01 to G99, P01 to P99, T01 to T99
41	Reserved for System Specific Use The default values for this field are Underscore '_' and the Space character. When using the identifier as a file name, the underscore character shall be used. Either may be used when the identifier is used within NITF subheader or SDE fields.	Underscore "_" Space Character

42 - 44	Starting Column Block (or Tile) Number The NITF block column index number for the first block of the image segment present in the actual data coverage to which the identifier is applicable. The column count is relative to the start of the segment specified by the Beginning Image Segment ID. The value depends on the scope/coverage of the identifier. When the identifier refers to the entire imaging segment, the code is '01.' When the identifier refers to a portion of the imaging segment, the code is the column index of the block to which the first pixel value in the data coverage belongs. For single block images this field contains 01.	001 - 999
45 - 49	Starting Row Block (or Tile) Number The NITF block row index number for the first block of the image segment present in the actual data coverage to which the identifier is applicable. The row count is relative to the start of the segment specified by the Beginning Image Segment ID. The value depends on the scope/coverage of the identifier. When the identifier refers to the entire imaging segment, the code is '01'. When the identifier refers to a portion of the imaging segment, the code is the row index of the block to which the first pixel value in the product coverage belongs. For single block images this field contains 00001.	00001 - 99999
50 - 51	Ending Image Segment ID For single-segment products, the value is always 'AA.' For multi-segment products, the value depends on the scope/coverage of the identifier. When the identifier refers to the entire imaging operation, the code is that of the last segment in the imaging operation. When the identifier refers to a portion of the imaging operation, the code is that of the segment to which the last pixel value in the portion belongs.	AA to ZZ
52 - 54	Ending Column Block (or Tile) Number The NITF block column index number for the last block of the image segment present in the actual data coverage to which the identifier is applicable. The column count is relative to the start of the segment specified by the Ending Image Segment ID. The value depends on the scope/coverage of the identifier. When the identifier refers to the entire imaging segment, the code is the last column index in the entire segment. When the identifier refers to a portion of the imaging segment, the code is the column index of the block to which the last pixel value in the data coverage belongs. For single block images this field contains 01.	001 - 999

55 - 59	Ending Row Block (or Tile) Number The NITF block row index number for the last block of the image segment present in the actual data coverage to which the identifier is applicable. The row count is relative to the start of the segment specified by the Ending Image Segment ID. The value depends on the scope/coverage of the identifier. When the identifier refers to the entire imaging segment, the code is the last row index in the entire segment. When the identifier refers to a portion of the imaging segment, the code is the row index of the block to which the last pixel value in the data coverage belongs. For single block images this field contains 00001.	00001 - 99999

D.3 Moving Target Indicator (MTI) File Naming Convention

Table D-3. 40-Character Image ID for MTI Files without Image Segments

Position	Description	Range
1-3	MTI	MTI
4 – 17	Date and time of collection DATIME field from MTIRPB TRE.	YYYYMMDDhhmmss
18 – 37	Mission Number AC_MSN_ID field from ACFTB	Mission Name as specified in the AIP ARS to Ground ICD Table 3.3.1.2.6-1.
38 – 40	Spaces	spaces

D.4 CIB/CADRG/RFP Product Identifiers

CIB/CADRG/RFP have product structures that include naming conventions that support those structures. National Geospatial-Intelligence Agency (NGA) produced and NGA outsourced CIB product structure is provided in paragraph D-13.

D.5 DPPDB Product Identifiers

DPPDB has product structure that includes naming conventions that support those structures. The DPPDB specified product structure is provided in paragraph D-14

D.6 DIGEST Geospatial SDE (GeoSDE)

Naming conventions for DIGEST have not been fully developed. Future releases of the IPON will include them as they are established.

D.7 For Systems Using The NTM Set Of SDEs

The governing documents for legacy NTM practice for implementing NITFS is the National Imagery Transmission Format Implementation Requirements Document (NITFIRD). Forthcoming practices are being documented under the auspices of the Future Imagery Architecture (FIA) program.

D.8 For Systems Using The Airborne SDEs (ASDEs)

A new tactical image identifier has recently been established for use by the Airborne Community. See Appendix J.

D.8.1 Management and Tracking of the Imaging Process. Imagery exploitation management systems currently depend on the 40-character product identifier to track the imaging process. Once the imaging collection process is completed, the set of files (one or more) associated with the imaging operation is placed in storage for retrieval. A message is sent to the exploitation management system that the requested imaging operation is complete and product is available for exploitation. The 40-character ID is the means for the management system to identify which file(s) resulted from the task to collect imagery. The following describes the relationship of AIMID, FTITLE, ITITLE/IID2, and the legacy 40-character ID for management of the imaging process. See appendix J for definition and description of a new "Tactical Image Identifier."

D.9 File Name

The file name shall consist of the 57-character identifier contained in the FTITLE field followed by the .NTF extension. The file name represents the actual pixel coverage (in terms of the beginning and ending segment and column/row indexes) in the NITF file.

D.10 For Systems Using The Commercial Set Of SDEs

At the time this document was being published, the commercial providers were developing proposals for common naming conventions.

D.11 For Systems Using The Geospatial Set Of SDEs

Within the DIGEST standard, there is a Standard ASCII Table of Contents (SATOC) that provides a mechanism to provide details about the contents of a DIGEST exchange medium. The file is formatted in ASCII as a colon delimited file. The file uses key words to identify information in an easily readable format. For example, information about the security and collection Area of Interest (AOI) may be contained in the file. Some of the information can be duplicated in NITF headers and sub headers. More information on the SATOC can be found in DIGEST Part 2 Annex E.

D.12 For Systems Using The Raster Product Format (RPF) Set Of SDEs

D.12.1 CIB Format Structure / Naming Conventions. Figure D-1 depicts the CIB directory/file structure. CIB data files are arranged in a hierarchical directory/subdirectory structure. The CIB “root” (RPF) directory contains the Table of Contents (TOC) File, one or more Frame File directories, and one or more Overview images.

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a. The TOC file provides an overview of the data content of the distribution media. It provides path names to each of the Frame Files on the interchange volume. The path names to the Frame Files will be used by user applications software to locate the Frame Files. The <file name> is "A.TOC"

b. CIB producers will choose the number of Frame File directories in a given volume and convention for assigning Frame files to directories. Each of the Frame file directory's on a given interchange volume shall be uniquely named in a manner to be determined by an authorized producer. The producers may also assign nested Frame file directories as needed to organize the Frame files, using a variable hierarchy.

c. The Frame Files contain the tiled image and support data for the geographic frames on a CIB interchange volume. A CIB Frame File includes all NITF and RPF components. Each Frame file shall include the RPF header section, location section, coverage section, compression section, color/grayscale section, image section, optional attribute section, related images section and replace/update section (only present for replacements and updates). The frame file naming convention shall be in accordance with MIL-STD-2411. The <file name> is logically coded as follows: <6-radix><1-edition><1-producer code>.<data series and zone>.

d. One or more Overview images may be provided on CIB interchange media. These indicate graphically where the Frame Files are located with respect to political and ocean boundaries, similar to the Location Diagram on the jewel-box liner. Overview images will be at the same level on the media as the TOC file. Each Overview image shall include a header section, location section, compression section, color grayscale section, and image section.

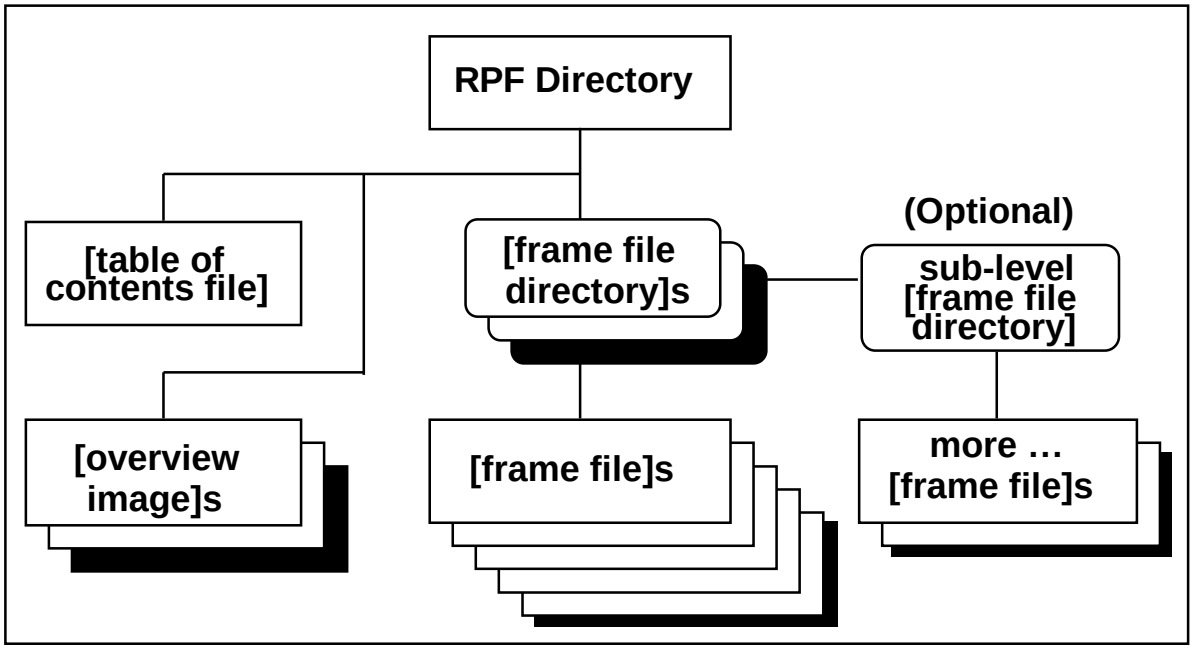

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Figure D-1. CIB Directory/File Structure

D.13 For Systems Using The Digital Point Positioning Data Base (DPPDB) Set Of SDEs

D.13.1 DPPDB Format Structure. Figure D-2 depicts the sequential arrangement of a DPPDB. The first file is the Master Product File, with numerous subheader files that provide information about the DPPDB and the reference graphic. Following the Master Product File (MPF) are the files that comprise the reference graphic frames. The rest of the files contained on the DPPDB are image files.

a. The MPF contains a directory of the image files on the tape, the reference graphic directory, and the exploitation product support data that applies to the entire product. Figure D-3 shows the file structure of the MPF, showing only the primary components of the file.

b. The reference graphic files are unmodified CADRG frame files. They are extracted from the CADRG media and recorded to the DPPDB product tape without further processing.

c. The files following the reference graphic files contain single compressed images and the associated support data for each of the overview and full resolution data set images comprising the DPPDB. The image files are arranged in groups of four (left and right overview image segments, followed by the full resolution left and right image segments), with each group pertaining to a single DPPDB model. Figures D-4 and D-5 shows the file structure for the overview and full resolution image segments.

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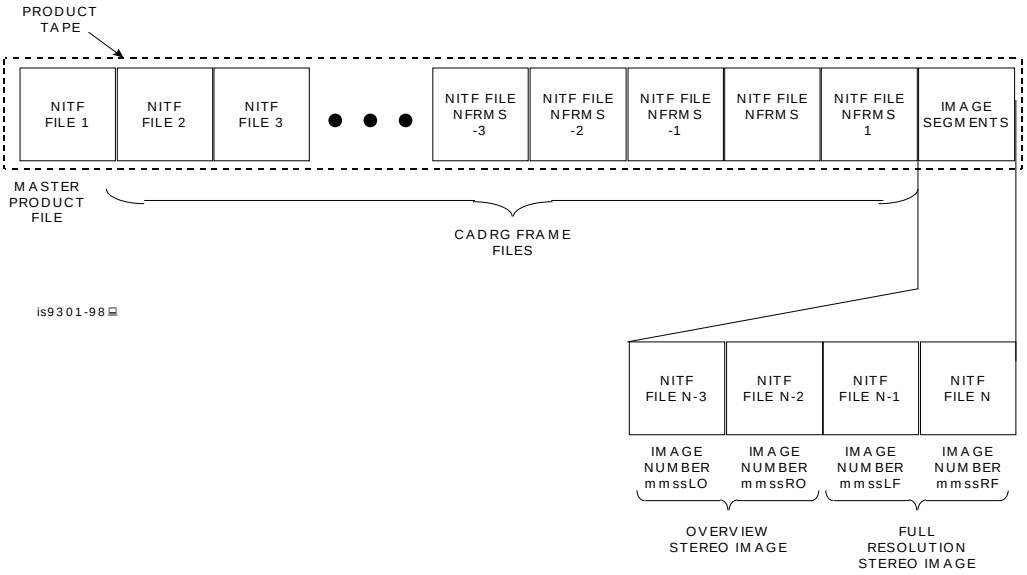

Figure D-2. DPPDB File Organization

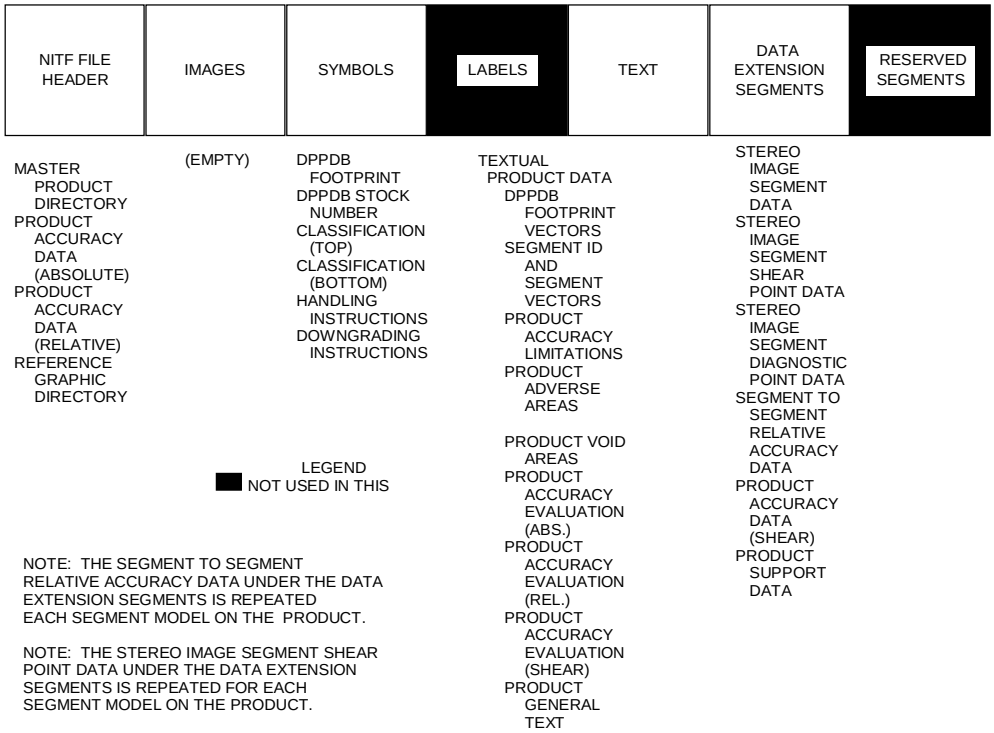

Figure D-3. Master Product File Structure

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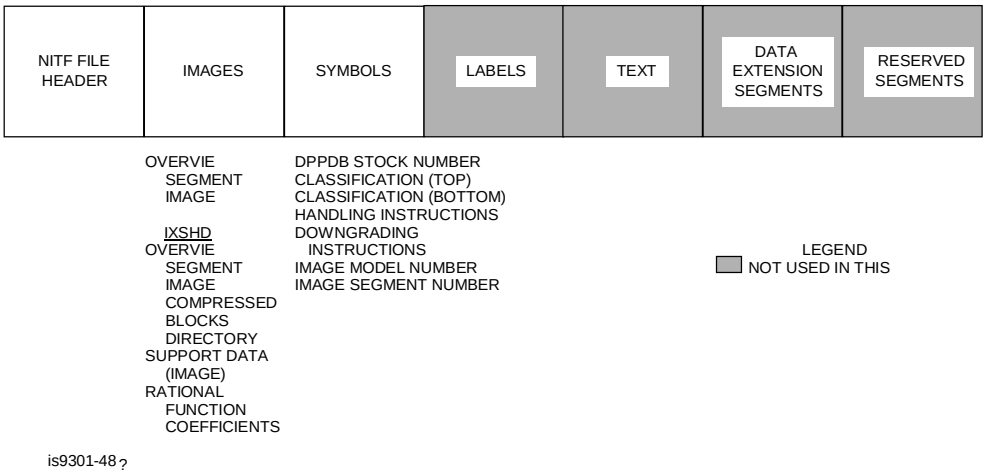

Figure D-4. DPPDB Overview Segment Image File

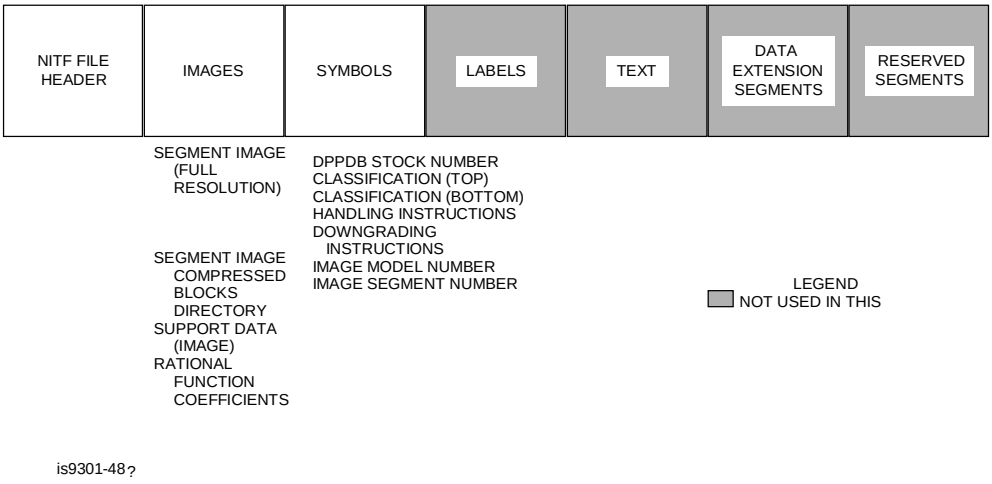

Figure D-5. DPPDB Full Resolution Image File

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Appendix E -- Chipping

E.0 General

This appendix provides information on the chipping process in the National Imagery Transmission Format Standard (NITFS). Chipping, in the context of this document, refers to a subset of image pixels, *and* a full complement of metadata, that has been extracted from another full or partial image. When *properly* organized and structured, the resulting "chip," along with other supporting data (explained later) provides enough "intelligence" to allow imagery users and exploiters to extract information from the pixel subset with the *same* degree of confidence and accuracy as if they were operating within the realm of the original, full imaging operation. Accordingly, an "intelligent" image chip is more than just a dumb "happy snap." In addition to satisfying visual needs, the intelligent chip provides the means for extracting or determining such things as geo-positions, distances, elevations, etc. These activities require an indexing scheme to convert "row and column" pairs within in a chip displayed on a screen to "line and sample" pairs within the original full image product.

For ease of understanding, future references to image "chipping" or "chips" in this appendix implies an intelligent process or subset of image pixels as just described.

E.1 Types of Image Chips

Two categories of image chips are generally recognized: Primary (Unexploited) and Secondary (Exploited). Implementations may support either or both forms of imagery chipping.

E.1.1 Primary/Unexploited Imagery Chipping

Implementations supporting this form of chipping typically cut chips on Fast Access Format (FAF), or image tile, boundaries. Chips cut in this manner will not have been exploited or altered in any way -- the resulting chip is simply a subset of pixels from the original unaltered image and normally will be the only image (IM) segment in the resulting NITF file. Chip files of this nature are characteristic of those produced by the National Geospatial-Intelligence Agency's (NGA's) Dissemination Element (DE). Although it is not generally required nor in common practice, producers of such chips are, however, encouraged to also include a properly completed ICHIPx Tagged Record Extension (TRE) (discussed later) in the image's IXSHD area, to promote a broader interoperability scope.

E.1.2 Secondary/Exploited Imagery Chipping

Implementations supporting this form of chipping will typically cut chips from any location ("pixel bound" as opposed to FAF/tile bounds) within the original image. Chips of this nature are characteristic of those produced by the Electronic Light

Tables (ELTs) or other similar exploitation applications. In addition to the image chip, other exploitation data (segments) such as annotations, textual information, etc., may be included in the NITF file.

E.2 Chipping Paradigms

Whenever pixels are extracted or chipped from another image, a means must be incorporated that enables any recipient of the chip to determine where in the original imaging operation the chip originated. This enables the user to perform functions such as mensuration or geo-positioning within the chip in the same manner as the full image. Regardless of the chipping paradigm employed, all perform the same function: to enable the recipient/interpreter to reference the chip's corresponding location in the original imaging operation.

Currently, there are three acknowledged methodologies for structuring and producing NITF image chips. All are capable of providing the same level of accuracy and confidence; however, only two are officially supported and endorsed by the NGA community. It is not uncommon to encounter products that employ all three means within the same NITF file/image segment. It should be noted, however, when such a practice is implemented, all chipping paradigms must be consistent and in harmony with each other.

E.2.1 ICHIPx Tagged Record Extension (TRE)

The NGA-preferred and endorsed means for recording pixel-boundary-chipping information is the ICHIPx TRE. The ICHIPx TRE evolved from the I2MAPD TRE (discussed below), beginning as ICHIPA. Subsequent minor modifications to the ICHIPA brought about the current version, ICHIPB. All NITF producers and interpreters should support the ICHIPB, and if necessary for backward compatibility, the ICHIPA.

In addition to recording pixel/grid boundaries/indices of the chip and those corresponding to the original, full image, the ICHIPB scan block origin and anamorphic correction, as required, and the full image's size.

Developers of new systems are encouraged to place the ICHIPB in all products whether or not they are chips. This helps foster proper use of the TRE, unambiguous image dimension information, and allows for other recording of other actions such as anamorphically corrected reduced resolution data sets (RRDSs).

Use, application, and implementation information related to the ICHIPB TRE can found in NGA document STDI-0002, *Compendium of Controlled Extensions (CE) for the National Imagery Transmission Format (NITF),*

E.2.2 Fast Access Format (FAF)

"FAF chipping" is a practice whereby a chipping TRE is not needed to determine the chip's origin in the original full image space. This practice requires "encoding" the original image's dimensions (usually in 1024x1024 tile/block multiples) within an image ID that is placed in the ITITLE field of the NITF image subheader. This same information can usually be found in any TRE that stores additional image identification data such as the AIMIDB. Then, using the same image ID and re-encoding the new FAF corners of the chip, the new image ID representing the chip is placed in the FTITLE field of the NITF file. Hence, by applying the chip's FAF cornerpoints to the original image, LINEs and SAMPLEs in the full image space can be derived for the chip.

Developers of new applications are discouraged from producing chip files based on the FAF-boundary paradigm just described. New interpreters may consider implementing this paradigm for legacy support reasons only.

E.2.3 I2MAPD Tagged Record Extension (TRE)

The I2MAPD TRE is a legacy product of the Image Data Exploitation (IDEX) system era. It was developed by the Lockheed Martin Corporation (LMCO) to support pixel-bound chipping. It also maintains provisions for information related to image warping, corner-point latitudes and longitudes, and resolution.

Originating as a "proprietary" TRE, it is not endorsed or supported by NGA. Although not encouraged, some systems have elected to implement the I2MAPD in conjunction with other aforementioned means for a more robust, backward compatible, chipping capability.

There is no known official documentation of the I2MAPD, other than a 1995 User's Guide produced by the LMCO IDEX Program Office. Copies of this .PDF document are available from the JITC NITF Lab, if necessary.

E.3 Support Data

E.3.1 National Technical Means (NTM)

Support Data Extensions (SDEs) in the National community are generally treated as sacred material, never to be altered for any reason. Such a practice is not known to be documented anywhere -- it is simply an accepted trait of the community. Accordingly, consumers of NTM imagery can process such products with a reasonably high degree of confidence that the image's support data is "as collected" and not likely to have been altered.

Unaltered support data from the sensor to the exploiter minimizes the processing burden on the original and subsequent "producers" of the image data due to the simple "pass it along" philosophy. In this paradigm, processing complexity falls to the interpreter. It is up to the receiver consider such things as chip-to-full image

location, scaling, etc., and make appropriate allowances when applying unaltered support data from the "as collected," full resolution image.

E.3.1.1 NTM Support Data Dependencies

As previously stated, NTM support data is traditionally never altered and NITF interpreters tend to expect it in that manner. However, should NITF implementations believe it to be necessary to alter this information, the following precautions are provided.

The practice of altering support data is not encouraged and failure to heed the following precautions may result in interoperability problems, false exploitation conclusions, or other unexpected anomalies. This information is provided and based upon observations and capabilities currently practiced in the community.

To be able to exploit image chips in the same manner as the full/source image from which a chip was obtained, there are known dependencies between the chipping process (FAF, ICHIPx, or I2MAPD) and the associated support data in the following (current version) Tagged Record Extensions (TREs).

- STDIDB - Full/source image ID and dimensions for RULER mensuration.
- MPD03B - RULER mensuration.
- MPD26A - RULER mensuration.
- RPC00A - RULER mensuration.
- CSD31A - RULER mensuration.
- IMBLKB - RULER mensuration.

If alterations are made to the content of any of the above TREs, the altering system must ensure that results obtained from the new TRE contents are the same as those that would have been obtained from the unaltered data. Additionally, similar metadata may appear in different locations in a NITF file, and if changes are made in one area, there must be corresponding changes in all other areas, to maintain consistency within the entire NITF file.

E.3.2 Tactical/Airborne

The Airborne Community has elected to provide producers the option to pass support data along "as collected" or altered (recalculated) to correspond to processing actions (chipping, scaling, etc.). This philosophy is inferred in the Airborne Support Data Extensions (ASDEs) area of NGA document STDI-0002, whereby guidance on recalculation is offered.

While confidence in data may be eroded, and processing burdens increased for producers, in the recalculation paradigm, the interpreter's job is eased since everything has been properly adjusted to *appear* as if the image was collected as presented.

E.4 Other Information

To the maximum extent possible, chips should retain as much of the source image's "historical" information as possible. An application that produces chips should retain all of the original header information to the point that it does not provide false or other misleading characteristics about the product. For example, retaining the original image ID allows the chip recipient to retrieve the full image if additional/adjacent areas of interest are desired. Another example is the image source. Regardless of subsequent processing, the pixels that are in the chip will always have been captured by the same sensor that captured the full image. Maintaining as much of the original information as possible is important from a historical perspective, yielding much about the lineage or pedigree of the product.

E.5 NITF Compliance

Technical and general information regarding implementation, formal assessment, test criteria, etc., is present in the ICHIPB chapter in NGA document STDI-0002.

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Appendix F -- NITFS Format Conversion Services

F.1 INTRODUCTION

F.1.1 Purpose. To describe recommended practices for NITFS imagery related format translation or conversion services to assist developers and users of Imagery Exploitation Systems and Archive/Dissemination Applications. Appendix G separately covers converting security fields between NITF version 2.0 and NITF version 2.1 formats.

F.1.2 Scope. The translation/conversion services identified herein provide a starting point to assist developers in understanding the technical considerations for implementing format conversion services while taking into account the targeted user community, system requirements, standards compliance, and interoperability objectives. Though the identified translations/conversions are primarily focused on NITF 2.0 and NITF 2.1, the developer can use the information as a guide for converting TFRD, TIFF, Sun Raster, and JPEG to either NITF 2.0 or NITF 2.1 and vice versa. Implementers should be aware that many NITF 2.1 file features cannot be converted to NITF 2.0 or other file formats because the features are not available in those formats. If all features in NITF2.1 could be converted to NITF2.0, there would be no need for NITF2.1. Hence, the user implementations must be upgraded to an NITF 2.1 capability that supports these features if the users have a real need for them.

This appendix addresses the following translation/conversion services:

- NITF2.0 to NITF2.1
- NITF2.1 to NITF2.0
- NITF to JPEG, SunRaster, TIFF, GeoTIFF (TBD003)
- JPEG, SunRaster, TIFF, GeoTIFF to NITF (TBD004)
- Feature Conversions within NITF Image Segments (TBD005):
    - Change of compression
    - Change of precision (bit-depth)
    - Change of resolution
    - Change of blocking (tiling) factor
    - Change of band (component) interleave
    - Change of-image representation (e.g., color to grayscale)

F.1.3 Background. Testing of format conversion services in the past has often surfaced inconsistencies when attempting to convert NITF products (files). Applications have routinely shown conversion inconsistencies as follows:

1. Lost Image Segments. When requesting image-related conversion services for a file with multiple image segments, all segments except the first image segment are lost.

2. Applying Conversion To All Image Segments. The conversion service attempts to apply the selected image conversion service characteristics for the first

image segment to all image segments in the file regardless of the different characteristics of individual image segments.

3. Display and Attachment Level. The service does not take into account the difference in the use of Display and Attachment Levels in relationship to the common coordinate system between the NITF 1.1, NITF 2.0, and NITF 2.1 file formats.

4. Bit-mapped Symbol Segments. The service incorrectly converts bit-mapped symbol segments supported in NITF 2.0 to some other graphic or image format. (Note: Continued use of bit-mapped symbol segments within NITF 2.0 files is highly discouraged. NITF 2.1 does not allow the use of bit-mapped symbol/graphic segments.)

5. Label Segments. The service incorrectly converts label segments supported in NITF 2.0 to some other graphic or image format. (Note: Continued use of label segments within NITF 2.0 files is highly discouraged. NITF 2.1 does not allow the use of label segments.)

6. JPEG Quantization/Huffman Tables. The service fails to embed the appropriate JPEG Quantization and Huffman tables when converting from NITF 2.0 JPEG compressed image segments that only contain references to external default Quantization/Huffman tables.

7. Bi-Level Images. The service incorrectly converts 1-bit-per-pixel non-compressed image segments supported in NITF 2.1.

8. CGM Version. The service incorrectly converts MIL-STD-2301A CGM features supported in NITF 2.1 to the earlier MIL-STD-2301 set of features supported in NITF 2.0.

9. Conversion to Less-Capable Formats. The service fails to identify unsupported NITF 2.0 image features when converting to NITF 2.0 from NITF 2.1.

- Non-integer images. The CLEVEL constraints for NITF 2.0 only allow for binary and unsigned integer data. NITF 2.1 CLEVELs allow for binary, unsigned integer, signed integer, floating point real, and complex pixel values.

- Masked images. NITF 2.0 only allowed block and pixel masks with non-compressed (NM) and VQ-compressed (M4) pixel data. NITF 2.1 extends the application of block and pixel masks to additional compression options.

- Integer Images. Mishandling of images with characteristics other than those with Actual-Bits-Per-Pixel (ABPP) of 8-, 11-, or 12-bit and having an Image Compression (IC) of non-compressed (NC) or JPEG lossy compressed (C3).

10. Text Segment Encoding. Failure to identify unsupported NITF 2.0 text formats of UT1 and U8S when converting from NITF 2.1.

F.1.4 Implementation Considerations. The following implementation considerations should be used when implementing translation/conversion services:

1. Routinely converting NITF 2.0 products to NITF 2.1 may not always be necessary as implementations supporting NITF Version 2.1 (MIL-STD-2500B) are backward compatible with NITF 2.0 applications. Basic reasons to consider converting NITF2.0 to NITF2.1 include:

- Migration of archive holdings to the latest version of NITF to promote future readability of the data (i.e., to avoid the potential for 'digital amnesia' for reading older data formats as the digital data holdings age.)

- Merging data segments from NITF2.0 data holdings with data segments from newer collections, especially when the newer data has characteristics not supported in NITF2.0. Therefore, this appendix provides guidance on conversion from NITF 2.0 to NITF 2.1.

2. The rationale for providing NITF 2.1 to NITF 2.0 conversion services is to allow users without NITF 2.1 capable applications to access some varieties of NITF 2.1 data that may reside in libraries or other holdings. NITF 2.0 does not support many NITF 2.1 features. Consequently not all NITF 2.1 files can be converted to NITF 2.0. Current NITF 2.0 user applications must be upgraded to NITF 2.1 applications if the users have a need for the newer features.

3. Image Libraries and similar network service providers often provide on-demand format conversion services. Through their client interface, users can request data holdings be delivered according to user-specified format and parameter options. The user can explicitly select conversion parameters for each selected product (file), or typically, the user can define pre-set parameters for exporting data from the library. For example, regardless of the various data formats/options of data files in the library, the user may set up a template to always deliver the data in a specific format (e.g., NITF2.0), with images at a specific precision (e.g., 8-bit-per-pixel) and compression (JPEG quality level 3), a specific resolution, etc. In this case, the service provider is obliged to look at the format and parameters of the requested data holdings and attempt to convert or reform the data to match the default user-prescribed parameters. In many instances, the user is primarily interested in assuring their interpret/read application (perhaps a commercial ELT) can properly present and use the data and does not want to repeatedly select delivery options for every product (file) retrieved from the library. They are not necessarily interested that the data be delivered exactly as specified in the template, especially if the default template causes data to be corrupted upon delivery.

Since NITF2.1 capable user applications (ELTs) can read NITF2.0, it may be more timely and efficient to deliver NITF2.0 holdings as NITF2.0 unless the user expressly requests conversion to NITF2.1. Perhaps the client interface for the default delivery options could include the means to indicate the degree of effort desired by the client to be applied to selected conversion services. For example, the user could set up the export options to routinely deliver data as NITF2.1 at a specific bit-depth precision and at a specific JPEG compression option. The interface could then provide the user options for dealing with NITF2.0 data holdings. The NITF2.0 data can be:

- Delivered 'as is,'
- Converted to NITF2.1 template options if the data consists of only a single image segment, or
- Do a best effort to convert all NITF2.0 data with possibility of delivering corrupted data in some complex data structure instances.

4. NITF2.1 does not directly support NITF2.0 Label Segments and bit-mapped Symbol Segments. However, for many conversions between NITF 2.0 and NITF 2.1, the visual representation displayed to the user can remain identical in appearance even though the internal segment representations may be different. This is a result of differences in file formats that can be successfully converted from one supported segment type to another. Label Segments can be converted to Graphic/Symbol Segments using the text capabilities within CGM, and bit-mapped Symbol Segments can be converted to 1-bit-per-pixel Image Segments.

5. Following conversion services, the resulting product must faithfully represent the information content of the original data product given the requested conversion service requested by the user. Otherwise, intervention is warranted to alert the user that the conversion may result in the unexpected loss of information beyond that requested by the user. For example, a user requesting a lower resolution of an image segment expects the information loss that comes with a reduced resolution image, but they would not expect information loss of support data, image or graphic overlays, text reports or other data segments that may be in the original NITF product (file).

F.2 SUGGESTIONS/RECOMMENDATIONS. The following are suggestions and recommendations for developers. The goal is to create NITF files that are both compliant with the standards and that correctly represent the intent of the original data producer. Tables F-1 through F-4 deal with file level and data source considerations. Tables F-5 through F-11 address the mapping of individual data fields within NITF 2.0 and NITF 2.1 file formats.

F.2.1 Segment Data Conversions.

F.2.1.1 NITF 2.0 to NITF 2.1. NITF 2.1 compliance requires backward compatibility to read/interpret NITF 2.0 formatted data. However, table F-1 is provided to assist developers in understanding the imported data fields in the conversion process. (E.g., batch updates of old data holdings to ensure future interpretability, etc.) Table F-1 identifies potential segment exportability considerations. Developers should consider not converting NITF 2.0 files containing bit-mapped symbol segments and/or label segments to NITF 2.1 files since these features are not directly supported in NITF 2.1. Conversion of the information content in these segment types can be accomplished, but it takes a significant programming effort to do so correctly. Converting these NITF 2.0 segments to NITF 2.1 segments requires bit-mapped symbol segments to become image segments and label segments to become CGM graphic segments. This results in additional verification of data segment structures to ensure the converted segments are compliant. Given the potential pitfalls of these types of conversions, other alternatives should be considered before implementing.

Table F-1. File Level Conversions From NITF 2.0 to NITF 2.1

Segments	Exportability	Comments
Image Segments	All	All varieties of NITF 2.0 Image Segments can be converted to NITF 2.1 with appropriate subheader adjustments. Subheader fields that need to be adjusted include: IDATIM, Security fields, ICORDS
Symbol Segments	CGM All	CGM Symbol Segments can be moved “As-Is” to NITF 2.1 Graphic Segments with appropriate subheader adjustments. Subheader fields that need to be adjusted include: Security fields
	Bit-mapped Symbols are not supported in NIT2.1. Conversion requires change from Symbol Segment format to Image Segment format.	Bit Mapped Symbol Segments may be converted to 1-bit-per-pixel Image Segmentss. This conversion will require generating a new image segment subheader and perhaps look-up table(s) and a pixel mask table with transparency option.
Label Segments	Label Segments are not Supported in NITF 2.1. Conversion requires change from Label Segment Format to Graphic Segment Format.	Label Segment content can be converted to CGM and placed in Graphic/Symbol Segments. This conversion will require using CGM text, auxiliary color, and transparency elements. This conversion will also require generating a new Graphic Segment subheader.
Text Segments	All	Text Segments can be moved “As-Is” with appropriate subheader adjustments. Subheader fields that need to be adjusted include: TXTALVL, TXTDT, Security fields

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Table F-1. File Level Conversions From NITF 2.0 to NITF 2.1

Segments	Exportability	Comments
Data Extension Segments	All	DES segment can be moved "As-Is" with appropriate subheader adjustments to include the DESTAG field. For NITF2.0, the only known producers of NITF data that use DESs are: CIB, CADRG, and DPPDB. Both the 'Controlled Extensions' DESTAG and the ''Registered Extensions' DESTAG are changed to the ''TRE_OVERFLOW' DESTAG use in NITF2.1. Unlike NITF2.0, both controlled and registered extensions overflowing from the same data segment may be comingled in a single TRE_OVERFLOW DES for that data segment.

F.2.1.2 NITF 2.1 to NITF 2.0. Table F-2 are provided to help the Software Developer understand the NITF 2.1 data types that are supported in NITF 2.0.

Table F-2. File Level Conversions From NITF 2.1 to NITF 2.0

Segments	Exportability	Comments
Image Segments	Limited	Both Image Representation and Image Compression field values play significant roles in determining which NITF2.1 Image Segments may successfully be converted to NITF 2.0 Image Segments. From the perspective of IREP value, NITF2.1 Image Segments with the following characteristics can be converted to NITF2.0 Image Segments with appropriate subheader adjustments: IREP / PVTYPE / NBPP / NBANDS MONO / INT, B / 1, 8, 16 / 1 RGB/LUT / INT, B / 1,8 / 1 RGB / INT / 8 / 3 YCbCr / INT / 8 / 3 MULTI / INT / 8, 16 / 4 From the perspective of compression code, NITF2.1 Image Segments with the following characteristics can be converted to NITF2.0 Image Segments with appropriate subheader adjustments: Compression / PVTYPE / NBPP / NBANDS NC / INT, B / 1, 8, 16 / 1, 3, 4 NM / INT / 8 / 1 JPEG DCT / INT / 8, 12 / 1, 3 JPEG Lossless / INT / 2-12 / 1 DS JPEG / INT / 8 / 1 Bi-Level / B / 1 / 1 VQ (C4/M4) / INT / 8 / 1

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Table F-2. File Level Conversions From NITF 2.1 to NITF 2.0

Segments	Exportability	Comments
Graphic Segments	Limited	NITF 2.1 Graphic Segments containing only CGM attributes supported in MIL-STD-2301 may be converted into NITF 2.0 Symbol Segments with appropriate subheader adjustments. Note: The CGM Identifier element may need to be edited to reflect Mil-Std-2301. NITF2.1 Graphic Segments containing MIL-STD-2301A CGM attributes not supported by the earlier standard (2301) cannot be coverted into NITF2.0 files. The following 2301A CGM elements or attributes not compatible with NITF2.0: - Auxiliary color - Transparency - Polygon Sets - Hatch Index - Edge width limited to 0, 2, 4, 6 pixels in 2.0 - Line Type dotted, dash-dot, dash-dot-dot - Character height limited to 35 pixels in 2.0
Text Segements	Limited	NITF 2.1 Text Segments with TXTFMT of STA or MTF moved “As-Is” with appropriate subheader adjustments NITF 2.1 Text Segments with TXTFMT of UT1 or U8S cannot be converted into an NITF 2.0 file.
Data Extension Segment	None	NITF 2.1 Data Extension Segments cannot be converted into NITF 2.0 files.

F.2.2 Header/Subheader Conversions.

F.2.2.1 File Header. Table F-3 describes file header to file header conversion considerations.

Table F-3. NITF Header Mappings

Field	Description	Size	Format Values NITF 2.0	Type	Mapping	Format Values NITF 2.1	Type
FHDR	File Type & Version	9	NITF02.00	R	Change	NITF02.10 or NSIF01.00	R
CLEVEL	Compliance Level	2	01-06 99 (when file size exceeds 2Gbyte limit for CLEVEL 06)	R	Possible Change, based on CLEVEL definitions.	03, 05, 06, 07, 09	R
STYPE	System Type	4	4 Spaces (Reserved)	O	Change	BF01	R
OSTAID	Originating Station ID	10	Alphanumeric (May not be all spaces)	R	Possible Change	BCS-A (May not be all spaces)	R
FDT	File Date & Time	14	DDHHMMSSZMONYY	R	Change	CCYYMMDDhhmmss	R
FTITLE	File Title	80	Alphanumeric	O	“As-Is”	UT-1 (default is all spaces)	R
FSCLAS	File Security Classification	1	T, S, C, R, or U	R	“As-Is”	T, S, C, R, or U	R
Security	Covered in Appendix G	166	See Appendix G	-	See Appendix G	See Appendix G	*
ENCRYP	Encryption	1	0 = Not Encrypted (This field must contain the value 0)	R	“As-Is”	0 = Not Encrypted (This field must contain the value 0)	R
FBKCG	File Background Color	3	0x00 to 0xFF	R	“As-Is” NITF 2.0 to NITF 2.1.	Unsigned Binary integer (0x00-0xFF, 0x00-0xFF, 0x00-0xFF in Red, Green, Blue order	R
ONAME	Originator's Name	27	Alphanumeric	O	“As-Is”	UT-1 (default is all spaces)	O
OPHONE	Originator's Phone Number	18	Alphanumeric	O	“As-Is”	BCS-A (default is all spaces)	O
FL	File Length	12	Numeric	R	Possible Changes based on segment changes.	Numeric	
HL	NITF Header Length	6	Numeric	R	Possible Changes based on segment changes.	Numeric	R

Legend:

R = Required O = Optional C = Conditional * = field does not exist ** = size of data field

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Table F-3. NITF Header Mappings (cont.)

Field	Description	Size	Format Values NITF 2.0	Type	Mapping	Format Values NITF 2.1	Type
NUMI	Number of Image Segments	3	Numeric	R	Possible Changes based on segment changes.	Numeric	R
LISH001	Length of Nth Image Subheader	6	Numeric	C	Possible Changes based on subheader changes.	Numeric	C
LInnn	Length of Nth Image	10	Numeric	C	Possible Changes based on segment changes.	Numeric	C
NUMS	Number of Graphic Segments	3	Numeric	R	Possible Changes based on segment changes.	Numeric	R
LSSH001	Length of Nth Graphic Subheader	4	Numeric	C	Possible Changes based on subheader changes.	Numeric	C
Lsnnn	Length of Nth Graphic	6	Numeric	C	Possible Changes based on segment changes.	Numeric	C
NUML / NUMX	Number of Label Segments	3	Numeric, if conversion required must be changed to CGM Graphics.	R	Change for 2.0 to 2.1 conversion if conversion service for labels is supported.	Not allowed in NITF 2.1, must always be “000."	R
LLSH001	Length of Nth Label Subheader	4	Numeric	C		N/A	*
LLnnn	Length of Nth Label	3	Numeric	C		N/A	*

Legend:

R = Required O = Optional C = Conditional * = field does not exist ** = size of data field

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Table F-3. NITF Header Mappings (cont.)

Field	Description	Size	Format Values NITF 2.0	Type	Mapping	Format Values NITF 2.1	Type
NUMT	Number of Text Segments	3	Numeric	R	“As-Is” on allowed changes.	Numeric, note only STA and MTF files can be converted, all other text types cannot be converted to NITF 2.0.	R
LTSH001	Length of Nth Text Subheader	4	Numeric	C	Possible Changes based on subheader changes.	Numeric	C
LTnnn	Length of Nth Text	5	Numeric	C	“As-Is” on allowed changes.	Numeric	C
NUMDES	Number of DES Segments	3	Numeric	R	Changes	Numeric, Note only NITF 2.0 to NITF 2.1 changes are allowed. No NITF 2.1 files containing DES will be converted to NITF 2.0.	R
LDSH001	Length of Nth DES Subheader	4	Numeric	C	Changes based on subheader format.	Numeric	C
LDnnn	Length of Nth DES	9	Numeric	C	“As-Is”	Numeric	C
NUMRES	Number of RES Segments	3	Numeric must be “000." Segment currently not allowed.	R	“As-Is”	Numeric must always be “000." Segment currently not allowed.	R
UDHDL	User Defined Header Data Length	5	Numeric	R	“As-Is”	Numeric	R
UDHOFL	User Defined Header Overflow	3	A numeric value conversion only allowed ifn this value is “000."	C	Will not be converted	A numeric value conversion only allowed if this value is “000."	C
UDHD	User Defined Header Data	**	TREs	C	“As-Is”	TREs	C
XHDL	Extended Header Data Length	5	Numeric	R	“As-Is”	Numeric	R
XHOFL	Extended Header Overflow	3	A numeric value conversion only allowed if this value is “000."	C	Will not be converted	A numeric value conversion only allowed ivf this value is “000."	C
XHD	Extended Header Data	**	TREs	C	“As-Is”	TREs	C

Legend:

R = Required O = Optional C = Conditional * = field does not exist ** = size of data field

F.2.2.2 Image Subheader. Table F-4 lists suggestions/recommendations for image to mage conversions between NITF formats, if the developer has a real need to convert NITF 2.0 bit-mapped symbols to NITF 2.1 images see paragraph F-2.2.3.

Table F-4. NITF Image Subheader Mappings

Field	Description	Size	Format Values NITF 2.0	Type	Mapping	Format Values NITF 2.1	Type
IM	File Part Type	2	IM	R	"As-Is"	IM	R
IID/IID1	Image ID	10	BCS-A non-blank; User defined	R	"As-Is"	BCS-A non-blank; User defined	R
IDATIM	Image Date & Time	14	DDHHMMSSZMONYY	O	"As-Is" for date, but format change is needed.	CCYYMMDDhhmmss	R
TGTID	Target ID	17	BBBBBBBBBBOOOOOCC	O	"As-Is"	BBBBBBBBBBOOOOOCC	R
ITITLE/IID2	Image IID	80	BCS-A (Default is spaces)	O	"As-Is"	BCS-A (Default is spaces)	R
ISCLAS	File Security Classification	1	T, S, C, R, or U	R	"As-Is"	T, S, C, R, or U	R
Security	Covered in Appendix G	166	See Appendix G	*	See Appendix G	See Appendix G	*
ENCRYP	Encryption	1	0 = Not Encrypted (This field must contain the value 0)	R	"As-Is"	0 = Not Encrypted (This field must contain the value 0)	R
ISORCE	Image Source	42	Alphanumeric	O	"As-Is"	Alphanumeric	R
NROWS	Number of Significant Rows in image	8	00000064-00065536 (Based on CLEVEL)	R	"As-Is"	00000064-00065536 (Based on CLEVEL), NITF 2.1 allows larger image sizes, but conversions are restricted to this range.	R
NOCLS	Number of Significant Columns in image	8	00000064-00065536 (Based on CLEVEL)	R	"As-Is"	00000064-00065536 (Based on CLEVEL), NITF 2.1 allows larger image sizes, but conversions are restricted to this range.	R
PVTYPE	Pixel value type	3	INT, B	R	"As-Is"	INT, B (Other pixel value types are allowed, but should not be converted.)	R

Legend:

R = Required O = Optional C = Conditional * = field does not exist ** = size of data field

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Table F-4. NITF Image Subheader Mappings (cont.)

Field	Description	Size	Format Values NITF 2.0	Type	Mapping	Format Values NITF 2.1	Type
IREP	Image Representation	8	Alphanumeric Mono, RGB, RGB/LUT, YCbCr601, MULTI	R	“As-Is”	Alphanumeric Mono, RGB, RGB/LUT, YCbCr601, MULTI (Other image representations are allowed, but should not be converted.)	R
ICAT	Image Category	8	VIS, EO, IR, SAR, MS other values allowed, but will not be converted.	R	“As-Is”	VIS, EO, IR, SAR, MS other values allowed, but will not be converted.	R
ABPP	Actual Bits-per-pixel Per Band	2	01, 08, 11 through 16	R	“As-Is," with exception of 12-bit Non-compressed with NPBB 0f 12-bit.	01, 08, 11 through 16, other values allowed, but will not be converted. Also, only 01 bit bi-level will be converted, and 12-bit Non-compressed with an NBPP of 12-bit will be converted to NITF 2.0 12-bit with NBPP of 16-bit.	R
PJUST	Pixel Justification	1	R	R	“As-Is”	R	R
ICORDS	Image Coordinate System	1	U, G, C, or N, values vary between file formats, correct representation must be assigned.	R	Change to correct coordinate representation.	U, G, N, S, D or (Default is spaces). Values vary between file formats correct representation must be assigned.	R
IGEOLO	Image Geographic Location	60	ddmmssXdddmmssY (4 times) or ggXYZmmmmmmmmmm (4 times)	C	Preserve, but format may change.	±dd.ddd±ddd.ddd (4 times) ddmmssXdddmmssY(4 times) or zzBJKeeeeennnnn (four times) or zzeeeeeennnnnn (4 times)	C
NICOM	Number of Image Comments	1	0-9	R	“As-Is”	0-9	R
ICOMn	Image Comment N	80	Alphanumeric	C	“As-Is”	Alphanumeric	C
IC	Image Compression	2	NC - No Compression, C1- Bi-Level, C3 - JPEG, other values allowed, but will not be converted.	R	“As-Is”	NC - No Compression, C1- Bi-Level, C3 - JPEG, other values allowed, but will not be converted.	R

Legend:

R = Required O = Optional C = Conditional * = field does not exist ** = size of data field

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Table F-4. NITF Image Subheader Mappings (cont.)

Field	Description	Size	Format Values NITF 2.0	Type	Mapping	Format Values NITF 2.1	Type
COMRAT	Compression Rate Code	4	C1 1D, 2DS, 2DH C3 xx.y Only convertible values. Note: NITF 2.0 files with default table, tables must be embedded for conversion to NITF 2.1.	C	Bi-level “As-Is," For JPEG either “As-Is” or conversion to NC.	C1 1D, 2DS, 2DH C3 xx.y Only convertible values.	C
NBANDS	Number of Bands	1	1, 3, or 4, ?others allowed?, but will not be converted.	R	“As-Is”	1, 3, or 4, others allowed, but will not be converted.	R
IREPBANDnn	nnth Band Component Representation	2	R, G, B, N, Y, Cb, Cr, spaces	R	“As-Is,”	M, R, G, B, N, Y, Cb, Cr, spaces	R
ISUBCATnn	nnth Band Subcategory	6	Alphanumeric - (Default 6 spaces)	R	“As-Is”	Values other than spaces allowed for non-convertible variations.	R
IFCnn	nnth Band Image Filter Condition	1	N	R	“As-Is”	N	R
IMFLTnn	nnth Band STD Image Filter Code	3	Reserved – 3 spaces	R	“As-Is”	Reserved - 3 spaces	R
NLUTSnn	nnth Band Number of LUTS	1	0, 1 or 3	C	“As-Is”	0, 1 or 3, other values allowed, but will not be converted.	C
NELUTnn	nnth Band Number of LUT Entries	5	For 1 or 3 LUTS move “As-Is."	C	“As-Is”	For 1 or 3 LUTS move “As-Is."	C
LUTDnnn	nnth Band Data of the mth LUT	*	For 1 or 3 LUTS move “As-Is."	C	“As-Is”	For 1 or 3 LUTS move “As-Is."	C
ISYNC	Image Sync Code	1	0	R	“As-Is”	0	R
IMODE	Image Mode	1	B, P, S	R	IMODE R must be changed, other optional or “As-Is."	B, P, S, R	R
NBPR	Number of blocks per row	4	0001-0256	R	NITF 2.0 to NITF 2.1 “As-Is." For NITF 2.1 to NITF 2.0 adjusted	0001-9999	R
NBPC	Number of blocks per column	4	0001-0256	R		0001-9999	R

Legend:

R = Required O = Optional C = Conditional * = field does not exist ** = size of data field

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Table F-4. NITF Image Subheader Mappings (cont.)

Field	Description	Size	Format Values NITF 2.0	Type	Mapping	Format Values NITF 2.1	Type
NPPBH	# of pixels per block (horiz.)	4	0064-8192 for single blocked images. For blocked images, 0008, 0016, 0032, 0064, 0128, 0256, 0512, 1024.	R	interleave and blocking assignments.	0001-8192	R
NPPBV	# Of pixels per block (vert.)	4	0064-8192 for single blocked images, 0008, 0016, 0032, 0064, 0128, 0256, 0512, 1024.	R		0001-8192	R
NBPP	# Of bits-per-pixel per band	2	01, 08, 12, 16	R	“As-Is” except for NITF 2.1 12-bit non-compressed, will be changed to 16-bit.	01, 08, 12, 16, other values allowed, but will not be converted.	R
IDLVL	Display Level	3	001-999	R	“As-Is”	001-999, Note, conversion to 2.0 will not be done if 2.1segment with lowest Display Level is not located (ILOC) at 0,0.	R
IALVL	Attachment Level	3	001-998	R	“As-Is”	001-998	R
ILOC	Image Location	10	RRRRRCCCCC	R	“As-Is”	RRRRRCCCCC	R
IMAG	Image Magnification	4	Alphanumeric	R	“As-Is”	BCS-A	R
UDIDL	User Defined Subheader Data Length	5	Numeric	R	“As-Is”	Numeric	R
UDOFL	User Defined Subheader Overflow	3	A numeric value conversion only allowed if this value is “000."	C	Will not be converted	A numeric value conversion only allowed if this value is “000."	C
UDID	User Defined Subheader Data	**	TREs	C	“As-Is”	TREs	C
IXSHDL	Extended Subheader Data Length	5	Numeric	R	“As-Is”	Numeric	R
IXSOFL	Extended Subheader Overflow	3	A numeric value conversion only allowed if this value is “000."	C	Will not be converted	A numeric value conversion only allowed if this value is “000."	C

Legend:

R = Required O = Optional C = Conditional * = field does not exist ** = size of data field

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Table F-4. NITF Image Subheader Mappings (cont.)

Field	Description	Size	Format Values NITF 2.0	Type	Mapping	Format Values NITF 2.1	Type
IXSHD	Extended Subheader Data	**	TREs	C	“As-Is”	TREs	C

Legend:

R = Required O = Optional C = Conditional * = field does not exist ** = size of data field

F.2.2.3 Bit-Mapped Symbols to Images Subheader Requirements. This conversion is not recommended, but Table F-5 shows suggestions/recommendations for converting NITF 2.0 Bit-Mapped Symbol Segments to NITF 2.1 Image Segments if/when this conversin service is required.

Table F-5 NITF Symbol to Image Subheader Mappings

Field	Description	Size	Mapping	Field	Description	Size	Format Values NITF 2.1	Type
SY	File part type	2	Change to IM	IM	File Part Type	2	IM	R
SID	Symbol id	10	To Image ID	IID1	Image ID	10	BCS-A non-blank; User defined	R
*	*	*	To all dashes.	IDATIM	Image Date & Time	14	All dashes	R
*	*	*	To all spaces	TGTID	Target ID	17	All spaces	R
SNAME	Symbol name	20	To IID2 first 20 characters, remaining are spaces.	IID2	Image IID	80	BCS-A (Default is spaces)	R
SSCLAS	Symbol security classification	1	To ISCLAS	ISCLAS	File Security Classification	1	T, S, C, R, or U	R
Security	Covered in Appendix G	166	To image security	Security	Covered in Appendix G	166	See Appendix G	*
ENCRYP	Encryption	1	To image ENCRYP	ENCRYP	Encryption	1	0 = Not Encrypted (This field must contain the value 0)	R
*	*	*		ISORCE	Image Source	42	Alphanumeric	R
STYPE	Symbol type	1	For Bit-mapped only, no mapping	*	*	*	*	*
NLIPS	Number of lines per symbol	4	Maps to both NROWS and NPPBV	NROWS	Number of Significant Rows in image	8	00000001-00008192	R
NPIXPL	Number of pixels per line	4	Maps to both NCOLS and NPPBH	NCOLS	Number of Significant Columns in image	8	00000001-00008192	R
*	*	*	Most be set to B	PVTYPE	Pixel value type	3	B	R

Legend:

R = Required O = Optional C = Conditional * = field does not exist ** = size of data field

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Table F-5 NITF Symbol to Image Subheader Mappings (cont.)

Field	Description	Size	Mapping	Field	Description	Size	Format Values NITF 2.1	Type
*	*	*	To Mono or RGB/LUT based on SCOLOR.	IREP	Image Representation	8	Mono, or RGB/LUT	R
*	*	*	Default to VIS.	ICAT	Image Category	8	VIS.	R
NBPP	Number of bits-per-pixel	1	Set both ABPP and NBPP to “01."	ABPP	Actual Bits-per-pixel Per Band	2	01	R
*	*	*	Default to ‘R."	PJUST	Pixel Justification	1	R	R
*	*	*	Default to “ “ space hex 0x20.	ICORDS	Image Coordinate System	1	space	R
*	*	*	Default to “0."	NICOM	Number of Image Comments	1	0-9	R
*	*	*	Normal NC, but NM, if transparent pixels.	IC	Image Compression	2	NC, NM	R
*	*	*	Defaults to “1."	NBANDS	Number of Bands	1	1	R
*	*	*	Either M if IREP Mono or LU if IREP is RGB/LUT	IREPBANDnn	nnth Band Component Representation	2	M, LU	R
*	*	*	Default 6 spaces.	ISUBCATnn	nnth Band Subcategory	6	6 spaces	R
*	*	*	Default to “N."	IFCnn	nnth Band Image Filter Condition	1	N	R
*	*	*	Default 3 spaces.	IMFLTnn	nnth Band STD Image Filter Code	3	3 spaces	R
*	*	*	For Mono 0 or 3 for RGB/LUT	NLUTSnn	nnth Band Number of LUTS	1	0 or 3	C
*	*	*	For RGB/LUT will be set to “00002."	NELUTnn	nnth Band Number of LUT Entries	5	Set to “00002."	C
*	*	*	Two colors based on SCOLOR	LUTDnnn	nnth Band Data of the mth LUT	*	Based on R, O, B or Y of SCOLOR.	C
*	*	*	Default to “0."	ISYNC	Image Sync Code	1	0	R
*	*	*	Default to “B”	IMODE	Image Mode	1	B	R

Legend:

R = Required O = Optional C = Conditional * = field does not exist ** = size of data field

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Table F-5 NITF Symbol to Image Subheader Mappings (cont.)

Field	Description	Size	Mapping	Field	Description	Size	Format Values NITF 2.1	Type
*	*	*	Default to “0001."	NBPR	Number of blocks per row	4	0001-9999	R
*	*	*	Default to “0001."	NBPC	Number of blocks per column	4	0001-9999	R
*	*	*	Maps from NPIXPL.	NPPBH	# of pixels per block (horiz.)	4	0001-8192	R
			Maps from NLIPS.	NPPBV	# Of pixels per block (vert.)	4	0001-8192	R
*	*	*	Default to “01."	NBPP	# Of bits-per-pixel per band	2	01	R
SDLVL	Display level	3	Copy to IDLVL “As-Is."	IDLVL	Display Level	3	001-999	R
SALVL	Attachment level	3	Copy to IALVL “As-Is."	IALVL	Attachment Level	3	001-998	R
SLOC	Symbol location	10	Copy to ILOC “As-Is."	ILOC	Image Location	10	RRRRRCCCCC	R
*	*	*	Default to “ 1.0."	IMAG	Image Magnification	4	“ 1.0”	R
*	*	*	Default to “00000."	UDIDL	User Defined Subheader Data Length	5	“00000”	R
SLOC2	Second symbol location	10	Not used.	*	*	*	*	*
SCOLOR	Symbol color	1	Used to determine image IREP, IC, LUT, and presence of pixel mask table for transparency.	*	*	*	*	*
SNUM	Symbol number	6	Not used.	*	*	*	*	*
SROT	Symbol rotation	3	Not used.	*	*	*	*	*
NELUT	Number of LUT entries	3	Not used.	*	*	*	*	*
SXSHDL	Extended Subheader data length	5	Map to IXSHDL.	IXSHDL	Extended Subheader Data Length	5	Numeric	R
SXSOFL	Extended Subheader overflow	3	Map to IXSOFL.	IXSOFL	Extended Subheader Overflow	3	Numeric	C

Legend:

R = Required O = Optional C = Conditional * = field does not exist ** = size of data field

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Table F-5 NITF Symbol to Image Subheader Mappings (cont.)

Field	Description	Size	Mapping	Field	Description	Size	Format Values NITF 2.1	Type
SXSHD	Extended Subheader Data	**	Map to IXSHD	IXSHD	Extended Subheader Data	**	TREs	C

Legend:

R = Required O = Optional C = Conditional * = field does not exist ** = size of data field

F.2.2.4 NITF 2.0 Symbol Subheader to NITF 2.1 Graphic Subheader for CGM. Table F-6 shows suggestions/recommendations for mapping between NITF 2.0 Symbol subheaders and NITF 2.1 Graphic subheaders when the symbol is in CGM format.

Table F-6 Graphic Subheaders Mappings

Fields	Description	Size	Format Values NITF 2.0	Type	Mapping	Format Values NITF 2.1	Type
SY	File part type	2	SY	R	Map “As-Is”	SY	R
SID	Symbol id	10	Alphanumeric (May not be all spaces)	R	Map “As-Is”	Alphanumeric (May not be all spaces)	R
SNAME	Symbol name	20	Alphanumeric	O	Map “As-Is”	Alphanumeric	R
SSCLAS	Symbol security classification	1	T, S, C, R, or U	R	Map “As-Is”	T, S, C, R, or U	R
Security	Covered in Appendix G	166	Covered in Appendix G	O	Covered in Appendix G	Covered in Appendix G	R
ENCRYP	Encryption	1	0=NOT ENCRYPTED (This value must be 0)	R	Map “As-Is”	0=NOT ENCRYPTED (This value must be 0)	R
STYPE / SFMT	Symbol type	1	C=CGM	R	Map “As-Is”	C=CGM	R
NLIPS	Number of lines per symbol	4	“0000”	R	Map “As-Is."	*	*
NPIXPL	Number of pixels per line	4	“0000”	R	Map “As-Is."	*	*
NWDTH	Line width	4	“0000”	R	Map “As-Is."	*	*
NBPP	Number of bits-per-pixel	1	“0” for CGM symbols	R	Map “As-Is."	*	*
SRES1	*	*	*	*	See previous 4 values.	Must be “0000000000000."	R
SDLVL	Display level	3	001-999	R	Map “As-Is."	001-999	R
SALVL	Attachment level	3	000-998	R	Map “As-Is."	000-998	R
SLOC	Symbol location	10	RRRRRCCCCC	R	Map “As-Is."	RRRRRCCCCC	R
SLOC2	Second symbol location	10	RRRRRCCCCC	O	*	*	-

Legend:

R = Required O = Optional C = Conditional * = field does not exist ** = size of data field

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Table F-6 Graphic Subheaders Mappings (cont.)

Fields	Description	Size	Format Values NITF 2.0	Type	Mapping	Format Values NITF 2.1	Type
SCOLOR	Symbol color	1	Hex 0x20 Space	R	*	*	*
SNUM	Symbol number	6	000000	O	*	*	*
SROT	Symbol rotation	3	000	R	*	*	*
NELUT	Number of LUT entries	3	000	R	*	*	*
DLUT	Symbol LUT data	*	(NEVER APPEAR)	C	*	*	*
SBND1	*	*	*	*	Calculate based on upper left location of Graphic	RRRRRCCCCC	R
SCOLOR	*	*	*	*	Map to “C."	C for color.	R
SBNDS2	*	*	*	*	Calculate based on lower right location of Graphic	RRRRRCCCCC	R
SRES2	*	*	*	*	Map to “00."	Default to “00."	R
SXSHDL	Extended Subheader data length	5	00000-99999	R	Map “As-Is."	00000-99999	R
SXSOFL	Extended Subheader overflow	3	000-999	C	Map “As-Is."	000-999	C
SXSHD	Extended Subheader Data	**	TREs	C	Map “As-Is."	TREs	C

Legend:

R = Required O = Optional C = Conditional * = field does not exist ** = size of data field

F.2.2.5 Labels to Graphics Subheader Requirements. This conversion is not recommended, but Table F-7 shows suggestions/recommendations for converting NITF 2.0 labels to NITF 2.1 CGM graphics if required by the sponsoring organization. The label character(s) along with the Label Text Color (LTC) and the Label Background Color (LTB) must be used in creating the CGM graphic elements to be included in the CGM graphic segment.

Table F-7 Label Subheader to Graphic Subheader

Fields	Description	Size	Mapping	Fields	Description	Size	Format Values NITF 2.1	Type
LA	File part type	2	Map to SY	SY	File part type	2	SY	R
LID	Label Id	10	Map “As-Is” to SID.	SID	Graphic Identifier	10	Alphanumeric (May not be all spaces)	R
				SNAME Leave all Spaces or create default.	Graphic name	20	Alphanumeric	R
LSCLAS	Label security classification	1	Map “As-Is” to SSCLAS.	SSCLAS	Graphic security classification	1	T, S, C, R, or U	R
Security	Covered in Appendix G	166	Covered in Appendix G	Security	Covered in Appendix G	166	Covered in Appendix G	R
ENCRYP	Encryption	1	Map “As-Is” to ENCRYP	ENCRYP	Encryption	1	0=NOT ENCRYPTED (This value must be 0)	R
STYPE / SFMT	Symbol type	1	Map “As-Is”	SFMT	Graphic type	1	C=CGM	R
LFS	Label Font Style	2	Not used.	*	*	*	*	*
LCW	Label cell width	2	Not used.	*	*	*	*	*
LCH	Label cell height	2	Not used.	*	*	*	*	*
*	*	*	Create as “0000000000000."	SRES1	*	*	Must be “0000000000000."	R
LDLVL	Display level	3	Map to SDLVL.	SDLVL	Display level	3	001-999	R
LALVL	Attachment level	3	Map to SALVL.	SALVL	Attachment level	3	000-998	R
LLOC	Label location	10	Map to SLOC.	SLOC	Graphic location	10	RRRRRCCCCC	R

Legend:

R = Required O = Optional C = Conditional * = field does not exist ** = size of data field

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Table F-7 Label Subheader to Graphic Subheader (cont.)

Fields	Description	Size	Mapping	Fields	Description	Size	Format Values NITF 2.1	Type
LTC	Label text color	3	Used to create text color element in CGM segment.	*	*	*	*	*
LTB	Label background color	3	Used to create auxiliary color element in CGM segment.	*	*	*	*	*
*	*	*	Calculate based on upper left location of Graphic	SBND1	First Graphic Bound Location	*	RRRRRCCCCC	R
*	*	*	Map to “C."	SCOLOR	Graphic Color	*	C for color.	R
*	*	*	Calculate based on lower right location of Graphic	SBNDS2	Second Graphic Bound Location	*	RRRRRCCCCC	R
*	*	*	Map to “00."	SRES2	*	*	Default to “00."	R
LXSHDL	Extended Subheader data length	5	Map “As-Is."	SXSHDL	Extended Subheader data length	5	00000-99999	R
LXSOFL	Extended Subheader overflow	3	Map “As-Is."	SXSOFL	Extended Subheader overflow	3	000-999	C
LXSHD	Extended Subheader Data	**	Map “As-Is."	SXSHD	Extended Subheader Data	**	TREs	C

Legend:

R = Required O = Optional C = Conditional * = field does not exist ** = size of data field

F.2.2.6 NITF 2.0 Text Subheader to NITF 2.1 Text Subheader. Table F-8 shows suggestions/recommendations for mapping Text subheaders.

Table F-8 Text Subheaders Mappings

Fields	Description	Size	Format Values NITF 2.0	Type	Mapping	Format Values NITF 2.1	Type
TE	File part type	2	TE	R	Map “As-Is”	TE	R
TEXTID	Text id	10/7	Alphanumeric (May not be all spaces)	R	Map first 7 bytes “As-Is” to NITF 2.1. Map 7 bytes NITF 2.1 to first 7 bytes of NITF 2.0.	Alphanumeric (May not be all spaces)	R
TXTALVL	*	*	*	*	Map NITF 2.1 3 bytes to bytes 8, 9 & 10 of NITF 2.0 TEXTID. When creating NITF 2.1 from NITF 2.0 map to “000."	000-998	
TXTDT	Text data and time	14	DDHHMMSSZMONYY	O	Map “As-Is” except for format change.	CCYYMMDDhhmmss	R
TXTITL	Text title	80	Alphanumeric		Map “As-Is."	Alphanumeric	
TSCLAS	Text security classification	1	T, S, C, R, or U	R	Map “As-Is."	T, S, C, R, or U	R
Security	Covered in Appendix G	166	Covered in Appendix G	O	Covered in Appendix G	Covered in Appendix G	R
ENCRYP	Encryption	1	0=NOT ENCRYPTED (This value must be 0)	R	Map “As-Is."	0=NOT ENCRYPTED (This value must be 0)	R
TXTFMT	Text format	3	STA or MTF	R	Map “As-Is," STA and MTF only.	STA or MTF, others allowed, but will not be converted.	R
TXSHDL	Extended Subheader data length	5	00000-99999	R	Map “As-Is."	00000-99999	R
TXSOFL	Extended Subheader overflow	3	000-999	C	Map “As-Is."	000-999	C

Legend:

R = Required O = Optional C = Conditional * = field does not exist ** = size of data field

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Fields	Description	Size	Format Values NITF 2.0	Type	Mapping	Format Values NITF 2.1	Type
TXSHD	Extended Subheader Data	**	Alphanumeric	C	Map “As-Is."	Alphanumeric	C

Legend:

R = Required O = Optional C = Conditional * = field does not exist ** = size of data field

F.2.2.7 NITF 2.0 DES Subheader to NITF 2.1 DES Subheader. Table F-9 shows suggestions/recommendations for mapping DES subheader, it is recommended that only NITF 2.0 to NITF 2.1 mapping be supported.

Table F-9 DES Subheaders Mappings

Fields	Description	Size	Format Values NITF 2.0	Type	Mapping	Format Values NITF 2.1	Type
DE	File part type	2	DE	R	Map “As-Is”	DE	R
DESTAG	UNIQUE DES TYPE IDENTIFIER	25	Registered Extensions Or Controlled Extensions	R	Map to “TRE_OVERFLOW." Note: Do not attempt to map NITF2.1 DES to NITF2.0.	TRE_OVERFLOW	R
DESVER	VERSION OF THE DATA FIELD DEFINITION	2	01-99	R	Map “As-Is."	01-99	
DESCLAS	DES security classification	1	T, S, C, R, or U	R	Map “As-Is."	T, S, C, R, or U	R
Security	Covered in Appendix G	166	Covered in Appendix G	O	Covered in Appendix G	Covered in Appendix G	R
DESOFLW	OVERFLOWED HEADER TYPE	6	UDHD, XHD, UDID, IXSHD, SXSHD, LXSHD, TXSHD	R	Map “As-Is."	UDHD, XHD, UDID, IXSHD, SXSHD, TXSHD	R
DESITEM	DATA ITEM OVERFLOWED	3	000-999	R	Map “As-Is."	000-999	R
DESSDL	Extended Subheader data length	4	00000	R	Map “As-Is."	00000	R
DESXSHD	Extended Subheader Data	**	Omit conditional fielld	C	Map “As-Is."	Omit conditional fielld	C

Legend:

R = Required O = Optional C = Conditional * = field does not exist ** = size of data field

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Appendix G -- Security Field Conversion/Mapping

G-1 INTRODUCTION

G-1.1 Purpose.

Describe common practices regarding transliteration of Security Field values between versions 2.0 and 2.1 of the National Imagery Transmission Format Standard (NITFS).

G-1.2 Scope

These security field transliteration practices provide a starting point for establishing a security marking and transliteration plan for implementation of the NITFS (U.S. classification system only). They do not supplant or override security marking policies, procedures, or directives applicable to specific implementing systems or facilities. Implementers and facility managers should consult with the designated security authorities to ensure their system and/or facility security practices comply with current security policies and directives. The conversions between the NITFS and other formats (e.g., SUN Raster, TIFF, JFIF, GIF, PNG, etc.) are not addressed since those formats have no standard metadata provisions for security markings. Proper population and transliteration of NITFS security fields is pertinent to imagery production, dissemination, archiving (libraries), exploitation, automated data guards and their related security implementation policies.

G-1.3 Background

The security field structure and definitions in NITF 2.1 were changed from those in NITF 2.0 to accommodate E. O.12958. There is no direct and easy mapping of data values for all instances of possible security markings between the two field structures. Although population of security fields is very consistent from original source producers (well-known sources), security field population of derived (exploited) classified products varies greatly among operational sites. Since imagery systems are migrating from NITF 2.0 to NITF 2.1, there are present and future requirements to make imagery format conversions within the imagery community. Proper handling of the security fields is critical when performing format conversion services. The practices in this appendix were initially developed in support of the Image Product Library (IPL) program in response to a request for assistance from the developer.

G-1.4 Assumptions

The transliteration practices are based on the following assumptions.

G-1.4.1 The requirement for NITF 2.1 to NITF 2.0 conversions is the greatest.

G-1.4.2 It is beneficial to the community to be able to convert as much data with varying security markings as possible.

G-1.4.3 Most of the original classified NITF 2.0 data is from a group of well-known sources. Since these data sources have known and consistent means of marking security fields, a more simple set of rules for transliteration can be defined.

G-1.4.4 In the near-term most of the original classified NITF version 2.1 data will be generated by airborne sources. Early guidance to these data producers in how best to populate security fields may minimize the impact of NITF 2.1 to NITF 2.0 transliterations that operationally need to be supported.

G-1.4.5 There are now secondary producers of NITF 2.1 products that may vary widely. So preservation of data during conversions is not guaranteed, even if guidance is provided to the airborne community as mentioned above.

G-2 DISCUSSION

To facilitate format conversions, a transliteration scheme and policies are needed for the security fields. In some cases the security fields map one-for-one while in other cases the data does not readily map. As a result there are two major issues: 1) providing developers rules for making the conversions, and 2) resolving policy issues that arise from making conversions between formats where the circumstances do not allow a full and unhindered mapping of all security marking data. The following is an attempt to bring to light the conversion issues.

G-2.1 NITF 2.1 to NITF 2.0

Operationally, most NITF 2.1 data in the near term will be generated by the airborne community (primarily collateral markings), Shuttle Radar Topography Mission data (Unclassified, but limited distribution) and the commercial satellite companies (Unclassified). This situation should generally allow for direct mapping to NITF 2.0 with minor exceptions. Translation will be somewhat more complex when control system/codeword markings are needed, but the complexity can be mitigated by establishing guidelines for marking data that will be facilitate transition from NITF 2.0 to NITF 2.1.

G-2.2 NITF 2.0 to NITF 2.1

Operationally most original source classified NITF 2.0 data is from well-known sources. Generally there are only two fields that do not readily map one-for-one between an NITF 2.0 generated files and NITF 2.1. It should be possible to establish translation rules for markings that come from well-known sources.

G-2.3 Exceptions

Finally, it may be best in some complex marking cases to prohibit, through policy, some format conversions where the security fields do not all map to an acceptable degree. The disadvantage is that it may constrain the movement of data within the community. As an alternative, when a server receives a conversion request where security enhancement related data (such as downgrading information) will be lost,

the user could be notified of the potential loss and be allowed to accept or refuse the converted file.

G-2.4 Recommended Practices

Table G-1 provides the recommended practices for populating NITF 2.0 security fields for compliance with E. O. 12958. The field specific guidelines in Table G-1 are designed to ease transliteration of NITF 2.0 security fields to NITF 2.1 security fields and postures users of NITF 2.0 for an eventual transition to NITF 2.1. Tables G-2 and G-3 outline suggested near-term transliteration practices for the NITF 2.1 to 2.0 and NITF 2.0 to 2.1 conversion cases. These practices are based on what is believed to be the preponderance of data being produced now and in the near future.

G-3 CONCLUSION

The discussion above is a brief overview of some specific problems regarding the overall security issues, it is not comprehensive on the subject. The issues and proposed practices primarily address the near-term since system developers need guidance now. Action is needed to develop long-term plans/solutions regarding the security issues of which conversions constitutes a portion.

Table G-1. NITF 2.0 Security Fields Application Guidelines for E. O. 12958

FIELD	NAME/DESCRIPTION	SIZE	VALUE RANGE	TYPE
xSCLAS	**Security Classification** This field shall contain a valid value representing the classification level of the entire file, or the applicable portion (segment) within the file. Valid values are T (=Top Secret), S (=Secret), C (=Confidential), R (= Restricted), U (=Unclassified).	1	T, S, C, R, or U	R
xSCODE	**Codewords** When applicable, this field shall contain a valid indicator of the SCI Control System and associated Sub-Category/Codewords as applicable. A hyphen character is used following a Control System identifier to link sub-category/codeword codes with the system identifier as a character string. A single slash character is used to separate SCI control system identifier strings. When this field is all spaces, no SCI Control Systems (and associated codewords) apply to the data.	40	Alphanumeric For ease of transliteration to NITF 2.1 security fields, only the first 11 characters of this field shall be populated. Therefore, abbreviations authorized for portion marking shall be used. Format Examples: AAA BB CC BB/CC/AAA BB-D/CC BB-D-EEE/CC	O

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Table G-1. NITF 2.0 Security Fields Application Guidelines for E. O. 12958 (cont)

FIELD	NAME/DESCRIPTION	SIZE	VALUE RANGE	TYPE
xSCTLH	**Control and Handling** When applicable, this field shall contain a valid Dissemination Control Marking. Valid values are as listed in the Control Markings Register. When this field is all spaces, no dissemination control and handling instructions apply.	40	Alphanumeric For ease of transliteration to NITF 2.1 security fields, only the first 2 characters of this field shall be populated. Examples: DS LIMDIS FO For Official Use Only OC ORCON NF NOFORN PR PROPIN RS RSEN See Control Markings Register for currently applicable codes.	O
xSREL	**Releasing Instructions** This field shall contain a valid list of countries and/or groups of countries to which the data is authorized for release. Valid items in the list are one or more of the following separated by single spaces (ASCII 32, decimal) within the field: country codes and groupings that are digraphs in accordance with FIPS PUB 10-4. When this field is all spaces, no file release instructions apply.	40	Alphanumeric Digraph values indicating individual countries, or groupings of countries, (separated by space characters). See FIPS PUB 10-4	O
xSCAUT	**Classification Authority** This field shall contain a valid identifier (code) of the Classification Authority Type, the Classification Reason code, and shall identify the classification authority. The codes shall be in accordance with the regulations governing the appropriate security channel(s). When this field is all spaces, no file classification authority applies (i.e., xSCLAS = U or R).	20	Alphanumeric l_n_mmmmmmmmmmmmmmmm Where: l = Classification Authority Type Code (O, D, M) where: O = Original Class. Authority D = Derived, single source M = Derived, multiple sources n = Classification Reason, values A to G referencing appropriate classification reason from E. O. 12958. mmmmmmmmmmmmmmmm = Identification of the classification authority.	O
xSCTLN	**Security Control Number** This field shall contain a valid security control number (alphanumeric) associated with the data. The format of the security control number shall be in accordance with the regulations governing the appropriate security channel(s). When this field is all spaces, no file security control number applies.	20	Alphanumeric	O

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Table G-1. NITF 2.0 Security Fields Application Guidelines for E. O. 12958 (cont)

FIELD	NAME/DESCRIPTION	SIZE	VALUE RANGE	TYPE
xSDWNG	**Security Downgrade** This field shall contain a valid indicator that designates the point in time at which a declassification or downgrading action is to take place. The valid values are (1) the code "999999" when the originating agency's determination is required (OADR), and (2) the code "999998" when a specific event determines at what point declassification or downgrading is to take place. When this field is all spaces, no security downgrade/declassification condition applies.	6	Alphanumeric Spaces (xSCLAS = U or R) 999999 (OADR) 999998 (Field xSDEVT contains security downgrade/declassification information.	O
xSDEVT	**Downgrading Event** If the Security Downgrade field (xSDWNG) equals "999998," this field shall be present and shall contain a valid specification of the downgrade event. If this field is present and all spaces, it shall imply that an error exists. Valid values for the event specification depend on the type of event. (See value range field.)	40	Alphanumeric Six possible field structures: 1. DD_CCYYMMDD 2. DE_kkkk

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Table G-2. NITF 2.0 TO NITF 2.1 Security Field Transliteration/Mapping (Last updated 26 May 2000)

FIELD (2.0)	DESCRIPTION	SIZE	VALUE (generic "codes" used here to graphically show transliteration of data)	NITF 2.1	DESCRIPTION	SIZE	Value (generic "codes" used here to graphically show transliteration of data)	Remarks
xSCLASS	Security Classification	1	a	xSCLASS	Security Classification	1	a	Direct Map
				xSCLSY	Security Classification System	2	US	Only US
xSCODE	Codewords	40	bbbbbbbbbbbbbbbbbbbb bbbbbbbbbbbbbbbbbbbb	xSCODE	Codewords	11	bbbbbbbbbbb	Problem field (15 usually used by 2.0 producers) If 2.0 field has codewords convert to corresponding digraphs allowed in 2.1. If codewords do not translate to approved digraph or exceeds 11 characters then make a "no conversion" decision (or manual override if human decision needed.
XSCTLH	Control and Handling	40	cccccccccccccccccccccc cccccccccccccccccc	xSCTLH	Control and Handling	2	CH	Problem Field Propose overflowing into xCLTX If a single codeword used in 2.0 field then convert to valid digraph. If there is no valid digraph or multiple digraphs then place "CH" and overflow digraphs, or other control and handling to xCLTX field.
XSREL	Releasing Instructions	40	dddddddddddddddddddd dddddddddddddddddddd	xSREL	Releasing Instructions	20	dddddddddddddddddddd	2.0 producers usually populate with spaces however, potential data loss if NITF 2.1 file xREL field exceeds 20 characters. Converters may abbreviate where possible, if data is lost from NITF 2.1-field xREL then make a "no conversion decision" (or allow manual override if human decision needed.)
xSCAUT	Classification Authority	20	eeeeeeeeeeeeeeeeeeee					Direct map to 2.1 xSCAUT
xSCTLN	Security Control Number	20	fffffffffffffffffffff					See xSCTLN below

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Table G-2. NITF 2.0 TO NITF 2.1 Security Field Transliteration/Mapping (Last updated 26 May 2000) (cont'd)

FIELD (2.0)	DESCRIPTION	SIZE	VALUE (generic "codes" used here to graphically show transliteration of data)	NITF 2.1	DESCRIPTION	SIZE	Value (generic "codes" used here to graphically show transliteration of data)	Remarks
xSDWNG	Security Downgrade	6	gggggg					No matter what value is in 2.0 field xSDWNG (or when data does not map cleanly) set the 2.1 field xSDG to O for OADR to force a manual review. Could also make declass in 10 years as a default. NOTE: this option allows for a cleaner conversion back to 2.0 if done later. Need to add "O" as code in NITF 2.1 (xSDG) N-105 for OADR
xSDEVT	Downgrading event	40	hhhhhhhhhhhhhhhhhhhh hhhhhhhhhhhhhh					No mapping required (Usually not used) If used however data goes in to xCLTX preceded by GE_
				xSDCTP	Declassification Type	2	Default	Data usually not present in 2.0 (If a downgrade was indicated in the 2.0 file from C with no other restrictions then the declassification fields xSDCDT could be used rather then downgrade fields in the 2.1 file.
				xSDCDT	Declassification Date	8	Default	Data usually not present in 2.0
				xSDCXM	Declassification Exemption	4	Default	Data usually not present in 2.0
				xSDG	Downgrade	1	Default	Map as one classification lower if a downgrade date or event in NITF 2.0. (In any case Downgrade action should be forced to a human decision)
				xSDGDT	Downgrade Date	8	Default	If date in 2.0 field xSDWNG then map to here converting 2 digit year to 4 digit year

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Table G-2. NITF 2.0 TO NITF 2.1 Security Field Transliteration/Mapping (Last updated 26 May 2000) (cont'd)

FIELD (2.0)	DESCRIPTION	SIZE	VALUE (generic "codes" used here to graphically show transliteration of data)	NITF 2.1	DESCRIPTION	SIZE	Value (generic "codes" used here to graphically show transliteration of data)	Remarks
				xCLTX	Classification Text	43	CH_cccccccccccccccc GE_hhhhhhhhhhhhhhhh hhh	Propose transliterating with data from 2.0 fields xSCTLH using code CH, and for Downgrade/declass event use CODE GE or DE to start downgrade/declass event, if data does not fit then make a "no conversion decision" (or let requester override and allow conversion any way)
				xSCATP	Classification Authority Type	1	Default	Data usually not present in 2.0 (If info is operationally known then this field can be populated)
				xSCAUT	Classification Authority	40	eeeeeeeeeeeeeeeeeeee	Mapped from 2.0 xSCAUT
				xSCRSN	Classification Reason	1	Default	Data usually not present in 2.0 (If info is operationally known then this field can be populated)
				xSSRDT	Security Source Date	8	Default	Data usually not present in 2.0 (If info is operationally known then this field can be populated)
				xSCTLN	Security Control Number	15	Default	First fifteen chars map, potential to lose 5 characters for NITF 2.1 file NOTE: The use and value of this field are questionable as Control numbers when dealing with data files are not usable in the same manner as with paper documents. Therefore, loss of data here may not be of any consequence.

NOTE: The example code words, digraphs and control and handling caveats listed in Mil-Std-2500B and referred to in Table G-2 above are for illustrative purposes only. Implementations should support security-marking requirements according to approved security policies and guidelines applicable to the site or facility using the system.

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Table G-3. NITF 2.1 TO NITF 2.0 Security Field Transliteration/Mapping (Last updated 26 May 2000)

FIELD (2.1)	DESCRIPTION	SIZE	VALUE (generic "codes" used here to graphically show transliteration of data)	NITF 2.0	DESCRIPTION	SIZE	VALUE (generic "codes" used here to graphically show transliteration of data)	Remarks
xSCLASS	Security Classification	1	a	xSCLASS	Security Classification	1	A	Direct map across
xSCLSY	Security Classification System	2	bb					No map needed US system assumed
xSCODE	Codewords	11	cccccccccc	xSCODE	Codewords	40	cccccccccc	Direct map across
xSCTLH	Control and Handling	2	dd	xSCTLH	Control and Handling	40	dd	Direct map across
xSREL	Releasing Instructions	20	eeeeeeeeeeeeeeeeeeee	xSREL	Releasing Instructions	40	eeeeeeeeeeeeeeeeeeee	Direct map across
				xSCAUT	Classification Authority	20	l_n_mmmmmmmmmmmmmmm	Data transliterated from 2.1 fields xSCATP, xSCRSN and xSCAUT
				xSCTLN	Security Control Number	20	pppppppppppppppp	Direct map across
				xSDWNG	Security Downgrade	6	999998	If any allowed code is in NITF 2.1 field xSDCTP this field always set to "999998"
				xSDEVT	Downgrading event	40	Examples 1. DD_ggggggg_i 2. DE_i_kkkkkkkkkkkkkkkkkkkkkkkkkkkkkkkkkkkkkkkkkkkk 3. GD_jjjjjjjj_i 4. GE_i_kkkkkkkkkkkkkkkkkkkk

Table G-3. NITF 2.1 TO NITF 2.0 Security Field Transliteration/Mapping (Last updated 26 May 2000) (cont'd)

FIELD (2.1)	DESCRIPTION	SIZE	VALUE (generic "codes" used here to graphically show transliteration of data)	NITF 2.0	DESCRIPTION	SIZE	VALUE (generic "codes" used here to graphically show transliteration of data)	Remarks
xSDCXM	Declassification Exemption	4	hhhh	If code in 2.1 field xSDCTP is X then this data is placed in 2.0 field xSDEVT (as shown in example 6 above in xSDEVT field)				
xSDG	Downgrade	1	i	If code in 2.1 field xSDCTP is DD or GD then this data is placed in 2.0 field xSDEVT (as shown in example 1 and 3 above in xSDEVT field)				
xSDGDT	Downgrade Date	8	jjjjjjjj	If code in 2.1 field xSDCTP is GD then this data is placed in 2.0 field xSDEVT (as shown in example 3 above in xSDEVT field)				
xCLTX	Classification Text	43	kkkk

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Appendix H -- Multi-Image Scene Table of Contents (MITOC) Tagged Record Extension (TRE) Specification

****

NOTICE: This document is not a stand-alone document. It is Appendix H to the Implementation Practices of NITFS (STDI-0005), which is not published yet. The contents of Appendix H are DRAFT. Developers considering implementation are requested to contact the JITC NITFS Lab.

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Multi-Image Scene Table of Contents (MITOC)

Tagged Record Extension (TRE)

Specification Version 0.2

10 January 2005

TBD/TBR Listing

Page Number	TBD/TBR	Description
H-15	TBD002	Define test criteria 12 December 03: Test criteria have been added but will remain an ongoing TBD until testing begins.
H-15	TBD003	Add Implementation Notes
H-5, H-12, H-16	TBD005	Is there a need to allow MITOC to describe a group of sub-scene overview composite images?

Change Log

Date	Pages Affected	Mechanism
29 August 2003	All	Version 0.1, Initial Coord. Draft
10 January 2005	- H-C-1 - 3 (para 3) and Table H-1 - 3.6	Version 0.2, 10 January 2005 - Added a reference to SCENE_TYPE in Annex C, second sentence. - Added guidance for new user communities developing to the MITOC - Removed "The MITOCA TRE remains unchanged when a volume gets chipped" because that may not be true. For the DCGS implementation it is not.

Effectivity Log

Number	Effective	Description

Point of Contact for this DRAFT: Chairman, NITFS Technical Board (NTB); ntbchair@nga.mil

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1 SCOPE

1.1 Introduction

The use of remote framing, scanning and similar imaging sensors to collect image data over large areas of the earth poses a number of challenges for managing the resulting large data flows through the traditional Tasking, Collection, Processing, Exploitation and Dissemination (TCPED) process. Such collection activities can result in the collection of hundreds, or even thousands, of images over a specific area of coverage. Users of the data desire a ‘macro-view’ of the collected coverage area that allows one to drill down to detailed information as needed. Systems often portray this ‘macro-view’ of a specific collection coverage area (imaging scene) by amalgamating the individual images into a composite overview. Timely exploitation and precision targeting objectives create the requirement to preserve access to the individual images and their associated 'as-collected' support data. The Multi-image Scene Table of Contents (MITOCA) Tagged Record Extension (TRE) provides a significant part of the solution for managing image scenes consisting of large numbers of individual image collects.

1.2 Purpose

The purpose of this document is to specify how this TRE is to be written and used. The MITOCA TRE provides a means to allow a collection of images (a multi-image scene), collected over a designated coverage area, to be treated as if it were a single image scene. This includes sensors collecting multiple images in order to image the full scene and sensors which image the same footprint multiple times. In the later case, each footprint is referred to as a Look. The MITOCA TRE addresses multi-image scenes that consist of:

- Single sensor type; single look
- Single sensor type; multiple looks
- Multiple sensor types; single/multiple look(s)

The MITOCA TRE provides support for managing a multi-image scene during the TCPED process. In particular, the MITOCA approach preserves the original, as-collected, image data and support data for each image collected within the scene to facilitate precision targeting using the best available parameters from the collected imagery. Additionally, support is provided for sub-scene derived products (chipping), both at image boundaries and sub-image boundaries.

1.3 Background

As advanced framing and similar sensors began to implement multi-image, to include multi-look, scene collects, data management challenges surfaced. Since

framing and similar sensors often collect thousands of images just to satisfy one tasked scene, the tracking and maintenance of the images are cumbersome. The NITFS Technical Board (NTB) received several reports that certain Distributed Common Ground/Surface System (DCGS) framing imagery products were unusable because their support data had been altered or was missing. Other reports indicated there were shortcomings in the NITFS. Due to these reports, the NTB hosted a Technical Exchange Meeting (TEM) on 11-12 March 2003, to encourage the DCGS community to articulate the issues needing attention. This led to a series of follow-on TEMs and teleconferences, known as the Multi-image Scene (MiS) TEMs, made up of a team of DCGS representative members. The purpose of the MiS TEMs were to define and articulate a common approach for packaging multiple images using options defined by the NITFS whenever possible. If, in the event existing methods did not exist, the MiS team was tasked to identify alternate candidate solutions. The MiS team began by establishing a set of foundation principles to use as a guideline for achieving a solution. It was determined the solution must:

- Promote precision targeting
- Ensure a means for tracking data through the TCPED process
- Maintain original support data
- Support a unique image ID
- Ensure a means to determine image membership as part of a collection of images
- Ensure a means to determine sequence within a collection of images
- Ensure a means to “bundle” many images with support data from a single scene in a single NITF file that is universally understood by recipients and efficiently assists user needs (e.g. graphic map overlay, overview thumbnail).
- Ensure a standard definition and application of terms are used: scene number, operation number, image segment, etc.

After evaluating the foundation principles, the MiS team agreed to develop a new controlled TRE, the MITOCA.

2 References

STDI-0002 The Compendium of Controlled Extensions (CE) for the National Imagery Transmission Format, Version 2.1, 16 November 2000

STDI-0005	Implementation Practices of the NITFS (IPON), Draft Version 0.2, 24 January 2003 (Note: The MITOCA TRE was initially published as part of the IPON, which is internally referenced by this TRE.)

3 Overview of MITOCA

A Multi-image Scene (MiS) can potentially consist of multiple Looks, each with thousands of individual images (e.g. frames) and each with its own set of support data. The MITOCA approach provides both a visual and textual index of the images comprising a MiS. The approach is to provide a composite image (overview) of the Looks within a MiS, typically at a reduced resolution when compared to the actual collected image data. The composite image, when used in conjunction with the MITOCA TRE, serves as an index to the actual collected images.

The MITOCA paradigm prescribes a flexible method to organize the images and support data. It provides information on a collection of images that belong to a common scene. The information contained in the MITOCA TRE provides a correlation between the row and column pixel value indices of the composite image and the actual 'as-collected' image(s) (e.g. frame(s)) corresponding to the same coverage depicted in the composite image. This allows a user to identify an area of interest in the composite and then readily find the corresponding full-resolution image(s) to act upon.

There is currently one known user community developing to the MITOC specification, i.e. the DCGS. The specifics of the DCGS MITOC implementation are detailed in Annex C. Other user communities are encouraged to develop their own implementation of the MITOC and should document by adding a new Annex to this specification. For assistance in publishing a new implementation of the MITOC, contact the JITC NITF Lab JITCN@disa.mil.

The use of the MITOCA TRE requires a basic understanding of certain terminology. The following section is intended to provide a basis for this understanding.

3.1 Multi-image Scene (MiS)

A **Multi-image Scene** is a group of images collected over a designated area of coverage, all with the same scene identification value. A MiS has the following characteristics:

- A MiS may be comprised of multiple 'Looks', each defined by a Minimum Bounding Polygon of 4 geo-points (MBP4).
- A MiS may contain data collected from numerous sensor types.
- A MiS may be contained in one or more NITF files.

- A MiS may be organized into multiple ‘Volumes’.
- A MiS has an identifier value used as a common root for other identifiers within the MBP4 (see Table1, SCENE_ID field).
- A MiS may have data voids within the coverage area MBP4 (see figure H-1).

3.2 Volume

A **Volume** is a mechanism for dividing data within a MiS. A Volume has the following characteristics:

- The division of a MiS into Volumes is somewhat arbitrary, but is typically based on data size, image segment counts, sensor type and imaging mode.
- A Volume is comprised of data from a single sensor type and imaging mode.
- A Volume only contains data from a single ‘Look’.
- Volumes in multiple ‘Looks’ need not have the same boundaries.
- Each Volume has a Volume number, which should be unique when generated by the same system. Once a Volume is passed on to subsequent users who may re-organize the Volume, the uniqueness of the Volume number may be lost.
- Each Volume has a single MITOCA TRE.
- Each Volume has a MBP4 that is all or part of the total coverage of the Look MBP4.
- Typically, there is a volume composite image associated with the Volume MBP4.

3.3 Look

A **Look** is a mechanism for identifying/grouping related imagings of a MiS. A Look has roughly the same footprint/coverage as the MiS. A Look has the following characteristics:

- A Look is comprised of data from a single sensor type and imaging mode.
- A Look may be organized into multiple Volumes that may contain multiple Component Images.
- Multiple Looks may have different Volume Boundaries.
- A Look has roughly the same aim point or footprint/coverage as the MiS.

- The Look coverage is defined by a MBP4.
- Looks within a MiS have unique look index numbers.
- Volumes associated with a particular Look have the same Look index value.

Note: Although shown as neatly juxtaposed images, the actual collected component images may have overlap, skewing, crabbing and other characteristics typical of remote sensing imagery.

Minimum Bounding Polygon geo-point

Minimum Bounding Polygon

Void in MBP4

Component Image

Volume Boundary

Figure H-1. Single Look Example

3.4 Component Image

A **Component Image** is an array of pixel values and associated support data contained in a volume and may be used to make a composite image. A Component Image has the following characteristics:

- The pixel array and support data have the same area of coverage.
- Typically, a Component Image is a full resolution image as collected by the sensor.
- For a step-framing sensor, each collected frame is a Component Image.
- For a ‘spot’ sensor, each ‘spot’ is a Component Image.
- For a scanning sensor, the scan lines corresponding to the support data coverage is a Component Image.
- Each Component Image has a unique Image ID within a MiS.

3.5 Composite Image

A **Composite Image** is an array of pixel values derived from one or more component images to form a composite overview of the coverage area (MBP4) of the associated component images or the Look containing the component images. A composite image has the following characteristics:

- A composite image portrays a ‘macro-view’ of a designated coverage area (Look MBP4 or Volume MBP4) by amalgamating the individual Component Images into a single image.
- The Composite image is typically a reduced resolution of the amalgamated Component images, but is not required to be.
- Composite Images are described by a MBP4.
- There are two types of composite images, a Look composite and a Volume composite. A Volume composite image is an overview image of the MBP4 coverage represented by the associated component image(s). A Look composite image is an overview image of the MBP4 coverage represented by the associated component image(s) in the Look.
- A composite image is comprised of data from a single sensor type and imaging mode.
- The Volume composite MBP4 coordinates are always populated.
- The Look composite MBP4 coordinates are populated whenever available.

3.6 MiS Table of Contents (MITOCA) TRE

A **MiS Table of Contents (MITOCA) TRE** correlates a group of one or more component images within a Volume MBP4 and an associated Volume composite image. It also can provide the Look composite image MBP4 of the entire Look to which the MITOCA coverage group (Volume) belongs. A MITOCA TRE has the following characteristics:

- There is one MITOCA TRE per group (Volume) of Component Images.
- A MITOCA may reference up to 999 Component Images.
- A MITOCA may reference one Volume composite and one Look composite image.
- A MITOCA describes the MBP4 for the Volume composite image.
- A MITOCA describes the number of pixel rows and columns in the Volume composite image.
- A MITOCA may describe the MBP4 for the Look composite image.
- A MITOCA provides the MBP4 for each of its Component Images.

- A MITOCA provides a row/column index relative to the Volume composite image for each of its Component Images.

- The MITOCA TRE allows for specifying different 'scene type' implementation practices that can be defined for specific community implementations of the MITOCA. These scene types may be defined and submitted to the NTB for inclusion as an annex to this MITOCA TRE specification. (See Annex C, the DCGS scene type implementation specifications, for the initial implementation description of the MITOCA)

- The MITOCA TRE remains unchanged when a volume gets chipped.

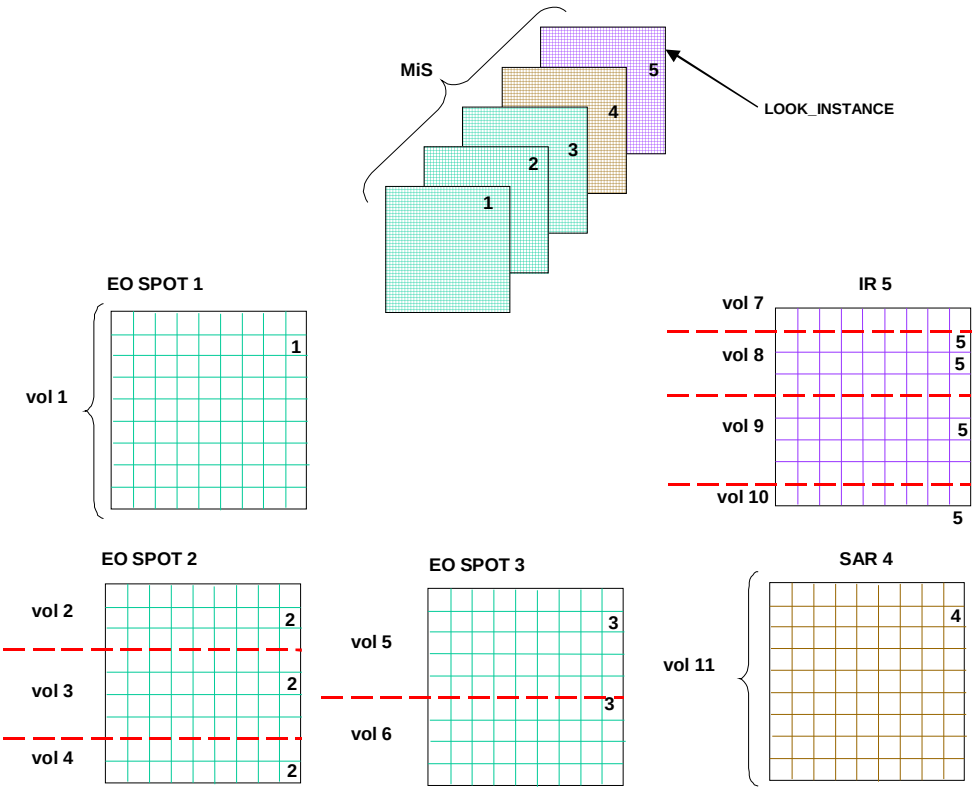

Figure H-2. Conceptual MiS Example

4 REQUIREMENTS

4.1 General Requirements

4.1.1. The MITOCA TRE is used to describe the organization of image segments grouped within a Volume. A Volume has only one Volume composite image. It may also have one Scene (Look) composite image from the Look producing the image segments in the volume. TBD005

4.1.2. A Volume only contains image data from a single sensor imaging mode and a single Look.

4.1.3. A single MITOCA TRE is provided for each volume of a MiS and may be used wherever the need exists to define and advertise a collection of individual component images that satisfy a common collection purpose.

4.1.4. Since a NITF file is limited to 999 image segments, a single NITF file may contain up to 999 volumes and/or component images, in any combination thereof, as long as the total number of NITF image segments does not exceed 999. This also means a single NITF file may have more than one MITOCA TRE.

4.1.5. The MITOCA TRE, when present, is always placed in the Extended Header Data (XHD) or User Defined Header Data (UDHD) sections of the NITF file header (or an associated TRE_OVERFLOW DES), and serves as a beacon to a recipient that the NITF file contains and/or references multiple NITF image segments (IMs) that belong to a common volume of a specific MiS.

4.1.6. All geographical coordinate points referenced in Table H-1 follow the same format. Xddmmss.cc represents degrees (00 to 89), minutes (00 to 59), seconds (00 to 59), and hundredths of seconds (00 to 99) of latitude, with X = N for North or S for South; and Ydddmmss.cc represents degrees (000 to 179), minutes (00 to 59), seconds (00 to 59), and hundredths of seconds (00 to 99) of longitude, with Y = E for East or W for West. The format ±dd.dddddd indicates degrees of latitude (North is positive), and ±ddd.dddddd represents degrees of longitude (East is positive). Any portion of a coordinate that is unknown shall be filled with a hyphen (-), including a completely unknown coordinate (e.g. ----------). The default hyphen convention should only be used under special circumstances such as when the coordinates will be known at a later lifecycle stage of the data collection, and when only some of the coordinates are known (e.g. not all four). When populating geographic coordinate points, as much information as possible should be provided, even if it is only one of the four coordinates.

4.1.7. Producers of multi-volume Looks should consider organizing volumes on meaningful information boundaries.

4.2 Detailed Requirements

The following table defines the format of the MITOCA TRE. The fields of this TRE are organized into three sections, those relevant to information about the MiS, Volumes and Components.

Table H-1. MITOCA – Multiple Images Table Of Contents

R = Required, C = Conditional, A = Alphanumeric (BCS-A), N = Numeric (BCS-N),
<> = Allowed default is specified

Field	Name/Description	Size	Value Range	Units	Type
CETAG	Unique Extension Identifier.	A/6	MITOCA	N/A	R
CEL	Length of CEDATA Field. This field shall contain the length in bytes of the data contained in the CEDATA Field. The entire TRE length is 11 + CEL.	N/5	Calculated 00000-99988	Bytes	R
The following fields define the MITOCA CEDATA Field:					
The Fields SCENE_TYPE through NUM_VOLUMES constitutes the MiS section of the MITOCA.					
SCENE_TYPE	Scene Type. 000 = Not designated 001 to 100 = DCGS Reserved (see Annex C) 101-999 = Reserved for future user communities. Contact the JITC NITF Lab for assistance JITCN@disa.mil. This field serves as a 'flag' to identify the specific implementation practices and conventions applicable for implementation and use of this TRE. Values can be registered at http://jitc.fhu.disa.mil/nitf/reg_fields.html.	N/3	000 to 999		R
SCENE_ID_LEN	Scene Identifier Length. Length of the SCENE_ID field in bytes. Together, the SCENE_ID field and the COMPONENT_ID field correlate to the IMAGE ID of the component image.	N/3	001 to 999	Bytes	R
SCENE_ID	Scene Identifier. Allows up to 999 characters to serve as the scene identifier. All components of a scene must have a common Scene ID, which is defined as the common portion of each component's unique image ID.	A/1-999	Alphanumeric		R

Table H-1. MITOCA – Multiple Images Table Of Contents

R = Required, C = Conditional, A = Alphanumeric (BCS-A), N = Numeric (BCS-N),
<> = Allowed default is specified

Field	Name/Description	Size	Value Range	Units	Type
LOOK_COMPOSITE_INDEX	Look Composite Index Value. Provides the unique "display level" reference in this NITF file for the NITF image segment (IM) that contains the Look Composite/Overview. 000 – Look Composite image is not present in this NITF file but the conditional MBP4 coordinates fields are populated. 001 to 999 – The IDLVL value in the Look Composite image/overview subheader. --- (3 hyphens) – Look Composite image is not present in this NITF file.	N/3	000, 001 to 999 or ---		R
LOOK_COMPOSITE_ID_LEN	Look Composite Identifier Length. Length of the LOOK_COMPOSITE_ID field in bytes. If the LOOK_COMPOSITE_INDEX is ---, then the LOOK_COMPOSITE_ID is not present and this field is populated 000.	N/3	000 to 999	bytes	R
LOOK_COMPOSITE_ID	Look Composite Image Identifier. This field is only present if the LOOK_COMPOSITE_ID_LEN is not 000 and contains the portion of the Look Composite image ID that uniquely identifies this Composite image. Together, the SCENE_ID field and the LOOK_COMPOSITE_ID field correlate to the IMAGE ID of this composite image.	N/1-999	Alphanumeric		C

Table H-1. MITOCA – Multiple Images Table Of Contents

R = Required, C = Conditional, A = Alphanumeric (BCS-A), N = Numeric (BCS-N),
<> = Allowed default is specified

Field	Name/Description	Size	Value Range	Units	Type
The following four fields describe the Minimum Bounding Polygon of four geo-points (MBP4) for the Look. In some cases, the coverage area described by these geo-points may not be completely represented with imagery referenced by this MITOCA (see figure 1. Single Look Example for description of void areas). These points are the earth coordinates corresponding with the image pixel array corner locations of the Look composite image and are provided in image coordinate order: (0,0), (0, MaxCol), (MaxRow, MaxCol), (MaxRow, 0). These conditional fields are not present if the LOOK_COMPOSITE_INDEX value is --- (hyphens).					
LOOK_CORNER_1	Look Corner Point 1. Pixel (0,0) corner point location of the composite image in lat/lon coordinates.	A/21	XDDMMSS.SSYDDDMMSS.SS or ±dd.dddddd±ddd.ddddddd		C
LOOK_CORNER_2	Look Corner Point 2. Pixel (0, MaxCol) corner point location of the composite image in lat/lon coordinates.	A/21	XDDMMSS.SSYDDDMMSS.SS or ±dd.dddddd±ddd.ddddddd		C
LOOK_CORNER_3	Look Corner Point 3. Pixel (MaxRow, MaxCol) corner point location of the composite image in lat/lon coordinates.	A/21	XDDMMSS.SSYDDDMMSS.SS or ±dd.dddddd±ddd.ddddddd		C
LOOK_ CORNER_4	Look Corner Point 4. Pixel (MaxRow, 0) corner point location of the composite image in lat/lon coordinates.	A/21	XDDMMSS.SSYDDDMMSS.SS or ±dd.dddddd±ddd.ddddddd		C
NUM_VOLUMES	Number of Volumes. Total number of volumes that make up the Look. ------ = Unknown/Default	N/6	000001 to 999999 or ------		<R>
The Fields LOOK_INSTANCE through DSR constitutes the Volume section of the MITOCA.					

Table H-1. MITOCA – Multiple Images Table Of Contents

R = Required, C = Conditional, A = Alphanumeric (BCS-A), N = Numeric (BCS-N),
<> = Allowed default is specified

Field	Name/Description	Size	Value Range	Units	Type
LOOK_INSTANCE	Look Instance. Identifies which 'Look' the data in this volume belongs to. Volumes may have special relationships within a Look, such as a MiS imaged with multiple looks (i.e. repetitive point imaging, or a MiS imaged with simultaneous sensors). In this case each repetitive point, EO or IR look image may be organized into one or more volumes that need to be easily associated. The mechanism used to associate the volumes of a repetitive look (point scene for example) is the LOOK_INSTANCE value.	N/6	000001 to 999999		R
VOLUME_NUM	Volume Number. Identifies which volume of the overall MiS the volume composite and/or collection of component images identified in this TRE belongs to. The volume number is strictly a consecutive count of volumes within the MiS, independent of Looks. For MiSs where temporal arrangement is relevant, it is highly recommended volumes be numbered in temporal order, where a lower number (e.g. 000001) represents the volume of images in the MiS that were collected first.	N/6	000001 to 999999		R
SENSOR_ID	Sensor Identifier. Identifies which specific sensor produced the collection of images in this volume. Values can be registered at http://jitc.fhu.disa.mil/nitf/reg_fields.html.	A/6	Alphanumeric		R

Table H-1. MITOCA – Multiple Images Table Of Contents

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<> = Allowed default is specified

Field	Name/Description	Size	Value Range	Units	Type
SENSOR_ID_TYPE	Sensor Identifier Type. Identifies the type of sensor that produced the collection of images in this volume. Values can be registered at http://jitc.fhu.disa.mil/nitf/reg_fields.html.	A/4	Alphanumeric		R
MPLAN	Mission Plan Mode. Identifies the collection (imaging) mode of the sensor that produced the collection of images in this volume. Values can be registered at http://jitc.fhu.disa.mil/nitf/reg_fields.html.	A/3	Alpahnumeric		R
VOLUME_COMPOSITE_INDEX	Volume Composite Image Index Value. Provides the unique "display level" referenced in this NITF file for the NITF image segment that contains the composite/overview image segment IM that depicts this volume. 000 – Volume composite image not present in this NITF file 001 to 999 - composite image display level (IDLVL in composite image segment subheader)	N/3	000, 001 to 999		R
VOLUME_COMPOSITE_ID_LEN	Volume Composite Identifier Length. Length of the VOLUME_COMPOSITE_ID field in bytes.	N/3	001 to 999	bytes	R

Table H-1. MITOCA – Multiple Images Table Of Contents

R = Required, C = Conditional, A = Alphanumeric (BCS-A), N = Numeric (BCS-N),
<> = Allowed default is specified

Field	Name/Description	Size	Value Range	Units	Type
VOLUME_COMPOSITE_ID	Volume Composite Image Identifier. This field contains the portion of the Volume Composite image ID that uniquely identifies the Composite image. Together, the SCENE_ID field and the VOLUME_COMPOSITE_ID field correlate to the IMAGE ID of this composite image.	N/1-999	Alphanumeric		R
The following four fields describe the Minimum Bounding Polygon of four geo-points (MBP4) for the Volume. In some cases, the coverage area described by these geo-points may not be completely represented with imagery referenced by this MITOCA (see figure 1. Single Look Example for description of void areas). These points are the earth coordinates corresponding with the image pixel array corner locations of the Volume composite image and are provided in image coordinate order: (0,0), (0, MaxCol), (MaxRow, MaxCol), (MaxRow, 0). Note: Volume composite coordinates must be provided even if the Volume composite image is not.					
VOLUME_CORNER_1	Volume Corner Point 1. Pixel (0,0) corner point location of the composite image in lat/lon coordinates.	A/21	XDDMMSS.SSYDDDMMSS.SS or ±dd.dddddd±ddd.ddddddd		R
VOLUME_CORNER_2	Volume Corner Point 2. Pixel (0, MaxCol) corner point location of the composite image in lat/lon coordinates.	A/21	XDDMMSS.SSYDDDMMSS.SS or ±dd.dddddd±ddd.ddddddd		R
VOLUME_CORNER_3	Volume Corner Point 3. Pixel (MaxRow, MaxCol) corner point location of the composite image in lat/lon coordinates.	A/21	XDDMMSS.SSYDDDMMSS.SS or ±dd.dddddd±ddd.ddddddd		R
VOLUME_ CORNER_4	Volume Corner Point 4. Pixel (MaxRow, 0) corner point location of the composite image in lat/lon coordinates.	A/21	XDDMMSS.SSYDDDMMSS.SS or ±dd.dddddd±ddd.ddddddd		R

Table H-1. MITOCA – Multiple Images Table Of Contents

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<> = Allowed default is specified

Field	Name/Description	Size	Value Range	Units	Type
NUM_COMPONENTS	Number of Component Image Segments. The number of component image segments (e.g. frames, tiles, etc.) that belong to this Volume. If the temporal arrangement of component images is relevant, it is highly recommended they be enumerated (below) and recorded (image segment wise) in the order they were collected.	N/3	001 to 999		R
COMPONENTS_FLAG	Component Image Segments Presence Flag. Indicates whether or not the component images, which belong to this volume, are present as individual image segments within this NITF file. Either **all** or **none** of the component image segments belonging to this volume are present in this NITF file. 0 = None of the component image segments are present in this NITF file (i.e., they are stored individually in separate NITF files). 1 = All of the component image segments are present in this NITF file. 2 to 9 Reserved.	N/1	0 or 1		R

Table H-1. MITOCA – Multiple Images Table Of Contents

R = Required, C = Conditional, A = Alphanumeric (BCS-A), N = Numeric (BCS-N),
<> = Allowed default is specified

Field	Name/Description	Size	Value Range	Units	Type
NUM_ROWS	Number of Pixel Rows. Number of significant pixel rows in the Volume composite/overview image. Same value as in the NROWS field in the composite image subheader. Note: since the coordinates of the Volume composite image must be provided even if the composite image is not, NUM_ROWS should always be known and always populated (similarly for NUM_COLS below).	N/8	00000001 to 99999999		R
NUM_COLS	Number of Pixel Columns. Number of significant pixel columns in the Volume composite/overview image. Same value as in the NCOLS field in the composite image subheader.	N/8	00000001 to 99999999		R
DSR	Down Sample Ratio. The down sample ratio of the Volume_composite/ overview image.	N/7	0001.00 to 9999.99 0001.00 = no down sample 0002.00 = down sampled 2 to 1 0003.00 = down sampled 3 to 1 0003.50 = down sampled 3.5 to 1 etc.		R
The Fields COMPONENT_ID_LEN through LOWER_LEFT_COL constitutes the Component Section of the MITOCA.					
COMPONENT_ID_LEN	Component Identifier Length. Length of the COMPONENT_ID field in bytes. Together, the SCENE_ID field and the COMPONENT_ID field correlate to the IMAGE ID of the component image.	N/3	001 to 999	bytes	R

Table H-1. MITOCA – Multiple Images Table Of Contents

R = Required, C = Conditional, A = Alphanumeric (BCS-A), N = Numeric (BCS-N),
<> = Allowed default is specified

Field	Name/Description	Size	Value Range	Units	Type
COMPONENT_INDEX_TYPE	Component Image Index Type. In addition to populating the Component ID field, either the Display Level (DL) or sequence count (starting with 001) of the Component Image Segment may be included through use of the conditional ISH_INDEX field. This conditional field allows a specific Component Image Segment within an NITF file to be identified in circumstances wherein the value populated in the ITITLE/IID2 field of the Image Subheader may not provide a means to uniquely identify the Component Image Segment.	N/1	0 – ISH_INDEX field is omitted. 1 – Display Level ISH_INDEX field contains the Display Level of the Image Segment within the NITF file. 2- Sequence Number. ISH_INDEX field contains the instance count of the Image Segment within the NITF file. 3 to 9 Reserved.	N/A	R
The remaining fields of this TRE repeat NUM_COMPONENTS times: ***(Note: If temporal arrangement of images is important, they should be enumerated below in the order they were collected)***					
COMPONENT_ID	Component Image ID. This is the portion of the component image ID within a MiS that uniquely identifies the referenced component image segment within the LOOK. Together, the SCENE_ID field and the COMPONENT_ID field correlate to the IMAGE ID of the component image.	A/1 - 999	Alphanumeric		R

Table H-1. MITOCA – Multiple Images Table Of Contents

R = Required, C = Conditional, A = Alphanumeric (BCS-A), N = Numeric (BCS-N),
<> = Allowed default is specified

Field	Name/Description	Size	Value Range	Units	Type
ISH_INDEX	Image Sub-Header Index. A conditional field depending on the value populated in the COMPONENT_INDEX_TYPE field. Contains either the Display Level (DL) or sequence count (starting with 001) of the Component Image Segment within the NITF file. This conditional field allows a specific Component Image Segment within an NITF file to be identified in circumstances wherein the value populated in the ITITLE/IID2 field of the Image Subheader may not provide a means to uniquely identify the Component Image Segment.	N/3	001 - 999		C
The following four fields describe the Minimum Bounding Polygon of four geo-points (MBP4) for the Component Image. These points are the earth coordinates corresponding with the image pixel array corner locations of the Component Image and are provided in image coordinate order: (0,0), (0, MaxCol), (MaxRow, MaxCol), (MaxRow, 0).					
COMPONENT_ CORNER_1	Component Corner Point 1. Pixel (0,0) corner point location of the component image in lat/lon coordinates.	A/21	XDDMMSS.SSYDDDMMSS.SS or ±dd.dddddd±ddd.ddddd		R
COMPONENT_ CORNER_2	Component Corner Point 2. Pixel (0, MaxCol) corner point location of the component image in lat/lon coordinates.	A/21	XDDMMSS.SSYDDDMMSS.SS or ±dd.dddddd±ddd.ddddd		R
COMPONENT_ CORNER_3	Component Corner Point 3. Pixel (MaxRow, MaxCol) corner point location of the component image in lat/lon coordinates.	A/21	XDDMMSS.SSYDDDMMSS.SS or ±dd.dddddd±ddd.ddddd		R
COMPONENT_ CORNER_4	Component Corner Point 4. Pixel (MaxRow, 0) corner point location of the component image in lat/lon coordinates.	A/21	XDDMMSS.SSYDDDMMSS.SS or ±dd.dddddd±ddd.ddddd		R

Table H-1. MITOCA – Multiple Images Table Of Contents

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Field	Name/Description	Size	Value Range	Units	Type
UPPER_LEFT_ROW	Upper Left Row Pixel Offset. Row pixel (offset[1]) of the upper left corner point of the component image relative to the Volume composite image. This field is not present if VOLUME_COMPOSITE_INDEX = 0.	N/8	00000000 to 99999998	pixels	C
UPPER_LEFT_COL	Upper Left Column Pixel Offset. Column pixel (offset[1]) of the upper left corner point of the component image relative to the Volume composite image. This field is not present if VOLUME_COMPOSITE_INDEX = 0.	N/8	00000000 to 99999998	pixels	C
UPPER_RIGHT_ROW	Upper Right Row Pixel Offset. Row pixel (offset[1]) of the upper right corner point of the component image relative to the Volume composite image. This field is not present if VOLUME_COMPOSITE_INDEX = 0.	N/8	00000000 to 99999998	pixels	C
UPPER_RIGHT_COL	Upper Right Column Pixel Offset. Column pixel (offset[1]) of the upper right corner point of the component image relative to the Volume composite image. This field is not present if VOLUME_COMPOSITE_INDEX = 0.	N/8	00000000 to 99999998	pixels	C
LOWER_RIGHT_ROW	Lower Right Row Pixel Offset. Row pixel (offset[1]) of the lower right corner point of the component image relative to the Volume composite image. This field is not present if VOLUME_COMPOSITE_INDEX = 0.	N/8	00000000 to 99999998	pixels	C

Table H-1. MITOCA – Multiple Images Table Of Contents

R = Required, C = Conditional, A = Alphanumeric (BCS-A), N = Numeric (BCS-N),
<> = Allowed default is specified

Field	Name/Description	Size	Value Range	Units	Type
LOWER_RIGHT_COL	Lower Right Column Pixel Offset. Column pixel (offset[1]) of the lower right corner point of the component image relative to the Volume composite image. This field is not present if VOLUME_COMPOSITE_INDEX = 0.	N/8	00000000 to 99999998	pixels	C
LOWER_LEFT_ROW	Lower Left Row Pixel Offset. Row pixel (offset[1]) of the lower left corner point of the component image relative to the Volume composite image. This field is not present if VOLUME_COMPOSITE_INDEX = 0.	N/8	00000000 to 99999998	pixels	C
LOWER_LEFT_COL	Lower Left Column Pixel Offset. Column pixel (offset[1]) of the lower left corner point of the component image relative to the Volume composite image. This field is not present if VOLUME_COMPOSITE_INDEX = 0.	N/8	00000000 to 99999998	pixels	C

Note 1: A component image row/col offset is computed with the component image down sampled to the same resolution (DSR) as the composite image it belongs to. Typically each component image in a NITF image segment is a full resolution image, an exception would be a volume of composite images, where the components of the volume are composites (TBD0005).

5 TEST CRITERIA [TBD002]

5.1 MITOCA Pack Criteria

The following test criteria apply to the packing (generation) of NITF files when using the MITOCA TRE.

5.1.1 All character values in MITOCA TRE are in the printable BCS-A character set (space (0x20) through tilde (0x7E)) with eight bits (one byte per character).

5.1.2 All data in fields designated as alphanumeric (BCS-A) are left justified and padded with spaces as necessary to fill the field.

5.1.3 All data in numeric (BCS-N) fields are right justified and padded with leading zeros as necessary to fill the field.

5.1.4 All required fields are present and contain valid data as defined in the MITOCA specification.

5.1.5 Conditional fields are only present when the conditional parameters of predicate fields so signify. When present, conditional fields contain valid data.

5.1.6 Fields are not populated with default or unknown-designator values unless the actual value is truly unavailable at the specific lifecycle stage of data formation.

5.1.7 Coordinate fields are accurately populated within the tolerance requirements designated for the Implementation Under Test (IUT).

5.1.8 The MITOCA TRE(s) is placed in either the Extended Header Data (XHD) or User Defined Header Data (UDHD) sections of the NITF file header, or in an associated TRE_OVERFLOW DES.

5.1.9 Each MITOCA TRE describes a single volume of NITF IM segments comprised of all, or a portion, of the image data collected from a single Look, a single sensor type, and operating in a single imaging mode.

5.1.10 The Volume index value is unique within the scene.

5.1.11 The LOOK_INSTANCE value is unique within the scene and is a common value among volumes of the same Look.

5.1.12 Application of the MITOCA TRE is limited to the established community implementation constraints as flagged by the value populated in the SCENE_TYPE field.

5.1.13 The LOOK_COMPOSITE_INDEX value accurately identifies the state and placement of the Look composite IM Segment.

5.1.14 The VOLUME_COMPOSITE_INDEX value accurately identifies the state and placement of the Volume IM Segment.

5.1.15 The component image row/col pixel (offset) values accurately associate the coverage of the component image within the composite image.

5.1.16 When chipping, a new Volume and MITOCA must be generated, to represent the Components of the chip.

5.1.17 A chipped Volume will maintain the original volumes VOLUME_NUM and LOOK_INSTANCE.

5.1.18 Pixel chipped Components will contain an ICHIPB TRE.

5.1.19 All chipped Composite images will contain an ICHIPB TRE.

5.2 MITOCA Unpack Criteria

The MITOCA TRE specification does not define specific functional requirements for the unpack, interpretation and use of the information provided in the MITOCA TRE. Therefore, the following unpack test criteria serve as foundation principles for determining compliance for whatever MITOCA-based functionality a specific implementation supports. These criteria serve as the basis for establishing the appropriate compliance test measures for the specified functional requirements of the IUT.

5.2.1 The IUT can accurately associate volume MBP4s within the Look MBP4. Upon selecting a point within the Look MBP4, the IUT can identify the volume(s) associated with that point.

5.2.2 Upon selecting a point within the Volume composite image, the IUT can accurately associate the component image(s) with the selected point.

5.2.3 The IUT can accurately associate data for each specific Look within a MiS, both single volume and multiple volume.

5.2.4 The IUT supports a multiple volume MiS collection when the volumes are within a single NITF file.

5.2.5 The IUT supports a multiple volume MiS collection when the volumes are distributed among multiple NITF files.

6 NOTES [TBD003]

Candidate Topics for Inclusion in NOTES section:

- Data/Processing Lifecycle Considerations for Population of MITOCA.
- Initialization of Sequence Numbers and Counters. When they need to be re-started, when they can continue, maintaining sequence order, etc.
- Use of ICHIPB TRE in conjunction with MITOCA.
- Including MITOCA TRE in NITF Files Containing a Single IM Segment.
- Clarify Proper Handling of Void Areas.
- Candidate Presentation/Display Options for NITF files with MITOCA in Light of Past Practice for Using the CCS and DL/AL Relationships.

ANNEX A - GLOSSARY

Chip – an extracted Area of Interest (AOI). The AOI may cross numerous independent image arrays, yielding numerous chips. There are two standard chipping techniques, Component chip and Pixel chip. In the case of **Component** chipping, if a Component has pixels in the AOI, then the entire Component is provided as one of the Component chips. In the case of **Pixel** chipping, if a Component has pixels in the AOI, then only the pixels (or close to those pixels) bounded by the AOI are provided. In both cases the resulting product may contain numerous chips, one for each Component associated with the AOI.

Component Image - an array of pixel values and associated support data contained in a volume and may be used to make a composite image.

Composite Image - an array of pixel values derived from one or more component images to form a composite overview of the coverage area (MBP4) of the component images or the Look containing the component images.

Frame - an array of pixel values typically generated from a framing sensor. Typically a frame is a component image.

Look – a mechanism for identifying/grouping related imagings of a MiS. The Look instance will identify which imaging instance a target was imaged in. Some sensors image the same target numerous times, each yielding numerous Looks.

Mosaic Image - for the purposes of this document, the same as a composite image.

Muliti-image Scene - a group of images collected over a designated area of coverage, all with the same scene number.

Overview Image - for the purposes of this document, the same as a composite image.

Scene Composite Image - an overview image of the Scene's Component Images.

Super-Composite – a composite image made up of composite images (TBD005).

TCPED – Tasking, Collection, Processing, Exploitation and Dissemination. A term encompassing the functions that makes up the end-to-end imagery and geospatial cycle.

Volume - a mechanism for dividing data within a single MiS.

Volume Composite Image - an overview image made up of the Volume's Component Images.

ANNEX B - ACRONYMS

A

AOI – Area of Interest

B

BCS-A – Basic Character Set – Alphanumeric

BCS-N - Basic Character Set – Numeric

C

CIP – Common Imagery Processor

D

DCGS – Distributed Common Ground/Surface System

DL – Display Level

E

EO – Electro-Optical

F

FR – Full Resolution

I

ICHIP – Image Chip (an NITF Tagged Record Extension)

IM –Image Segment

IN – Image Sub Header

IPON – Implementation Practices of the NITFS

IR – Infrared

IUT – Implementation Under Test

M

MBP4 – Minimum Bounding Polygon of 4 geo-points

MiS – Multi-image Scene

MITOCA – Multi-image Scene Table of Contents

N

NITF – National Imagery Transmission Format

NITFS – National Imagery Transmission Format Standard

NTB – NITFS Technical Board

R

RR – Reduced Resolution

S

SAR – Synthetic Aperature Radar

SWS –Software Work Station

T

TEM – Technical Exchange Meeting

TCPED – Tasking, Collection, Processing, Exploitation and Dissemination

TRE – Tagged Record Extension

U

UDHD – User Defined Header Data

V

VC – Volume Composite

X

XHD – Extended Header Data

ANNEX C – THE DCGS IMPLEMENTATION OF MITOCA

This appendix describes the specific practices for the DCGS implementation of the MITOCA TRE. The implementation described in Annex C corresponds with a SCENE_TYPE of 001.

C.1 DCGS Tactical Image Identification

Each image will be identified by a unique image identification located in the NITF image subheader Image Identification 2 (IID2) field (NITF2.1) or Image Title (ITITLE) field (NITF 2.0). The mapping defined in STDI-0002 Version 2.1, Table 8-4 between AIMIDB and ITITLE/IID2 is no longer a requirement and should not be implemented. The next release of the STDI-0002 will reflect this change. The structure and content of the ID is defined in the Tactical Image ID section of the "Implementation Practices of the National Imagery Transmission Format Standard (IPON)", version 1.0 (Note: The MITOCA TRE was initially published in the IPON, version 2.0 also). The DCGS Implementation employs two variations of image ID, a Component ID and a Composite ID. Both variations are provided for every Volume in the MITOCA and the respective image subheader IID2 fields of each image. In cases where a Look or Volume Composite is not present, its ID will not be present in the MITOCA.

C.1.1 Component IDs

The first 18 bytes of the 40 character Tactical Image ID identify scene characteristics, and the last 22 bytes uniquely identify the component. In the case of multi-component scenes, there will be numerous components with the same "root" ID (first 18 bytes), each having unique trailing IDs (last 22 bytes). Together the root 18 and trailing 22 bytes constitute a unique image ID.

C.1.2 Composite IDs

The first 18 bytes match the root ID of the components used to make the composite and the trailing 22 bytes uniquely ID the composite. Composite images will use the REPLAY field to indicate the image was processed into a composite. The following codes will identify the type of composite:

- C01 – Look composite
- C02 – Volume composite

The following table provides specific instructions for some fields of the MITOCA TRE. Those fields not listed below adhere to the general implementation as defined in Table 1 above.

Table H-C-1. MITOCA Fields

Field	Description	DCGS Implementation
SCENE_TYPE	Scene Type. This field serves as a 'flag' to identify the specific implementation practices and conventions applicable for implementation and use of this TRE.	This field is set to 001 to flag this TRE follows the DCGS implementation practices for the MITOCA TRE.
SCENE_ID_LEN	Scene Identifier Length. Length of the SCENE_ID field in bytes. Together, the SCENE_ID field and the COMPONENT_ID field correlate to the IMAGE ID of the component image.	This field must be set to 018 since the first 18 characters of the DCGS image ID are common within a scene.
SCENE_ID	Scene Identifier. Allows up to 999 characters to serve as the scene identifier. All components of a scene must have a common Scene ID, which is defined as the common portion of each component's unique image ID.	This field is 18 bytes long and is populated with the first 18 characters of the DCGS Image ID common to all components in the scene. The first 18 characters of the Image ID must be the same for all components in the scene. Reference the definition of the DCGS Image ID in the "Implementation Practices of the National Imagery Transmission Format Standard (IPON)", version TBD, dated TBD.
LOOK_COMPOSITE_ID_LEN	Look Composite Identifier Length. Length of the LOOK_COMPOSITE_ID field in bytes. If the LOOK_COMPOSITE_INDEX is ---, then the LOOK_COMPOSITE_ID is not present and this field is populated 000.	This field will either be 000, indicating there is not a Look Composite, or it will be 022, since the last 22 characters of the 40-character DCGS image ID are used to differentiate individual images within a common scene.
LOOK_COMPOSITE_ID	Look Composite Image Identifier. This field is only present if the LOOK_COMPOSITE_ID_LEN is not 000 and contains the portion of the Look Composite image ID that uniquely identifies this Composite image. Together, the SCENE_ID field and the LOOK_COMPOSITE_ID field correlate to the IMAGE ID of this composite image.	If the LOOK_COMPOSITE_ID_LEN is 022, this field will contain the remaining 22 of the 40 character image ID beyond the scene ID portion (18 characters) extracted from the ITITLE/IID2 field of the component image. The REPLAY field will be a flag that this is a Composite image.

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Multi-image Scene (MiS) Table of Contents (MITOCA) Tagged Record Extension (TRE)

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Field	Description	DCGS Implementation
SENSOR_ID	Sensor Identifier. Identifies which specific sensor produced the collection of images in this volume.	See STDI-0002, ACFTB: SENSOR_ID field for allowed value range.
SENSOR_ID_TYPE	Sensor Identifier Type. Identifies the type of sensor that produced the collection of images in this volume.	See STDI-0002, ACFTB: SENSOR_ID_TYPE field for allowed value range
MPLAN	Mission Plan Mode. Identifies the collection (imaging) mode of the sensor that produced the collection of images in this volume.	See STDI-0002, ACFTB: MPLAN field for allowed value range
VOLUME_COMPOSITE_INDEX	Volume Composite Image Index Value. Provides the unique "display level" referenced in this NITF file for the NITF image segment that contains the composite/overview image segment IM that depicts this volume. 000 – Volume composite image not present in this NITF file 001 to 999 - composite image display level (IDLVL in composite image segment subheader)	Recommend the Volume Composite image always be present.
VOLUME_COMPOSITE_ID_LEN	Volume Composite Identifier Length. Length of the VOLUME_COMPOSITE_ID field in bytes.	This field must be set to 022 since the last 22 characters of the 40-character DCGS image ID are used to differentiate individual images within a common scene.
VOLUME_COMPOSITE_ID	Volume Composite Image Identifier. This field contains the portion of the Volume Composite image ID that uniquely identifies the Composite image. Together, the SCENE_ID field and the VOLUME_COMPOSITE_ID field correlate to the IMAGE ID of this composite image.	The remaining 22 of the 40 character image ID beyond the scene ID portion (18 characters) extracted from the ITITLE/IID2 field of the component image. The REPLAY field will be a flag that this is a Composite image.
COMPONENT_ID_LEN	Component Identifier Length. Length of the COMPONENT_ID field in bytes. Together, the SCENE_ID field and the COMPONENT_ID field correlate to the IMAGE ID of the component image.	This field must be set to 022 since the last 22 characters of the 40-character DCGS image ID are used to differentiate individual images within a common scene.

Field	Description	DCGS Implementation
COMPONENT_ID	Component Image ID. This is the portion of the component image IDs within a MiS that uniquely identifies the referenced component image segment within the LOOK. Together, the SCENE_ID field and the COMPONENT_ID field correlate to the IMAGE ID of the component image.	The remaining 22 of the 40 character image ID beyond the scene ID portion (18 characters) extracted from the ITITLE/IID2 field of the component image.

C.1.3 Composite/Overview Image ASDE Considerations

When generating a composite overview image, the inclusion of all the ASDEs from the full resolution component(s) is not required and in some cases may even be confusing to a recipient of the data. The necessity of the ASDEs should be determined based on how the composite/overview image will be used. The following list provides some guidelines and considerations for generating ASDEs for composite/overview images.

- As a minimum, the Aircraft Information (ACFTB) and Additional Image Identification (AIMIDB) ASDEs should be present, but both ASDEs will need to be re-populated to reflect the characteristics of the composite/overview image.

- Even though the EO-IR Sensor Parameters (SENSRA) ASDE is required for EO/IR/MSI, it may not be feasible, due to the numerous SENSRA ASDEs present in the component images of the composite. The presence of this TRE is not expected.

- If the SENSRA ASDE were included in a composite/overview, the values should be recalculated to reflect the component images of the composite/overview.

- The presence of the optional ASDEs identified in the STDI-0002 Version 2.1, Table 8-1 will not be expected.

- If the composite/overview image will be used for exploitation purposes, the ASDEs from the full resolution image component(s) should be present with the addition of the ICHIPB ASDE.

- If the composite/overview image is accompanied by the full resolution component(s) and will not be used for exploitation, the presence of the SENSRA and optional ASDEs are not necessary.

- The acceptance of the Tactical Image ID may cause a future action to abolish the requirement for using the AIMIDB ASDE altogether, even in full resolution component images. It is expected that future research will lead toward the abolishment of AIMIDB or a new AIMIDC.

C.2 DCGS Tactical Output Data Types

As DCGS imagery data is passed from one component to another, it will typically conform to one of six output types, lettered A through F. This section attempts to describe these output types. Figure H-C-1 below depicts the DCGS lifecycle with the expected output types for each component.

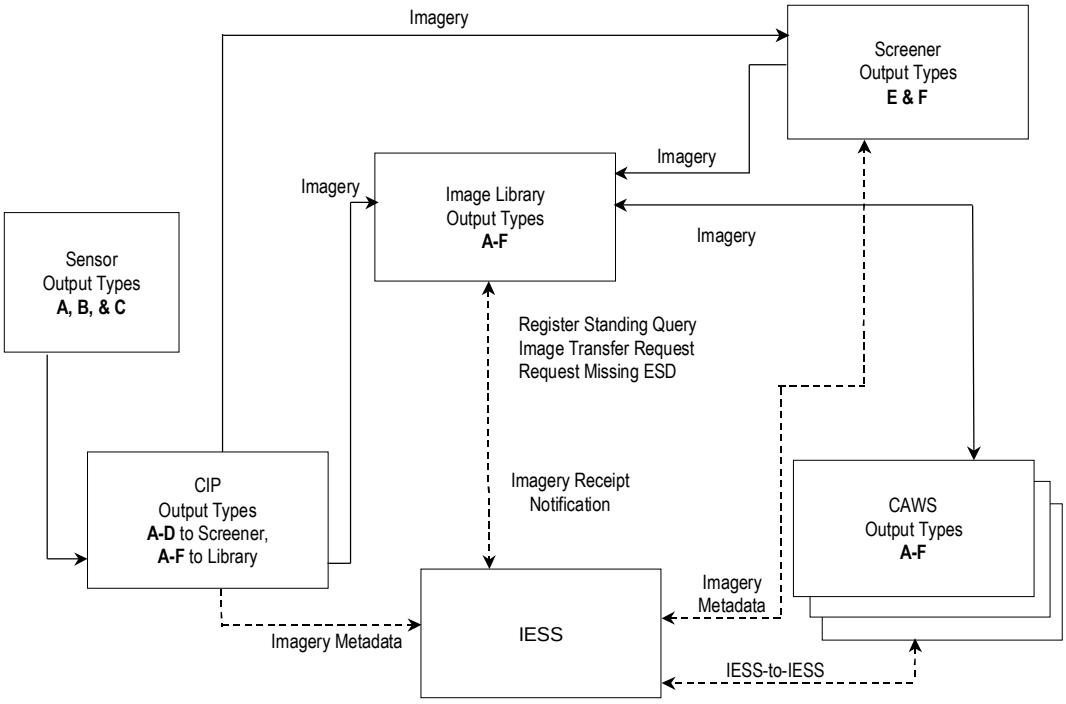

Figure H-C-1 - Expected Output Types

The examples below use the following acronyms:

FR – Full Resolution Image M – MITOCA TRE

RR – Reduced Resolution Image ( ) – delineates a NITF file

VC – Volume Composite image [ ] – delineates a Volume

C.2.1 Output Type A

- A Look composed of FR images only, each in a separate NITF file
- A MITOCA is not present
- A composite image is not present

$$(FR_1) + \ldots + (FR_N)$$

C.2.2 Output Type B

- A Look composed of FR images and corresponding RR images
- Ideally, a MITOCA is present for every FR/RR pair, i.e. each pair is a Volume having one Component Image (the FR) and a Volume composite (the RR)
- The only difference between A and B is the RR (which in this case is the Volume composite)

$$(FR_1 + RR_2) + \ldots + (FR_N + RR_N) \text{ or}$$

$$\text{Ideally: } [\ (M_1 + FR_1 + RR_1)\ ] + \ldots + [\ (M_N + FR_N + RR_N)\ ]$$

C.2.3 Output Type C

- A single or multi-volume Look composed of FR images in separate NITF files
- Contains a MITOCA TRE and a Volume composite

$$[\ (FR_1) + \ldots + (FR_N) + (M_1 + VC_1)\ ] \text{ or}$$

$$[\ (FR_1) + \ldots + (FR_N) + (M_1 + VC_1)\ ] + [\ (FR_{N+1}) + \ldots + (FR_{N+M}) + (M_X + VC_X)\ ] + \ldots$$

C.2.4 Output Type D

- A single or multi-volume Look with Volume composite(s)
- Each Volume contains a MITOCA TRE

$$[\ (M_1 + VC_1)\ ] + \ldots + [\ (M_X + VC_X)\ ]$$

C.2.5 Output Type E

- A single or multi-volume Look composed of FR images all in a single NITF file
- Contains a MITOCA TRE and Volume composite
- The Volume Composite may be contained in a separate NITF file of Output Type D

$[(M_1 + VC_1 + FR_1 + \ldots + FR_N)] + [(M_X + VC_X + FR_{N+1} + FR_{N+M})] + \ldots$ or

$[(\text{an Output Type D}) + (FR_1 + \ldots + FR_N)] + [(\text{an output type D}) + (FR_{N+1} + FR_{N+M})] +$

C.2.6 Output Type F

- An image chip of any of the above output types (Type A – Type E), see section C.3 for a detailed description and examples of chipping outputs
- Contains a MITOCA TRE and Volume composite

C.2.7 Display/Attachment Levels

- Initially, systems may not be able to ingest and exploit the MITOCA to its full potential. It is therefore recommended that the NITF display/attachment Level (DL/AL) fields be used to organize and "collage" the Components of a MiS Volume when possible. This will, as a minimum, act as a default overview display, and will provide a minimum level of visual appreciation for the Volume when a Volume Composite is not present or the receiving application does not support MITOCA. The following items are for consideration only and the implementation of "collaged" Components is not a requirement, just a recommendation. It may not even be possible under all circumstances, due to file size, the size of the NITFS common coordinate system space, and other like constraints. The following is a list of things to consider when implementing DL/AL within a MiS.Use attachment levels to keep from maximizing the ten bytes of the image location ILOC field
- A collage can be generated by:
    - abutting each Component exactly on NROWS/NCOLS pixel boundaries or
    - abut each Component, but not exactly on NROWS/NCOLS pixel boundaries leaving background color between Components

- If a Composite image exists, place it in the upper left corner of the NITFS CCS and begin the collage of Components directly below the Composite, so as to not cover the Composite with the collage

- Ensure maximum CCS size of (00000000, 00000000) to (99999999, 99999999) is not exceeded

C.3 Standard Output of MITOC Chipping

This section contains general purpose information on image chipping in any scenario at any stage of the lifecycle (i.e., exploitation, screener, library, etc.) where chipping may take place. For ease of explanation, the DCGS screener workstation (SWS) scenario has been chosen.

After DCGS imagery has been passed through the Common Imagery Processor (CIP) it will be transferred to a screener as a reduced resolution (RR) composite image. A user at the SWS can then choose an area of interest (AOI) from the composite imagery displayed on the screen. The pixel information contained within the AOI is used to create an image chip file--a full resolution (FR) file(s) containing the AOI. Figure H-C-2 illustrates three types of chipping outputs, which will be further described in following paragraphs.

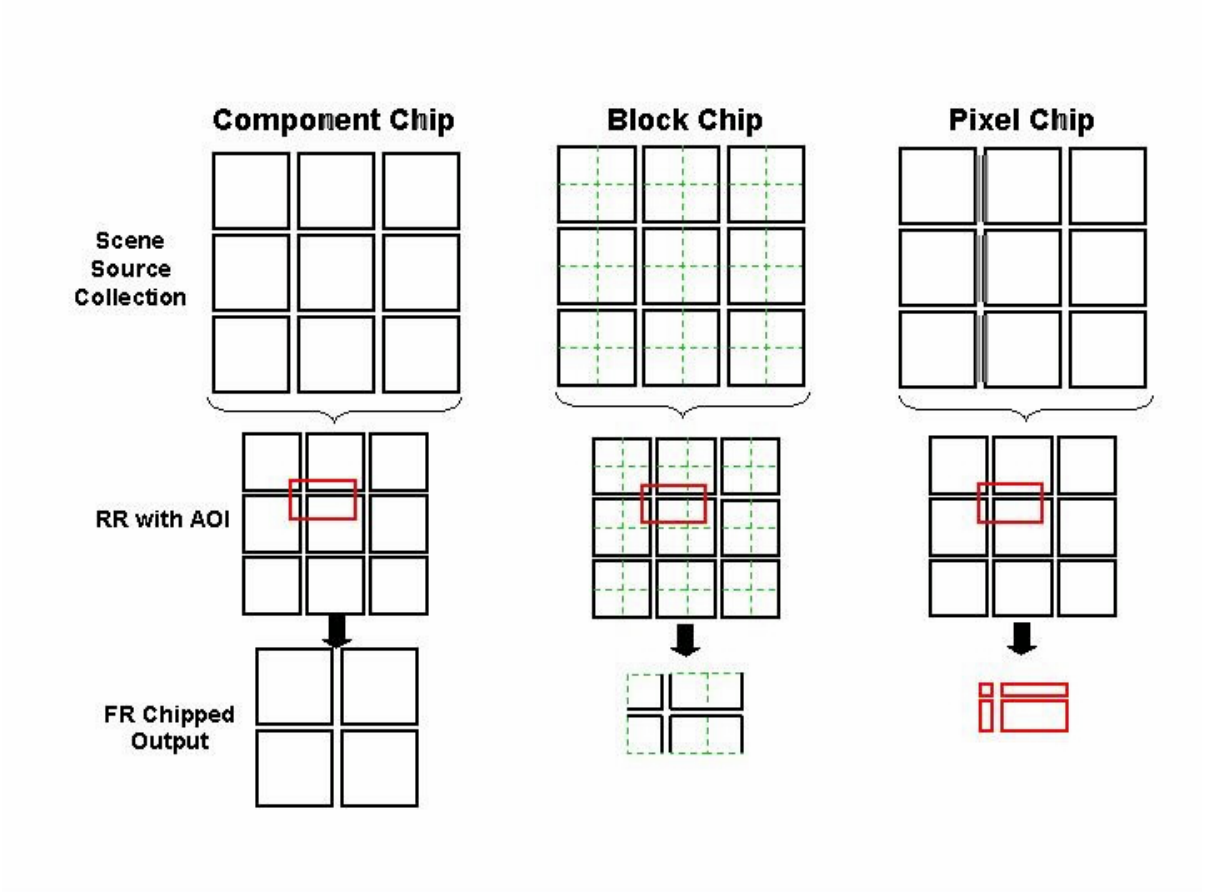

Figure H-C-2 - Standard MITOCA Chip Outputs

C.3.1 Pixel Chip

With pixel chipping, the recipient will receive the pixels bounded within the AOI by the user at the screener workstation. This AOI generates a new composite image (usually RR), and can optionally be included in an image segment in the output chip file. A MITOCA and an ICHIPB TRE will accompany the composite image in the segment's main header and image subheader respectively. When the AOI crosses multiple components, the resulting output will contain each component "piece" (only those pixels within the bounds of the AOI) of the chipped image within its own image segment with an ICHIPB TRE for each. Each component piece will also contain the original support data for that component. See figure H-C-3.

Pixel chipping can also be performed within a single component. In this case, the output would only contain an image segment for the piece chipped and may optionally include a new composite image.

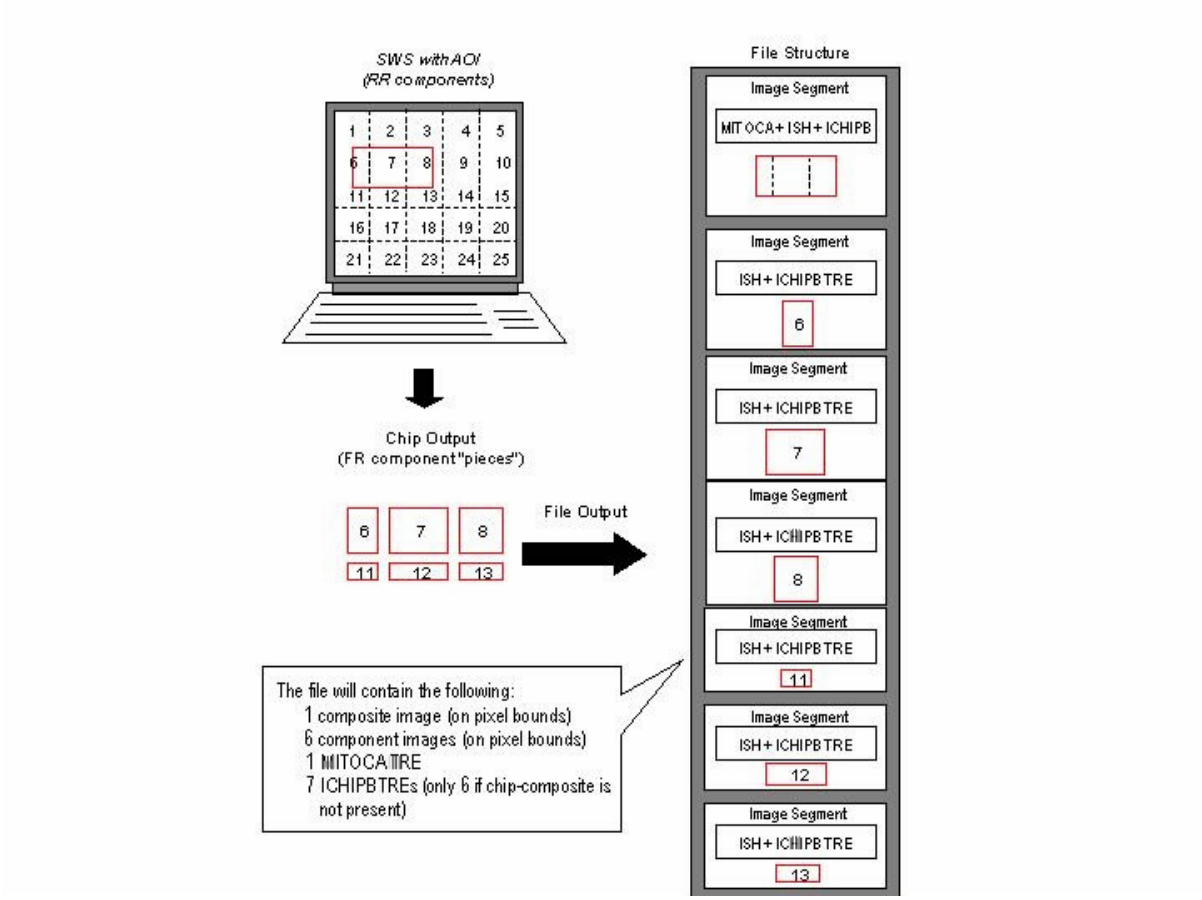

Figure H-C-3 - Pixel Chip Output

C.3.2 Component Chip

With component chipping the output is not necessarily an actual image chip. The recipient will receive each whole component within the bounds of the AOI chosen by the user at the screener workstation. This AOI generates a new composite image (usually RR). Since the output is the same data as the original (just re-grouped) there is no need for an ICHIPB TRE. The new composite image can optionally be included in an image segment in the output "chip" file along with an ICHIPB TRE. A MITOCA TRE will accompany the composite image in the segment's main header. When the AOI crosses multiple components, the resulting output will contain each whole component of the AOI within its own image segment with its original support data. Again, an ICHIPB TRE is not included with any of the components. Figure H-C-4 illustrates Component chipping.

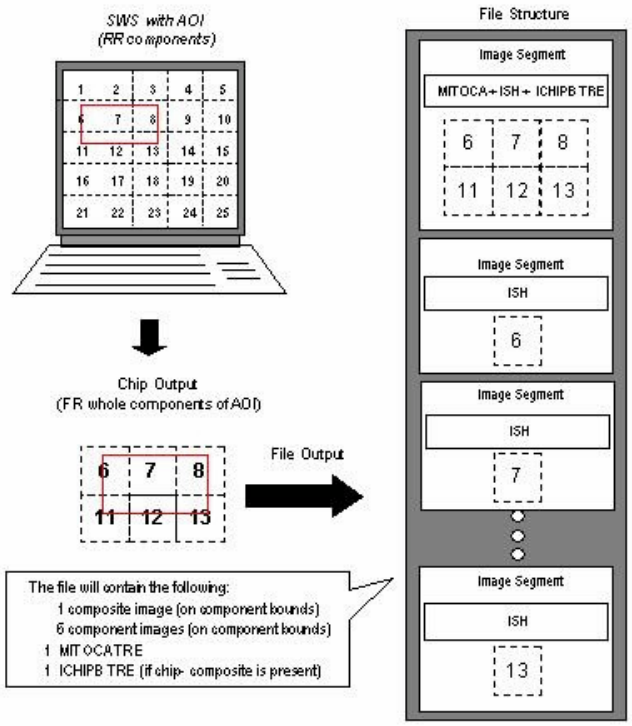

Figure H-C-4- Component Chip Output

C.3.3 Block Chip

With block chipping, the recipient will receive all the internal NITF image blocks touched by the AOI. These blocks generate a new composite image (usually RR), and can optionally be included in an image segment in the output chip file. A MITOCA and an ICHIPB TRE will accompany the composite image in the segment's main header and image subheader respectively. When the AOI crosses multiple components, the resulting output will be an image segment for each component, containing only the affected blocks of each component. Each segment will contain an ICHIPB and the original original support data for that component. See figure H-C-5.

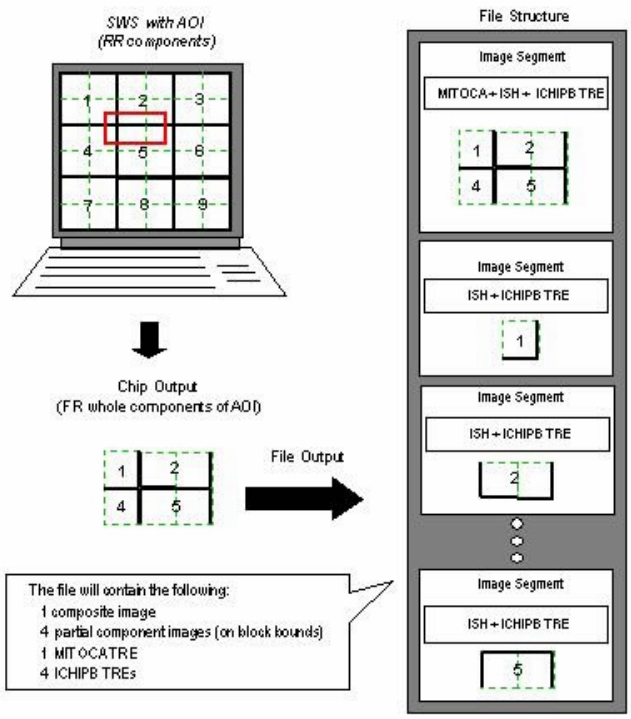

Figure H-C-5- Block Chip Output

C.4 Library Considerations

A library provides services for receipt, catalog, browse, search, select, notify, format conversion, information maintenance, storage, archive, and communicating geospatial intelligence information. The MITOCA TRE provides support for managing a multi-image scene during the Tasking, Collection, Processing, Exploitation and Dissemination (TCPED) process. A MITOCA TRE can be

beneficial to a library because it will be able to act on a Volume of related imagery instead of treating each individual Component as a stand-alone image. The following sub-sections define the basic characteristics of a MiS in a library and provide some minimum guidelines for developers to consider. Features that are somewhat advanced (support not expected during early development stages) are noted by an *.

C.4.1 Ingest

- Volumes should be cataloged as a single image, therefore there is no need to catalog every Component individually (even in the case where every image of a scene is its own Volume)
- Only the FR IM and support data of a paired IM segment Volume (one FR, one RR both having the same image ID) should be cataloged (see Output Type B)
- R-sets should be generated from the FR, not a RR (see Output Type B)
- A RR can be used as a thumbnail image or a new R-set can be made (see Output Type B)
- If a Volume Composite is not provided, consider generating a burned-in composite of the NITF canvas
- A Volume may only contain a file main header with a MITOCA TRE and should still be cataloged
- *A Look Composite can be made by amalgamating Volume Composites

C.4.2 Discovery

- Clients should initially be capable of discovering relevant Volume Composites
- Clients should additionally be capable of using a Volume Composite to narrow down an area of interest
- A Volume with only a MITOCA (and possibly a Volume Composite) can be used by the client to find the list of relevant components, but an additional search will be necessary to retrieve them
- Components belonging to the same scene can be tracked using the image ID (particularly Output Type A)

- Paired IM segments (one FR, one RR both having the same image ID) constituting their own Volume can be identified by: identical image IDs and by comparing Image Magnifications (IMAG) (see Output Type B)

C.4.3 Translation

- Translations/conversions should be uniformly applied across the whole Volume.

C.4.4 Export

- Products should be exported as one of the six output types described in C.2.

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Appendix I -- Generation of Reduced Resolution NITF Image files

I-1 Purpose. This appendix provides guidance on the generation of reduced resolution images in the National Imagery Transmission Format (NITF).

I-2 Scope. This appendix discusses practices for generating NITF reduced resolution images in a manner consistent with the traditional method used by the National imagery community. It also provides guidance on deviations from the National Imagery Producer approach to producing reduced resolution images. Generation of National Technical Means (NTM) Reduced Resolution Data Sets (RRDS) by National producers is described in the NITF Implementation Requirements Document (NITFIRD). This appendix only addresses RRDS for single image segment NITF files.

I-3 Background. Generally, the historical use of the term RRDSs in the NITF community has referred to the National Technical Means (NTM) Imagery producers. This concept is to build the RRDS while preserving sufficient support data to facilitate exploitation of the resulting RRDS. There are cases where applications down-stream from the NTM Producer may want to produce RRDS. In these cases, it is important to do so in a manner that emulates the NTM approach while not being mistaken for a bona fide NTM producer. There are also cases where applications may develop Reduced Resolution NITF files that are for the sole purpose of supporting display features of the subject application.

I-4 Practices

In the following discussion the nomenclature “rX” is used whereby “X” is the power of 2 used in the decimation of the Rset such that: NOTE: The term decimated/ion used herein means an “image that is reduced in resolution from the original full resolution image”).

“r0” means the original full resolution image.

“r1” means a decimated image where the number of rows and columns are reduced by 1/2 producing an image with 1/4 of the image display size of the full resolution image. This is referred to as a “reduction of 1/2” or an IMAG of “/2”.

“r2” means a decimated image where the number of rows and columns are reduced by 1/4 producing an image with 1/8th the display size of the full resolution image. This is referred to as a “reduction of 1/4” or an IMAG of “/4”.

I.4.1 File Name. If the file name of the rX file contains the sub-string “.rX” anywhere within it, the decimated files shall contain the same file name with the “X” replaced by the appropriate Rset value. If the file name of the rX file does not

contain the string ".rX" then the file names of the decimated files shall contain the same values as the original file with the string ".rX" appended to the end of the string. If the file name of the rX file contains more than one ".rX" sub-string, the first occurrence from left to right shall take precedence and shall be the only one modified.

I.4.2 FTITLE Field. If the FTITLE field of the rX file contains the sub-string ".rX" in the 41st, 42nd and 43rd character positions, the decimated files shall contain the FTITLE with the "X" replaced by the appropriate Rset value, otherwise, the FTITLE will remain unchanged in the .rX files.

I.4.3 IMAG Field. The IMAG field shall contain the value corresponding to the reduction of the Rset using the nomenclature as specified in MIL-STD-2500.

I.4.4 ITITLE Field. The ITITLE field of the rX file shall be exactly duplicated in the reduced resolution image segments of the NITF files.

I.4.5 If the rX IM segment contains more than one image band then each decimated IM segment shall contain the same number of image bands. The image bands of each decimated IM segment shall be in the same order as the rX file.

I.4.6 The decimated files shall contain the same number of blocks per row and blocks per column as the original rX file.

I.4.7 The smallest block size of a decimated file will be 8 rows and/or 8 columns. Note: This (8 x 8 pixel block size) is a known deviation from the NTM standard for producing R-sets.

I.4.8 If the original rX file contains any Support Data Extensions (SDEs) (also known as Tagged Record Extensions (TRE) or TAGs) they will be copied into the decimated files.

I.4.9 In the case where an application is building reduced resolution images for the sole purpose of supporting internal processing/display functions, SDEs should not be included in the file and the file naming convention should differ from the naming convention described above. The intent is to not confuse other applications that may key on the file naming convention as the indicator that the file is an "NTM" or "NTM like" file fit for exploitation purposes.

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Appendix J -- Tactical Image Identifier (TII) Specification

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NOTICE: This document is not a stand-alone document. It is Appendix J to the Implementation Practices of NITFS (STDI-0005), which is not published yet. The contents of Appendix J are DRAFT. Developers considering implementation are requested to contact the JITC NITFS Lab.

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TACTICAL IMAGE IDENTIFIER

SPECIFICATION

VERSION 0.5

07 January 2005

DRAFT

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Tactical Image Identifier
Version 0.5, 07 January 2005
DRAFT

TBD/TBR Listing

Page Number	TBD/TBR	Description
J5	TBR001 (Resolved)	Is the Sortie number of the month the number of the month, day, either or something else? It is of the month.
J9	TBR002 (Resolved)	We need to add a definition for SCNUM. How will we handle the immediate/manual scene (Currently the SCNUM is 00000 and two additional fields (IMHOSTNO and IMREQID) get used to number the scene. Do those numbers get carried over to Tac ID, or are all zeros ok? See paragraph J.3.3 for CONOPS Alternatives.
J-7	TBR005 (Resolved)	Some systems (e.g. SHARP) use the remaining characters of IID2 field. Downstream systems (e.g.; NGL, IESS, IPL, IEC) currently do not read these characters. The TII Specification will not preclude programs from using the remaining 40 characters, and there is no expectation on how it will be populated other than with BCS-A.
J-8	TBD001	Test criteria. Need to develop test criteria for implementing Tac Image ID.

Change Log

Date	Pages Affected	Mechanism

Effectivity Log

Number	Effective	Description

Tactical Image Identifier Specification
Version 0.5, 07 January 2005
DRAFT

Editors Notes

Date	Change	Rationale
March 2004	- Added the TBR/TBD and change logs - Added an Introduction, Purpose, Scope, Background and References - Expanded general implementation guidelines	Completeness
10 May 2004	REPLAY field. Removed the P01-P99 series for reprocessed data.	There is no need for both a G and P series; this is an unnecessary carry-over from legacy data.
24 Aug 2004	- Removed definition of Conditional (C) and brackets (<>). - Changed Alphanumeric to BCS-A and Numeric to BCS-N - Added full definition of ACQUISTION_DATE - Restricted the value range for SORTIE_NO and PRODUCT_NO - Removed the brackets from PROJECT_CODE and REPLAY - Specifically identified some values as uppercase characters - Identified interim values for some fields	- All fields are Required (R) - Consistency with MIL-STD-2500B - So the reference to another document is not needed - IESS requirement - Information should always be present - Clarification - During early development some required information may not be available
6 October 2004	The following changes were made based on the 30 Sept 04 meeting. - Removed the restriction of the value range of the PROGRAM_CODE - Changed the description of the PROJECT_CODE	-Restriction no longer necessary -NGA will be assigning the number, not DIA -000-FFF already includes 000-999. - It really is sortie number of the month.

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Date	Change	Rationale
	- Removed reference to 000-999 in the PRODUCER_SN - Removed TBR001. - Removed TBR005.	- There is no expectation for the population of the remaining 40 characters of the IID2 field.
26 October 2004	- Changed the PROGRAM CODE value range back to the original values. - Closed TBR002 - Added clarification for libraries on how to handle legacy IID2. - Corrected spelling	- compliant with the current governing document CJCSI 3250.01B. - see TBR listing above - clarification - correctness
22 November 2004	- Provided the source of information for Tac ID subfields - Provided guidance for assigning scene numbers for immediate/manual and re-tasked images	- Completeness - Completeness
6 January 2005	- Changed the PRODUCTION_DATIM subfield description to match the subfield name. - Replaced all references to PROCESS_DATIM with PRODUCTION_DATIM	- Completeness - Clarification - Consistency
7 January 2005	- Added Tac ID pack test criteria. Unpack test criteria remain TBD. - Provided guidance for assigning scene numbers for immediate/manual and re-tasked images in table J-2.	- Completeness - Clarification

Point of Contact for this DRAFT: Chairman, NITFS Technical Board (NTB); ntbchair@nga.mil

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J.1 INTRODUCTION

The increasing use of tactical sensors to collect image data over large areas of the earth poses a number of challenges for managing the resulting large data flows through the traditional Tasking, Collection, Processing, Exploitation and Dissemination (TCPED) and the Task, Post, Process and Use (TPPU) processes. Several groups within the Intelligence Community (IC) identified shortfalls with past conventions for image identification within the tactical airborne community. Primary coordination of the new tactical image identifier (e.g.; Tac Image ID) has been through the DCGS IMINT IPT and NITF Technical Board (NTB). Comments and revisions to this specification will be managed through the NITFS Technical Board (NTB), which is the controlling authority for the NITF and any future related Tactical Image Identifier issues.

J.1.1 Purpose

This appendix specifies a new tactical image identification scheme. It provides guidance, clarification and recommended practices to allow tactical imagery producers to provide unique image identifications. It also provides common practice for updating tactical image identifiers by downstream processing systems.

J.1.2 Scope

This appendix identifies all cases in which updating/editing of the tactical identification is necessary. This specification applies to NITF 2.1 formatted data only, and in particular, to the Image Identification 2 (IID2) field in the NITF Image Segment Sub-header.

When using this Tactical Image Identifier specification, the previous Image Identifier formulation mapping partially derived from the Additional Image Identification (AIMIDx) Tagged Record Extension (TRE) shown in table 8-4 of STDI-0002 shall not be used. AIMIDB may be phased out altogether in the future.

The new tactical identification scheme primarily applies to tactical airborne imagery collection and ground-processing systems as called out by appropriate requirements documents and program authorities. These systems/processors have the responsibility of assigning an initial image identifier when creating the primary image product.

Downstream processors (e.g. screeners, Image Product Library (IPL), an Electronic Light Table (ELT), etc.) update characters -33-40 when creating new secondary image products for external dissemination (e.g. sent to an IPL); however, they do not edit/update the tactical identification when passing along (re-transmitting) images.

Libraries receiving NITF files with the legacy AIMIDB 40-character mapping of the IID field will not convert to the new DCGS Tactical Image ID and are asked to use associated TREs to detect and handle. Furthermore, the libraries shall not update to IID2, including PRODUCTION_DATIM for legacy airborne imagery. Libraries receiving NITF files with the new DCGS Tactical Image ID should use the ACFTx TRE's presence to determine it is from an airborne producer.

NOTE: Neither this appendix, nor The Compendium of Controlled Extensions for the NITF, STDI-0002, provides definitive guidance to tactical users for file naming, population of the NITF File Header FTITLE field, derivative imagery product naming or any other relationships between them. Each individual sensor, processor, system, and/or program is left to define its own practices within their respective requirements documents.

J.1.3 Background

The Airborne Support Data Extension (ASDE) section of STDI-0002 defines the Additional Image Identification (AIMIDx) Tagged Record Extension (TRE). The original intent of the AIMIDx TRE was to provide identification of the original source imagery and its associated support data. The AIMIDx is:

- A required component of all airborne imagery segments (one in each subheader of every NITF image segment).
- Used for catalog, discovery, and retrieval from standard imagery libraries, and
- The source for defining the legacy forty-character image identifier used to populate the IID2 field within the image subheader (see STDI-0002, table E-4).

Various tactical sensors and associated processing programs currently populate the AIMIDx TRE (and consequently the IID2 field) using different conventions and practices. Airborne sensors that generate NITF files frequently populate the AIMIDx TRE fields with the allowed default values for a variety of reasons (e.g., lack of onboard processing capability, lack of information, etc.). Individual ground/surface processors attempt to populate the missing data, sometimes resulting in confusion and duplicate IID2 field entries. This confusion impacts various imagery management systems, image libraries and automated dissemination systems causing the Tactical DCGS community to develop a new image identification convention, defined herein.

The DCGS community developed the Tac Image ID solution with the intent to provide uniqueness and functionality with the least impact/disruption. This solution accommodates the Imagery Exploitation Support System's (IESS's) twenty-four-

character (for uniqueness) and forty-character image ID constraints. This solution does not create a new AIMID TRE version. Tactical sensors and associated processing programs will continue to populate the AIMIDB TRE with valid data, and the processors will continue to edit any fields containing default values, received from the sensors. The new Tac Image ID changes some of the data sources used to populate the IID2 field. The new Tac Image ID will continue to use the values found in the Acquisition Date, Project Code, and Replay fields.

J.2 REFERENCES

MIL-STD-2500A	National Imagery Transmission Format (Version 2.0) for the National Imagery Transmission Format Standard, 12 October 1994 with Notice 1, 07 February 1997; Notice 2, 26 September 1997; and Notice 3, 01 October 1998.
MIL-STD-2500B	National Imagery Transmission Format (Version 2.1) for the National Imagery Transmission Format Standard, 22 August 1997 with Notice 1, 02 October 1998 and Notice 2, 01 March 2001.
STDI-0002	The Compendium of Controlled Extensions (CE) for the National Imagery Transmission Format Version 2.1, 16 November 2000.

J.3 TACTICAL IMAGE IDENTIFIER SPECIFICATION

Table J-1 shows the sub-field structure of the Tactical Image Identifier. The identifier will be used to populate the first 40 bytes/octets of the Image Identifier 2 (IID2) field of each tactical NITF image segment.

J.3.1 Sub-field Information Sources

The original producer of a NITFS IM segment populates the IID2 field as specified by table J-2. Generally, the original producer will be an airborne onboard image processor if it supports NITFS outputs, or a ground station image processor (e.g. CIP) or a combination thereof.

Table J-1 depicts the recommended data flow of Tac Image ID subfield information.

Table J-1. Tactical Image Identifier sources of subfield information

Source	Tac Image ID Subfield	System Information Sent To
Source Authority	Program Code	PRISM Mission/Collection Planner
	Sortie Number	
	Project Code	
PRISM	Collection Date	Mission/Collection Planner
	Program Code	
	Sortie Number	
	Project Code	
Mission/Collection Planner	Collection Date	On-Board NITF Processor Ground NITF Processor (e.g.; CIP) IESS (via CCPM)
	Program Code	
	Sortie Number	
	Scene Number	
	Project Code	
On-Board NITF Processor	Acquisition Date	Ground NITF Processor (e.g.; CIP) or pass through to downstream systems (e.g.; IPL, screener, workstation)
	Program Code	
	Sortie Number	
	Scene Number	
	Product Number	
	Project Code	
	Replay	
	Producer Serial Number	
	Production Date and Time	
Ground NITF Processor	Acquisition Date	Downstream systems
	Program Code	
	Sortie Number	
	Scene Number	
	Producer Code	
	Product Number	
	Project Code	
	Replay	
	Producer Serial Number	
	Production Date and Time	

Sometimes the initial NITF formulation occurs at a stage in which some or not all of the data required to populate the subfields may be available to the onboard processor. In this case, the onboard processor must create a “template” ID populating those subfields for which it has the data. The processor populates fields

with the defined default values (see Table J-3) when the actual value is not yet known.

The Common Imagery Processor (CIP) will use the following logic to populate the Tactical Image Identifier: 1) Manual Entry (via NITF Packing Plan); 2) Sensor Data (when provided/supported); Site Defaults (via the NITF Configuration File).

J.3.2 REPLAY field

The codes G01-G99 designating “reprocessed” and codes T01-T99 designating “retransmitted” are only to be used by the processor that does the original formulation of the image in NITF format, including downstream formulation of composites by screener, IPL, or ELT. If a sensor sends down image data in a non-NITF format to the ground processor, the ground processor will formulate the original NITF IM segment and use code “000”. For multiple image scenes, the Gxx and Txx codes are only used for component images. The C01 and C02 codes are only used for composite images (overviews) of a multi-image scene. See the specification for the Multi-Image Scene Table of Contents (MITOCA) TRE.

J.3.2.1 Reprocessed image data

If the image processor needs to reprocess the raw image data and formulate another NITF IM Segment from the same data, then it must apply the G01 code for the first reprocessed NITF IM segment, G02 for the second, and so on. Downstream processing actions (e.g. recompression, rotation, chipping, selecting specific bands, etc) to edit and resave the IM segment must only update the PRODUCTION_DATIM subfield of the pre-established Tactical Image ID. However, if the downstream processor is formulating a brand new image (e.g. a composite overview) then an entire new Tactical Image ID is formulated.

J.3.2.2 Retransmitted image data

The processor originating (e.g. onboard image processor, ground station, etc.) an NITF IM segment populates the REPLAY subfield with “000”. If the processing station is requested to retransmit the image, and it still has a copy of the original NITF IM segment it created, then it must update the REPLAY subfield with T01 for the first retransmission, T02 for the second retransmission, etc.

If the processor does not retransmit an existing NITF IM segment, but reprocesses the raw data into a new NITF IM segment, then they must use the Gxx codes. The re-formulation of the image may result in different pixel values, whereas a retransmitted image should be identical to the originally formulated image data. If the ground station image processor retransmits vice reprocesses, it should use the Txx codes. In either case, the PRODUCTION_DATIM subfield will also need to be updated accordingly.

J.3.2.3 Reduced Resolution Data Sets (Rsets)

For production of Reduced Resolution data sets (Rsets) created for use with the image as a group (e.g.; to facilitate zooming), the Tac Image ID PRODUCTION_DATIM will not be updated. The full resolution image and all its associated Rsets will have the same tactical image ID. However, if a specific reduced resolution image is selected or created as a stand-alone product for further dissemination, the PRODUCTION_DATIM subfield must be updated.

For instance, if the recipient of an image containing a Tac Image ID produces "standard" Rsets on ingest, the PRODUCTION_DATIM does not need to be updated. However, if a user requests a non-standard Rset (an Rset other than the one created automatically on ingest), the library must update the PRODUCTION_IDATIM prior to exporting the product.

J.3.3 Immediate/Manual Scene Numbers and Re-Tasked Images

The Imagery Exploitation Support System (IESS) requires that each scene in a mission have a unique scene number. Scene numbers do not have to be sequential, only unique. Various mission/collection planners can produce ad hoc "re-tasking" or "immediate scenes" collections. In order to satisfy the downstream automated exploitation environment, there are three alternative system CONOPS that mission/collection planners and on-board NITF sensors should follow when creating "re-tasked" or "immediate scenes". The third alternative applies to immediate scenes only.

J.3.3.1 Alternative One

Alternative One is to assign scene numbers for these special cases at the end of the original mission plan. For instance, if the original mission contained 300 scenes, number re-tasking or immediate scenes starting at 301.

J.3.3.2 Alternative Two

Alternative Two is to assign either of these type scenes at a predetermined reserved set of values that are high enough to not impact any original mission plan. For instance, starting at 66,500.

J.3.3.3 Alternative Three

The third alternative is based on STDI-0002, CN1 CONOPS where immediate scenes are assigned "00000" in IID2. Actual assigned scene values are populated in IMHOSTNO and IMREQID under the ACFT/B TRE. Scene numbers from IMHOSTNO and IMREQID should not be mapped to IID2. While this alternative is still acceptable, it is not recommended under the new Tac Image ID environment for

several reasons. First it creates the need for downstream systems to continue to depend on a TRE for scene number(s). Second, NITF processing systems must ensure they do not map the scene information from ACFT/B even though this is a mandatory TRE for all airborne imagery. Third is the associated relationship of the Common Collection Plan Message (CCPM) [see Appendix K] for the Tac Image ID airborne system CONOPS environment. If scene numbers assigned in IMHOSTNO and IMREQID are mapped to the CCPM and are duplicate scene numbers (e.g.; used in original mission plan), this will break certain IESS operations.

Table J-2. Tactical Image Identifier (Tactical Image ID)

R = required by all original image producers

IID2 (Bytes)	Subfield Name	Subfield Description	Value Range		Type
1-7	ACQUISITION_DATE	Acquisition Date. This is the image collection date and **not** the start of mission date or aircraft takeoff date. DD is the day of the month, MMM is a three letter abbreviation of the month, JAN, FEB,…DEC (uppercase), YY is the least significant 2 digits of the year Note: This is the same date (different format) as recorded in the Image Subheader IDATIM field.	BCS-A DDMMMYY		R
8--9	PROGRAM CODE	Program Code. Assigned by Operations (e.g.; CAOC). This value is the same as the first two characters of the Mission ID.	BCS-A 0-9, A-Z (uppercase) 1st char is numeric 2nd char is alphabetic		R
10-11	SORTIE NO	Sortie Number. Assigned by Operations. Last two characters of sortie number of the month.	BCS-A 0-9, A-Z (uppercase)		R
12-16	SCNUM	Scene Number. Identifies the current scene, and is determined from the mission plan, except for ad hoc “re-tasking” or “immediate scenes”. Scene numbers do not have to be sequential, only unique. See paragraph for J.3.3 for further details.	BCS-N 00000-99999		R
17-18	PRODUCER_CODE	DOD/DIA producer code. Uniquely defines a producer per site. Site designation.	BCS-A AA-ZZ (uppercase)		R

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IID2 (Bytes)	Subfield Name	Subfield Description	Value Range		Type
19-24	PRODUCT_NO	Product Number. "Producer-defined" product id number which uniquely defines each product produced by a given producer. This could be a simple one-up product sequence number. E.g., the CIP Product Number is comprised of three separate subfields: a processing configuration number (1 char, 0-F), a product type id (2 chars, 01-FF), and a product sequence number (3 chars, 000-FFF); for CIP processing configuration = 1, product type id = 12, and product sequence number = 25; then the PRODUCT_NO = 10C019 (hex).	BCS-A 0-9, A-Z (uppercase)		R
25 -26	PROJECT_CODE	Project Code. Two-character NGA assigned project code.	BCS-A AA-ZZ (uppercase)		R
27 - 29	REPLAY	Replay indicator. Indicates whether the data was reprocessed or retransmitted. See para J.3.1 for additional discussion. 000: original C01: DCGS-I Look Composite C02: DCGS-I Volume Composite G01-G99: Reprocessed Image T01-T99: Retransmitted Image	BCS-A 000, C01, C02, G01-G99, or T01-T99		R
30 -32	PRODUCER_SN	Producer serial number. Defines a unique instance of the primary image producer (e.g.; processor).	BCS-A 000-FFF (No space characters) Represented as either a decimal or a hexadecimal value		R

IID2 (Bytes)	Subfield Name	Subfield Description	Value Range		Type
33-40	PRODUCTION_DATIM	Production Date and Time. Eight -char (hex) production date/time (GMT represented in hexadecimal as elapsed time in seconds since midnight January 1, 1970. Note: This date and time should be equivalent to, or be within a few seconds of the FILE header FDT field and the PIAPRx PRODUCRTIME field (format is different). Any transaction/change/update/modification/editing of the image segment (image subheader and/or pixel values) requires updating characters 33-40 (PRODUCTION_DATIM) to reflect the date/time of the processing action. Anytime a processor edits and resaves a NITFS IM segment that has the new Tactical Image ID, it must update the PRODUCTION_DATIM subfield (bytes 33-40). If the image segment is resaved unmodified (“as is”) or as part of another NITF file (e.g. accumulated into a volume in a NITF file with MITOCA), the PRODUCTION_DATIM_subfield does not need to be updated. See para J.3.2 for reduced resolution data sets (Rsets).	BCS-A Hexadecimal: 00000000-FFFFFFFF		R

J.4 DEFAULT FIELD VALUES

The following table identifies several fields and corresponding values that will be used as defaults by the Common Imagery Processor (CIP) as a flag to identify some information is temporarily unknown, even though these fields are required. As TAC Image ID is adopted by more entities the need for default values will diminish.

Table J-3. Interim Tactical Image ID Default Field Values

Field Name	Interim Field Value
PROGRAM_CODE	9Z
SORTIE_NO	00
PRODUCER_CODE	ZX
PROJECT_CODE	ZZ
REPLAY	000
PRODUCER_SN	000

J.5 COMPLIANCE TEST CRITERIA

J.5.1 Tac Image ID Pack Criteria

The following test criteria apply to the packing (generation) of NITF files when using the Tactical Image ID.

J.5.1.1 All character values are in the printable BCS-A character set (space (0x20) through tilde (0x7E)) with eight bits (one byte per character).

J.5.1.2 All data in fields designated as alphanumeric (BCS-A) are left justified and padded with spaces as necessary to fill the field.

J.5.1.3 All data in numeric (BCS-N) fields are right justified and padded with leading zeros as necessary to fill the field.

J.5.1.4 All fields are present and contain valid data as defined in the Tactical Image ID specification.

J.5.1.5 All field values are within the value range specified in Table J-2.

J.5.1.6 Fields are not populated with default or unknown-designator values unless the actual value is truly unavailable at the specific lifecycle stage of data formation.

J.5.1.7 The production date and time (PRODUCTION_DATIM) is within five seconds of the File Header file date and time (FDT).

J.5.2 Tac Image ID Unpack Criteria (TBD001)

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Appendix K -- Common Collection Plan Message (CCPM) Specification

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NOTICE: This document is not a stand-alone document. It is Appendix K to the Implementation Practices of NITFS (STDI-0005), which is not published yet. The contents of Appendix K are DRAFT and reflect the latest changes agreed upon as a result of a 01 November 2004 Global Hawk-PRISM meeting and 23-24 November coordination between airborne collection/mission planners and IESS. Developers considering implementation are requested to contact the NITFS Lab.

****

COMMON COLLECTION PLAN MESSAGE

SPECIFICATION

VERSION 0.1

24 November 2004

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Common Collection Plan Message Specification
Version 0.1, 24 November 2004
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TBD/TBR Listing

Page Number	TBD/TBR	Description
K7	TBR001	Update the System/Segment Interface Control Document for IESS 5.0, #4260023B, 10 June 2003 for CCPM Version 0.1
K12	TBD001	Test criteria. Need to develop test criteria for implementing CCPM.

Change Log

Date	Pages Affected	Mechanism

Effectivity Log

Number	Effective	Description
NE129	Distributed Common Ground/Surface System (DCGS)-IMINT 1.2	Deliveries IESS 5.0.3 and CCPM version 0.2
NE178	Airborne Integration into NSG (AIN) 3.0	Deliveries IESS 5.1.1 and CCPM version 0.1

Editors Notes

Date	Change	Rationale
24 November 2004	- Initial inclusion of CCPM in the IPON. CCPM has been published twice before in the IESS External ICD.	– Provide IC level accessibility and coordination mechanism

Point of Contact for this DRAFT: Chairman, NITFS Technical Board (NTB); ntbchair@nga.mil

Common Collection Plan Message Specification
Version 0.1, 24 November 2004
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K.1 INTRODUCTION

The increasing use of tactical sensors to collect image data over large areas of the earth poses a number of challenges for managing the resulting large data flows through the traditional Tasking, Collection, Processing, Exploitation and Dissemination (TCPED) and the Task, Post, Process and Use (TPPU) processes. Several groups within the Intelligence Community (IC) identified shortfalls with past conventions for image routing within some areas of the tactical airborne community.

A data flow alternative for single site/single mission management is being delivered via the Distributed Common Ground/Surface System-IMINT 1.2 milestone release (DCGS-I 1.2). The Common Collection Plan Message (CCPM) is part of this solution. Primary coordination of the Common Collection Plan Message has been through the DCGS IMINT IPT, the NITF Technical Board (NTB) and direct IESS-Mission/Collection Planning System (M/CPS) coordination.

Comments and revisions to this specification will be managed through the NITFS Technical Board (NTB). Lower level interface requirements regarding CCPM implementation should be handled via the NGA IESS PMO.

K.1.1 Purpose

This appendix specifies the CCPM scheme. It provides guidance, clarification and recommended practices for M/CPS's in providing the CCPM to IESS.

K.1.2 Scope

This appendix identifies development guidelines, provides the CCPM format, and establishes the system CONOPS for the 24 November 2004, version 0.1 CCPM. The 25 February 2003 initial draft version 0.1 release and the 03 June 2003 version 0.2 release of the CCPM are not documented herein as they have been superceded by the 24 November 2004 Version 0.1 release.

Lower level interface requirements for CCPM are documented in the System/Segment Interface Control Document for IESS 5.0, number 4260023B [TBR001]. This ICD and IESS 5.1.1 will be compliant with this IPON Appendix K release and Version 0.1 CCPM format.

The Mission/Collection Planning System (M/CPS) Interface to IESS is a one-way interface that provides the capability for an external airborne mission/collection planning system to send Common Collection Plan Message (CCPM) information to IESS for enhanced airborne mission support.

The CCPM applies to tactical airborne imagery M/CPSs and the IESS exploitation management systems as called out by appropriate requirements documents and program authorities. M/CPS's have the responsibility of implementing and passing the CCPM under DCGS-I 1.2 and DCGS 10.2 operations.

NOTE: Each individual M/CPS, and/or program, is left to define its own practices within their respective requirements documents especially regarding development of the optional fields of CCPM.

K.1.3 Background

In 2002 after several Technical Exchange Meetings (TEMs) and DCGS IMINT IPTs, a DCGS-I 1.2 milestone was scoped. One on the main requirements of DCGS-I 1.2 was to delivery an alternative, non-conflicting and flexible imagery data flow workflow management capability. This solution is based primarily on IESS-CIP exchanges. To enhance this operation, several "front-end" message exchanges were incorporated including CCPM. CCPM allows IESS to pre-set several data flow routings.

The external CCPM message is transmitted to establish or update in the IESS database the full scene imagery to be collected for a particular mission. The external M/CPS system transmits the external CCPM message in XML format to IESS using FTP. IESS parses and validates the message. If the message passes validation, IESS performs TIC/RIC to identify the targets with due requirements covered by each scene description identified in the message. Routing information for the scenes covering Time Critical Targets (TCTs, targets whose exploitation priority meets or exceeds the defined threshold value) and unchippable scenes (scenes from sensors for which Spot Image Request is not supported) covering targets with due requirements are stored in the database. If the CCPM is an update for a mission in progress, Product Routing Plan Messages will be sent to the CIP for all modified scenes, provided that IESS has not yet received an Exploitation Metadata Message (EMM) for that scene.

K.2 REFERENCES

4260023B	System/Segment Interface Control Document for IESS 5.0, 10 June 2003
AF Multi-INT TRD	Air Force Distributed Common Ground System (AF DCGS), Block No. AFDCGS-03-004 10.2 Air Force Multi-INT Technical Requirements Document, 19 September 2003

K.3 COMMON COLLECTION PLAN MESSAGE SPECIFICATION

Table K-1 shows the sub-field structure of the Common Collection Plan Message (CCPM).

Table K-1. Common Collection Plan Message (CCPM)
24 November 2004

Field Name	Type	Size	Range	M, C or O	Remarks
MISSION REC					(START)
Project_Code	Alpha (upper case)	2		M	NGA assigned codes
Take_Off_Time	Numeric	12		M	Launch time of platform in GMT. YYMMDDhhmmss where Y = Year, M = Month, D = Day, h = Hour, m = Minute, s = Second
Program Code	Alphanumeric	2		M	Theater Code(digit) followed by Program Name(alpha)
Sortie	Alphanumeric	2		M	Sortie of the month
Message_Sequence_ Number	Numeric	3	001-999	M	If Message_Sequence_Number = 001, it is a complete Collection Plan. If Message_Sequence_Number > 001 it is a delta Collection Plan relative to the last Collection Plan.
Sensor_ID	Alphanumeric	6		M	SENSOR_ID field in ACFTB TRE
MISSION REC					(END)
SCENE COUNT REC					(START)
Scene_Count	Numeric	5	00001-99999	M	Number of Scenes
SCENE COUNT REC					(END)
SCENE REC					(START) Repeated for each Scene_Count
Sensor_Mode	Numeric	3	001-999	M	MPLAN field in ACFTB TRE
Scene_Number	Numeric	5	00001-99999	M	Scene Number
Scene_ToT	Numeric	12		O	The collection date and time over target (Planned or Required) YYMMDDhhmmss where Y = Year, M = Month, D = Day, h = Hour, m = Minute, s = Second

Field Name	Type	Size	Range	M, C or O	Remarks
Scene_Trans_Code	Character	1	Blank, A, C, D	M	If Message_Sequence_Number = 001: Blank If Message_Sequence_Number > 001: A = Add C = Change D = Delete
Scene_NIIRS	Numeric	3	0.0 – 9.0	O	Required minimum NIIRS with GSD
Clockwise_Coord_1	Alphanumeric	15	Lat/Long	M	Scene Corner Coord 1 Pixel(0,0) DDMMSSHDDDMMSSH where D = Degree, M = Minute, S = Second, H= Hemisphere
Clockwise_Coord_2	Alphanumeric	15	Lat/Long	M	Scene Corner Coord 2 DDMMSSHDDDMMSSH where D = Degree, M = Minute, S = Second, H= Hemisphere
Clockwise_Coord_3	Alphanumeric	15	Lat/Long	M	Scene Corner Coord 3 DDMMSSHDDDMMSSH where D = Degree, M = Minute, S = Second, H= Hemisphere
Clockwise_Coord_4	Alphanumeric	15	Lat/Long	M	Scene Corner Coord 4 DDMMSSHDDDMMSSH where D = Degree, M = Minute, S = Second, H= Hemisphere
BE COUNT REC					(START)
BE_Count	Numeric	3	000-999	M	Number of BEs
BE COUNT REC					(END)
BE REC					(START) Repeated for each BE_Count
BE_Suffix	Alphanumeric	15		C	BE and Suffix
BE_Name	Alphanumeric	38		C	Target Description
BE_Lat/Long	Alphanumeric	15	Lat/Long	C	DDMMSSHDDDMMSSH where D = Degree, M = Minute, S = Second, H= Hemisphere
BE_Elevation	Alphanumeric	8	-99999.9 to +99999.9	C	Ground Elevation in feet MSL
BE_Priority	Numeric	3	000-999	C	Exploitation Priority
BE REC					(END)

Field Name	Type	Size	Range	M, C or O	Remarks
SCENE REC					(END)

M: Mandatory - must be present in all messages (required for IESS Collection Plan Processing)
C: Conditional - will be present in all messages meeting defined conditions
O: Optional – may be present in a message (anything not Mandatory or Conditional)
NOTE: Alpha entries are to be in upper case.

K.3.1 Sources of information for CCPM

M/CPSs provide IESS with the CCPM. All DCGS M/CPSs should be capable of populating all mandatory fields of the CCPM based on available standard mission/collection planning information. Populating Scene NIIRS, an optional field of CCPM, will depend on individual sensors' ability to provide this information. BE related information (conditional fields) will be dependent on the M/CPS receiving this information.

K.3.2 System CONOPS for CCPM to IESS

M/CPSs should send a CCPM for the original mission/collection pre-plan/plan. The Message Sequence Number for the original mission must be 001. The Scene Trans Code must be blank in this case. The original pre-planned mission CCPM should contain only one entry for the first two records/sections of CCPM - MISSION REC and SCENE COUNT REC - but a separate entry for each scene collection for the remaining CCPM records/sections - SCENE REC, BE COUNT REC, and BE REC (conditional sub-field).

M/CPSs should send a CCPM for each ad hoc collection. Ad hoc collections are those added, changed, or deleted from the original pre-planned/planned mission. Ad hoc collections can be "re-tasking" scene types or "immediate scene" types. Each new CCPM must be numbered sequentially under the Message Sequence Number sub-field of CCPM. For instance, the first ad hoc CCPM should have a 002 entry in the Message Sequence Number sub-field. Each new CCPM must have a "A", "D" or "C" populated in the Scene Trans Code sub-field. Collections were the basic ground coverage and targets/BEs are the same but collection angle is changed should have a "c" in the Scene Trans Code sub-field.

For each ad hoc collection, M/CPSs should contain only one entry for the first two records/sections of CCPM - MISSION REC and SCENE COUNT REC - and a

separate entry for each scene collection for the remaining CCPM records/sections - SCENE REC, BE COUNT REC, and BE REC (conditional sub-field).

There are three alternatives for how to handle numbering of immediate scenes. See Appendix J, Tactical Image Identifier Specification, for alternative breakdown and details.

K.3.3 Functional Interface Specification

Common Collection Plan Message (CCPM) files, in XML format, will be transferred from an external mission/collection planning system to designated IESS directories using standard FTP, as specified by IETF-STD-0009, or POSIX compliant copy commands initiated by the external source. IESS parses and validates the XML data.

The XML schema for this interface is documented in the System/Segment ICD for IESS 5.0. Refer to the XML schema definitions in Appendix J for complete syntax information for the XML message files.

This interface supports the receipt of data message files from external sources recognized by the IESS server. Recognized FTP sources will be provided access to directories on the IESS server designated for the receipt of specific data message files. External data sources must coordinate with the agencies responsible for the IESS server to obtain the directory identification and logon information prior to transferring data files. The interface consists of one message - CCPM.

IESS will validate the Message Sequence Number in ascending order. However, this is an IESS internal validation. No error message is send to the M/CPS. CCPM is currently a one-way interface only. If an external CCPM messages fails validation, an application status notice is created to notify the IESS user. No provision is made to correct the message.

K.3.4 IESS filename convention for the CCPM

The IESS filename convention for the CCPM file is given below:

Position	Description
1-2	Node (Organization) Code
3-7	“MCCCP”
8-13	Transmission Sequence (One Up) Number
14	“.” (period)
15-16	“OX” = Temporary, “OC” = Final

NOTES:

1. The Node Code must be configurable and may vary for each external source. The default value is “MC.”

2. The Transmission Sequence is a fixed width number that starts at 000000 and increments by 1 with every message. After 999999 it then rolls back over to 000000. The intention of this part of the file name is to keep messages from overwriting one another as they build up in the FTP directory.

K.4 COMPLIANCE TEST CRITERIA (TBD001)

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Appendix L -- Exploitation Applications

This appendix provides implementation information for known National Imagery Transmission Format (NITF) data producers. Its purpose is to assist Program Managers/users and developers in understanding the NITF packaging of dta that they may need to use in their products/sustems. The information is provided as a guide and is a snapshot based on publication time of this document.

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NITFS APPLICATION SUMMARY ELT/5500PRO, ImageScout and ILT Plus	
System Identifier:	Paragon ELT/5500PRO, ImageScout and ILT Plus Version 2.0 Build 210
NITFS Services:	Interprets/Displays: NITF 1.1, NITF 2.0, NITF 2.1, and NSIF 1.0 files with images, graphics, label and text segments. Generate/Exports: NITF 2.0, NITF 2.1, and NSIF 1.0 files with images, graphics, and text segments.
NITF/NSIF Version(s):	NITF Versions 1.1(interpret only), 2.0, and 2.1 NSIF Version 1.0
Reference Documents:	Military Standard (MIL-STD)-2500A and 2500B, MIL-STD-2301 and 2301A, MIL-STD-188-198A, Standardization Agreement (STANAG) 4545, STDI-0002
NITFS Compliance Test Report:	September 2004

System Description
The ELT/5500PRO, ImageScout, and ILT PLUS are Complexity Level (CLEVEL) 07 imagery applications that run on Windows 2000 and Windows XP 32-bit hardware platforms and are functionally the same, but are tailored for specific customers by Paragon to reflect specific system's name in the application banner, about box, and help menus. The applications provide high performance, wide-area search, and negation tools for (National Technical Means) NTM imagery as well as advanced ELT exploitation functionality, including support for many commercial imagery file formats. This support includes layering of multiple images to one view, geo-referenced chipping, ultra smooth panning, 30+ imagery algorithms, blend/flicker/swipe with multiple images or maps, snail-trail recording, advanced graphics tools, and complex template production. For the NTM capability, the applications are configured with the National Geospatial-Intelligence Agency mensuration software RULER, version 12.1, in order to exploit NTM imagery products.

Supported Operating Systems
Windows 2000 and XP

General Characteristics	
File Naming Convention	When exporting (saving) the file, the user can either use default assigned name or rename the file.
CLEVELs Supported	NITF 2.1/NSIF 1.0: CLEVEL 07 NITF 2.0: CLEVEL 06
Origination Station Identifier Convention	Using application desktop editor, the user can modify stored value before exporting files.
Security Marking Options Supported	Using application desktop editor, the user can modify stored value before exporting files.

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NITFS APPLICATION SUMMARY ELT/5500PRO, ImageScout and ILT Plus	
Originator's Designated Background Color	Using application desktop editor, the user can modify stored value before exporting files.
Originator's Name Field Convention	Using application desktop editor, the user can modify stored value before exporting files.
Originator's Phone Number Convention	Using application desktop editor, the user can modify stored value before exporting files.
Image Segments Supported	Interpret: Bounds of CLEVEL (100 segments) Generate: Single and Multi image segments
Symbol Segments Supported	Interpret: Bounds of CLEVEL (2 Mb), CGM, Bit-Map, and Labels Generate: CGM only to bounds of CLEVEL
Text Segments Supported	Interpret: Bounds of CLEVEL (32 segments), STA, UT1, U8S, and MTF as STA Generate: STA only to bounds of CLEVEL
Data Extension Segments (DESs) Supported	Interpret: Bounds of CLEVEL (10 segments), TRE_OVERFLOW, Controlled Extensions, Registered Extensions, PIX001 (Windows) and PIX002 (UNIX). PIX001-002 are non-standardized DES types used by Paragon Applications that were grandfathered by the NTB. Generate: PIX001 for data the does not fit into an image, graphic, or text segment Preserve: Yes
Reserved Extension Segments (RESs) Supported	Not yet defined
File Header Tagged Record Extensions (TREs) Supported	Interpret: PIAE, PIX005 (registered TRE) Generate: PIAE, PIX005 Preserve: Yes
File Size/Range Supported	Interpret: Bounds of CLEVEL Generate: Bounds of CLEVEL
Image Segment Options Supported	
Image Identifier 1 (short ID)	Using application desktop editor, the user can modify stored value before exporting files.
Image Identifier 2 (long ID)	Using application desktop editor, the user can modify stored value before exporting files.
Target Identifier Field	Using application desktop editor, the user can modify stored value before exporting files.

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NITFS APPLICATION SUMMARY ELT/5500PRO, ImageScout and ILT Plus	
Image Source Field	Using application desktop editor, the user can modify stored value before exporting files.
Image Comment Fields	Using application desktop editor, the user can modify stored value before exporting files.
Image Characteristics	
Dimensions	Interpret: Bounds of CLEVEL Generate: Bounds of CLEVEL
Pixel Value Types (PVTYPEs) Supported	Application dependent, no user input. Interpret: Bi-Level (B), Unsigned Integer (INT), and Signed Integer (SI) Generate: INT and SI
Image Representation (IREP) Types	Application dependent, no user input. Interpret: Monochrome (MONO); Red, Green, Blue (RGB); RGB/ Look Up Table (LUT); YCbCr (Y = brightness, Cb = Chrominance (Blue); Cr = Chrominance (red); and Multi-band Imagery (MULTI). Note: The Paragon Applications will open other IREPs, but does not fully support them as required by NITFS. Generate: MONO, RGB, YCbCr, MULTI
Image Categories (ICAT) Supported	Interpret: Visible Imagery (VIS), Electro-Optical (EO), Synthetic Aperture Radar (SAR), InfraRed (IR), Multi-spectral (MS), MAP (MAP). Note: The Paragon Applications will open other ICATs, but does not fully support them as required by NITFS. Generate: Drop menu of all 30 MIL-STD-2500B categories
Bounding Rectangle Coordinates	Interpret: Supports all allowed representations Generate: Geographic Only.
Decompression supported Compression Options	Interpret: JPEG Discrete Cosine Transform (DCT) (C3 and M3; 8 and 12-bit), DownSample (I1); Vector Quantization (VQ) (C4 and M4), BI-Level (C1 and M1), and JPEG 2000 (C8) Generate: NC, I1, C3, and C8

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NITFS APPLICATION SUMMARY ELT/5500PRO, ImageScout and ILT Plus		
Pixel Interleave(s)	Interpret:	All allowed representations
	Generate:	Mono -- Band Interleaved by Block (IMODE B), Color – Band Interleaved by Pixel (IMODE P), YCbCr – Band Interleaved by Pixel (IMODE P), and MS – IMODE B
Blocking	Interpret:	single and multi block
	Generate:	single and multi block
Location offset supported	Interpret:	Common Coordinate System (CCS) origin
	Generate:	CCS origin
Attachment Level supported	Interpret:	Not Supported
	Generate:	All overlays assigned an attachment level of “000”.
Reduced Resolutions	Interpret:	Yes
	Generate:	Yes to include National Technical Means (NTM)
Image Subheader TREs Supported	Interpret:	IOMAPA, National SDE, Commercial SDE, and Digest TREs are processed; PIAE and other TREs can be displayed with user-supplied scripts
	Generate:	NSDE, Digest, and PIAE
	Preserve:	All others
Graphic Segment Options Supported		
Graphics Supported	Interpret:	Yes
	Generate:	Yes
Graphic Identifier Convention	Using application desktop editor, the user can modify stored value before exporting files.	
Location offset supported	Interpret:	Yes
	Generate:	Yes
Attachment Level supported	Interpret:	Not Supported
	Generate:	All overlays assigned an attachment level of “000”.
Graphic Subheader TREs supported	Interpret:	Displays PIAE TREs
	Generate:	No
Bitmap Supported	Interpret:	Yes
	Generate:	No

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NITFS APPLICATION SUMMARY ELT/5500PRO, ImageScout and ILT Plus	
Degree of Bitmap Support	Interpret: Fully Supported
CGM Supported	Interpret: Yes Generate: Yes
Degree of CGM Support	Interpret: Full Support Generate: Text, Polygons, Ellipse, Rectangles, Polylines
Text Segment Options Supported	
Text Support	Interpret: Yes Generate: Yes
Text Identifier Convention	Using application desktop editor, the User can modify stored value before exporting files.
Text Title Convention	Using application desktop editor, the User can modify stored value before exporting files.
Attachment Level supported	Interpret: Not Supported Generate: All overlays assigned an attachment level of “000”
Text Subheader TREs supported	Interpret: Displays PIAE TREs Generate: No
STA (Basic Latin Character Set)	Interpret: Yes Generate: Yes
UT1 (Universal Multiple Octet Coded Character Set (UCS) Transformation Format 1)	Interpret: Yes Generate: No
U8S (Universal Multiple Octet Coded Character Set (UCS) Transformation Format 8 (UTF-8) Subset)	Interpret: Yes Generate: No
MTF (US Message Text Format)	Interpret: Yes Generate: No
Data Extension Segments Supported	
Controlled Extensions (NITF 2.0 only)	Interpret: PIAE TREs Generate: No Preserves: Yes
Registered Extensions (NITF 2.0 only)	Interpret: RPF TREs Generate: No Preserves: Yes

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NITFS APPLICATION SUMMARY ELT/5500PRO, ImageScout and ILT Plus	
TRE_OVERFLOW	Interpret: PIAE TREs Generate: No Preserves: Yes
STREAMING_FILE_HEADER	Interpret: No Generate: No
Reserved Extension Segments Supported	
None yet defined.	N/A
Support for other Data Services	
DPPDB	Interpret: No Generate: No
CIB	Interpret: Partial Exploit: ELT is capable of reading the CIB table of contents metadata to mosaic and the frames of a boundary rectangle rather than just displaying individual frame files. There are other metadata within the files (e.g. attributes) which ELT does not display or parse, therefore only partial support is indicated. Display: Yes Parse: Yes Generate: No, not as CIB, but will exports as single image product, with DIGEST TREs
CADRG	Interpret: Partial Exploit: ELT is capable of reading the CADRG table of contents metadata to mosaic and the frames of a boundary rectangle rather than just displaying individual frame files. There are other metadata within the files (e.g. attributes) which ELT does not display or parse, therefore only partial support is indicated. Display: Yes Parse: Yes Generate: No, not as CADRG, but will exports as single image product, with DIGEST TREs

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NITFS APPLICATION SUMMARY ELT/5500PRO, ImageScout and ILT Plus		
NTM (legacy)	Interpret:	Yes
	Exploit:	Yes
	Display:	Yes
	Parse:	Yes
	Generate:	Yes, converted from TFRD
Airborne SDEs	Interpret:	No
	Generate:	No
Commercial SDEs	Interpret:	Yes
	Exploit:	Yes
	Display:	Yes
	Parse:	Yes
	Generate:	Exports as a DIGEST Product not Commercial SDE
DIGEST TREs	Interpret:	Partial; GEOPS, GEOLO, MAPLO, PRJPS, REGPT
	Exploit:	Partial
	Display:	Yes
	Parse:	Partial
	Generate:	Partial; GEOPS, GEOLO, MAPLO, PRJPS, REGPT
Future Imagery Architecture (FIA):	Interpret:	No
	Generate:	No

NITFS Conversion Services	
Reads:	BMP, LANDSAT7, CADRG, JPEG/JFIF, CIB, TIFF/GEOTIFF, DTED, NITF, NSIF, ADF, ADRG, Compare Document, DOQ, ECW, ENVI, ERDAS, MDF, GeoSPOT, JPEG, JPEG 2000, Movie, MrSid, RAW, Remote View, Shape File, Stereo Document, Sun Raster and Symbol Library, and TFRD. Note: Supports NITF, NSIF, and TFRD as identified above. For other file formats, the Paragon Applications will display file formats as well as allowing exploitation of those formats that have exploitable information.
Writes:	BMP, TIFF/GEOTIFF, NITF, NSIF, MDF, GeoSPOT, JPEG, JPEG 2000, RAW, and Sun Raster. Note: For TFRD source, the Paragon Applications will export NITF files with NSDEs. For other file formats that are exploitable, the Paragon Applications will export NITF and NSIF files with DIGEST TREs.

Other Pertinent Information
None

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NITFS APPLICATION SUMMARY ELT/5500	
System Identifier:	Paragon ELT/5500, version 2.0, build 210
NITFS Services:	Interprets/Displays: NITF 1.1, NITF 2.0, NITF 2.1, and NSIF 1.0 files with images, graphics, label, and text segments. Generate/Exports: NITF 2.0, NITF 2.1, and NSIF 1.0 files with images, graphics, and text segments.
NITF/NSIF Version(s):	NITF versions 1.1(interpret only), 2.0, and 2.1 NSIF version 1.0
Reference Documents:	MIL-STD-2500A and 2500B, MIL-STD-2301 and 2301A, STANAG 4545
NITFS Compliance Test Report:	September 2004

System Description
The ELT/5500 is a CLEVEL 07 imagery application that runs on Windows 2000 and Windows XP 32-bit hardware platforms. The application provides high performance, wide-area search, and negation tools for (National Technical Means) NTM imagery as well as advanced ELT exploitation functionality, including support for many commercial imagery file formats. This support includes layering of multiple images to one view, geo-referenced chipping, ultra smooth panning, 30+ imagery algorithms, blend/flicker/swipe with multiple images or maps, snail-trail recording, advanced graphics tools, and complex template production. For the NTM capability, the applications are configured with the National Geospatial-Intelligence Agency mensuration software RULER, version 12.1, in order to exploit NTM imagery products.

Supported Operating Systems
Windows 2000 and XP

General Characteristics	
File Naming Convention	When exporting (saving) the file, the user can either use default assigned name or rename the file.
CLEVELs Supported	NITF 2.1/NSIF 1.0: CLEVEL 07 NITF 2.0: CLEVEL 06
Origination Station Identifier Convention	Using application desktop editor, the user can modify stored value before exporting files.
Security Marking Options Supported	Using application desktop editor, the user can modify stored value before exporting files.
Originator's Designated Background Color	Using application desktop editor, the user can modify stored value before exporting files.
Originator's Name Field Convention	Using application desktop editor, the user can modify stored value before exporting files.
Originator's Phone Number Convention	Using application desktop editor, the user can modify stored value before exporting files.

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NITFS APPLICATION SUMMARY ELT/5500		
Image Segments Supported	Interpret:	Bounds of CLEVEL (100 segments) Single and Multi image segments
	Generate:	Single and Multi image segments
Symbol Segments Supported	Interpret:	Bounds of CLEVEL (2 Mb), CGM and Bit-Map
	Generate:	CGM only to bounds of CLEVEL
Text Segments Supported	Interpret:	Bounds of CLEVEL (32 segments), STA, UT1, U8S, and MTF as STA
	Generate:	Generate: STA only to bounds of CLEVEL
Data Extension Segments (DESs) Supported	Interpret:	Bounds of CLEVEL (10 segments), TRE_OVERFLOW, Controlled Extensions, Registered Extensions, PIX001 (Windows) and PIX002 (UNIX). PIX001-002 are non-standardized DES types used by Paragon Applications that were grandfathered by the NTB.
	Generate:	PIX001 for data the does not fit into an image, graphic, or text segment
	Preserve:	Preserve: Yes
Reserved Extension Segments (RESs) Supported	Not yet defined	
File Header Tagged Record Extensions (TREs) Supported	Interpret:	PIAE, PIX005 (registered TRE)
	Generate:	PIAE, PIX005
	Preserve:	Yes
File Size/Range Supported	Interpret:	Bounds of CLEVEL
	Generate:	Bounds of CLEVEL
Image Segment Options Supported		
Image Identifier 1 (short ID)	Using application desktop editor, the user can modify stored value before exporting files.	
Image Identifier 2 (long ID)	Using application desktop editor, the user can modify stored value before exporting files.	
Target Identifier Field	Using application desktop editor, the user can modify stored value before exporting files.	
Image Source Field	Using application desktop editor, the user can modify stored value before exporting files.	
Image Comment Fields	Using application desktop editor, the user can modify stored value before exporting files.	

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NITFS APPLICATION SUMMARY ELT/5500	
Image Characteristics	
Dimensions	Interpret: Bounds of CLEVEL Generate: Bounds of CLEVEL
Pixel Value Types (PVTYPEs) Supported	Application dependent, no user input. Interpret: B, INT, and SI Generate: INT and SI
Image Representation (IREP) Types	Application dependent, no user input. Interpret: All allowed representations Generate: No
Image Categories (ICAT) Supported	Interpret: All allowed representations Generate: Drop menu of all 30 MIL-STD-2500B categories
Bounding Rectangle Coordinates	Interpret: Supports all allowed representations Generate: Geographic Only.
Decompression supported Compression Options	Interpret: JPEG DCT, (C3 and M3; 8 and 12-bit), DownSample (I1), VQ (C4 and M4), BI-Level (C1 and M1), JPEG Lossless (C5 and M5), and JPEG 2000 (C8) Generate: NC, I1, C3, and C8
Pixel Interleave(s)	Interpret: All allowed representations Generate: IMODE B and P
Blocking	Interpret: Single and multi block Generate: Single and multi block
Location offset supported	Interpret: Common Coordinate System (CCS) origin Generate: Common Coordinate System (CCS) origin
Attachment Level supported	Interpret: Not Supported Generate: All overlays assigned an attachment level of “000”.
Reduced Resolutions	Interpret: Yes Generate: Yes to include National Technical Means (NTM)

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NITFS APPLICATION SUMMARY ELT/5500		
Image Subheader TREs Supported	Interpret:	IOMAPA, Commercial SDE, and Digest TREs are processed; PIAE and other TREs can be displayed with user-supplied scripts
	Generate:	Digest and PIAE
	Preserves:	All others
Graphic Segment Options Supported		
Graphics Supported	Interpret:	Yes
	Generate:	Yes
Graphic Identifier Convention	Interpret:	No
	Generate:	No
Location offset supported	Interpret:	Yes
	Generate:	Yes
Attachment Level supported	Interpret:	Not Supported
	Generate:	All overlays assigned an attachment level of “000”.
Graphic Subheader TREs supported	Interpret:	Yes
	Generate:	No
Bitmap Supported	Interpret:	Yes
	Generate:	No
Degree of Bitmap Support	Interpret:	Fully Supported
	Generate:	No
CGM Supported	Interpret:	Yes
	Generate:	Yes
Degree of CGM Support	Interpret:	Full Support
	Generate:	Text, Polygons, Ellipses, Rectangles, and Polylines
Text Segment Options Supported		
Text Support	Interpret:	Yes
	Generate:	Yes
Text Identifier Convention	Using application desktop editor, the user can modify stored value before exporting files.	
Text Title Convention	Using application desktop editor, the user can modify stored value before exporting files.	

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NITFS APPLICATION SUMMARY ELT/5500	
Attachment Level supported	Interpret: Not Supported Generate: All overlays assigned an attachment level of “000”.
Text Subheader TREs supported	Interpret: Yes Generate: No
STA (Basic Latin Character Set)	Interpret: Yes Generate: Yes
UT1 (Universal Multiple Octet Coded Character Set (UCS) Transformation Format 1)	Interpret: Yes Generate: No
U8S (Universal Multiple Octet Coded Character Set (UCS) Transformation Format 8 (UTF-8) Subset)	Interpret: Yes Generate: No
MTF (US Message Text Format)	Interpret: Yes Generate: No
Data Extension Segments Supported	
Controlled Extensions (NITF 2.0 only)	Interpret: PIAE TREs Generate: PIX001 (attached data file that do not fit characteristics of image, graphic or text segments) Preserves: Yes
Registered Extensions (NITF 2.0 only)	Interpret: RPF TREs Generate: No Preserves: Yes
TRE_OVERFLOW	Interpret: PIAE TREs Generate: PIX001 (attached data file that do not fit characteristics of image, graphic or text segments) Preserves: Yes
STREAMING_FILE_HEADER	Interpret: No Generate: No
Reserved Extension Segments Supported	
None yet defined.	N/A

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NITFS APPLICATION SUMMARY ELT/5500	
Support for other Data Services	
DPPDB	Interpret: No Generate: No
CIB	Interpret: Partial Exploit: ELT is capable of reading the CIB table of contents metadata to mosaic and the frames of a boundary rectangle rather than just displaying individual frame files. There are other metadata within the files (e.g. attributes) which ELT does not display or parse, therefore only partial support is indicated. Display: Yes Parse: Yes Generate: No, not as CIB, but will exports as single image product, with DIGEST TREs
CADRG	Interpret: Partial Exploit: ELT is capable of reading the CADRG table of contents metadata to mosaic and the frames of a boundary rectangle rather than just displaying individual frame files. There are other metadata within the files (e.g. attributes) which ELT does not display or parse, therefore only partial support is indicated. Display: Yes Parse: Yes Generate: No, not as CADRG, but will exports as single image product, with DIGEST TREs
NTM (legacy)	Interpret: No Generate: No
Airborne SDEs	Interpret: No Generate: No

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NITFS APPLICATION SUMMARY ELT/5500	
Commercial SDEs	Interpret: Yes Exploit: Yes Display: Yes Parse: Yes Generate: Exports as a DIGEST Product not Commercial SDE
DIGEST TREs	Interpret: Partial; GEOPS, GEOLO, MAPLO, PRJPS, REGPT Exploit: Partial Display: Yes Parse: Partial Generate: Partial; GEOPS, GEOLO, MAPLO, PRJPS, REGPT
Future Imagery Architecture (FIA):	Interpret: No Generate: No

NITFS Conversion Services
Reads: BMP, LANDSAT7, CADRG, JPEG/JFIF, CIB, TIFF/GEOTIFF, DTED, NITF, NSIF, ADF, ADRG, Compare Document, DOQ, ECW, ENVI, ERDAS, MDF, GeoSPOT, JPEG, JPEG 2000, Movie, MrSid, RAW, Remote View, Shape File, Stereo Document, Sun Raster and Symbol Library. Note: Supports NITF and NSIF as identified above. For other file formats, the ELT/5500 will display file formats as well as allowing exploitation of those formats that have exploitable information. Writes: BMP, TIFF/GEOTIFF, NITF, NSIF, MDF, GeoSPOT, JPEG, JPEG 2000, RAW, and Sun Raster. Note: For other file formats that are exploitable, the ELT/5500 will export NITF0020and NSIF files with DIGEST TREs.

Other Pertinent Information
None

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NITFS APPLICATION SUMMARY ELT/3500	
System Identifier:	Paragon ELT/3500, version 5.0, build 210
NITFS Services:	Interprets/Displays: NITF 1.1, NITF 2.0, NITF 2.1, and NSIF 1.0 files with images, graphics, label and text segments. Generate/Exports: NITF 2.0, NITF 2.1, and NSIF 1.0 files with images, graphics, and text segments.
NITF/NSIF Version(s):	NITF versions 1.1(interpret only), 2.0, and 2.1 NSIF version 1.0
Reference Documents:	MIL-STD-2500A and 2500B, MIL-STD-2301 and 2301A, STANAG 4545
NITFS Compliance Test Report:	September 2004

System Description
The ELT/3500 is a CLEVEL 07 imagery application that runs on Windows 2000 and Windows XP 32-bit hardware platforms. The application provides high performance, wide-area search, and negation tools for advanced ELT exploitation functionality, including support for many commercial imagery file formats. This support includes layering 30+ imagery algorithms, advanced graphics tools, complex template production, and reporting attachments.

Supported Operating Systems
Windows 2000 and XP

General Characteristics	
File Naming Convention	When exporting (saving) the file, the user can either use default assigned name or rename the file.
CLEVELs Supported	NITF 2.1/NSIF 1.0: CLEVEL 07 NITF 2.0: CLEVEL 06
Origination Station Identifier Convention	Using application desktop editor, the user can modify stored value before exporting files.
Security Marking Options Supported	Using application desktop editor, the user can modify stored value before exporting files.
Originator's Designated Background Color	Using application desktop editor, the user can modify stored value before exporting files.
Originator's Name Field Convention	Using application desktop editor, the user can modify stored value before exporting files.
Originator's Phone Number Convention	Using application desktop editor, the user can modify stored value before exporting files.

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NITFS APPLICATION SUMMARY ELT/3500		
Image Segments Supported	Interpret:	Bounds of CLEVEL (100 segments) Single and Multi image segments
	Generate:	Single and Multi image segments
Symbol Segments Supported	Interpret:	Bounds of CLEVEL (2 Mb), CGM and Bit-Map
	Generate:	CGM only to bounds of CLEVEL
Text Segments Supported	Interpret:	Bounds of CLEVEL (32 segments), STA, UT1, U8S, and MTF as STA
	Generate:	STA only to bounds of CLEVEL
Data Extension Segments (DESs) Supported	Interpret:	Bounds of CLEVEL (10 segments), TRE_OVERFLOW, Controlled Extensions, Registered Extensions, PIX001 (Windows) and PIX002 (UNIX). PIX001-002 are non-standardized DES types used by Paragon Applications that were grandfathered by the NTB.
	Generate:	PIX001 for data the does not fit into an image, graphic, or text segment
	Preserve:	Yes
Reserved Extension Segments (RESs) Supported	Not yet defined	
File Header Tagged Record Extensions (TREs) Supported	Interpret:	PIAE, PIX005 (registered TRE)
	Generate:	PIAE, PIX005
	Preserve:	Yes
File Size/Range Supported	Interpret:	Bounds of CLEVEL
	Generate:	Bounds of CLEVEL
Image Segment Options Supported		
Image Identifier 1 (short ID)	Using application desktop editor, the user can modify stored value before exporting files.	
Image Identifier 2 (long ID)	Using application desktop editor, the user can modify stored value before exporting files.	
Target Identifier Field	Using application desktop editor, the user can modify stored value before exporting files.	
Image Source Field	Using application desktop editor, the user can modify stored value before exporting files.	

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NITFS APPLICATION SUMMARY ELT/3500	
Image Comment Fields	Using application desktop editor, the user can modify stored value before exporting files.
Image Characteristics	
Dimensions	Interpret: Bounds of CLEVEL Generate: Bounds of CLEVEL
Pixel Value Types (PVTYPEs) Supported	Application dependent, no user input. Interpret: B, INT, and SI Generate: INT and SI
Image Representation (IREP) Types	Application dependent, no user input. Interpret: All allowed representations Generate: MONO, RGB, YCbCr, MULTI
Image Categories (ICAT) Supported	Interpret: All allowed representations Generate: Drop menu of all 30 MIL-STD-2500B categories
Bounding Rectangle Coordinates	Interpret: Supports all allowed representations Generate: Geographic Only.
Decompression supported Compression Options	Interpret: JPEG DCT, (C3 and M3; 8 and 12-bit), DownSample (I1), VQ (C4 and M4), BI-Level (C1 and M1), JPEG Lossless (C5 and M5), and JPEG 2000 (C8) Generate: NC, I1, C3, and C8
Pixel Interleave(s)	Interpret: All allowed representations Generate: IMODE B and P
Blocking	Interpret: Single and multi block Generate: Single and multi block
Location offset supported	Interpret: Common Coordinate System (CCS) origin Generate: Common Coordinate System (CCS) origin
Attachment Level supported	Interpret: Not Supported Generate: All overlays assigned an attachment level of “000”.
Reduced Resolutions	Interpret: Yes Generate: Yes

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NITFS APPLICATION SUMMARY ELT/3500		
Image Subheader TREs Supported	Interpret:	IOMAPA, Commercial SDE, and Digest TREs are processed; PIAE and other TREs can be displayed with user-supplied scripts
	Generate:	Digest and PIAE
	Preserves:	All others
Graphic Segment Options Supported		
Graphics Supported	Interpret:	Yes
	Generate:	Yes
Graphic Identifier Convention	Interpret:	No
	Generate:	No
Location offset supported	Interpret:	Yes
	Generate:	Yes
Attachment Level supported	Interpret:	Not Supported
	Generate:	All overlays assigned an attachment level of “000”.
Graphic Subheader TREs supported	Interpret:	Yes
	Generate:	No
Bitmap Supported	Interpret:	Yes
	Generate:	No
Degree of Bitmap Support	Interpret:	Fully Supported
	Generate:	No
CGM Supported	Interpret:	Yes
	Generate:	Yes
Degree of CGM Support	Interpret:	Full Support
	Generate:	Text, Polygons, Ellipses, Rectangles, and Polylines
Text Segment Options Supported		
Text Support	Interpret:	Yes
	Generate:	Yes
Text Identifier Convention	Using application desktop editor, the user can modify stored value before exporting files.	
Text Title Convention	Using application desktop editor, the user can modify stored value before exporting files.	

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NITFS APPLICATION SUMMARY ELT/3500		
Attachment Level supported	Interpret:	Not Supported
	Generate:	All overlays assigned an attachment level of “000”.
Text Subheader TREs supported	Interpret:	Yes
	Generate:	No
STA (Basic Latin Character Set)	Interpret:	Yes
	Generate:	Yes
UT1 (Universal Multiple Octet Coded Character Set (UCS) Transformation Format 1)	Interpret:	Yes
	Generate:	No
U8S (Universal Multiple Octet Coded Character Set (UCS) Transformation Format 8 (UTF-8) Subset)	Interpret:	Yes
	Generate:	No
MTF (US Message Text Format)	Interpret:	Yes
	Generate:	No
Data Extension Segments Supported		
Controlled Extensions (NITF 2.0 only)	Interpret:	PIAE TREs
	Generate:	PIX001 (attached data file that do not fit characteristics of image, graphic or text segments)
	Preserves:	Yes
Registered Extensions (NITF 2.0 only)	Interpret:	RPF TREs
	Generate:	No
	Preserves:	Yes
TRE_OVERFLOW	Interpret:	PIAE TREs
	Generate:	PIX001 (attached data file that do not fit characteristics of image, graphic or text segments)
	Preserves:	Yes
STREAMING_FILE_HEADER	Interpret:	No
	Generate:	No
Reserved Extension Segments Supported		
None yet defined.	N/A	

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NITFS APPLICATION SUMMARY ELT/3500	
Support for other Data Services	
DPPDB	Interpret: No Generate: No
CIB	Interpret: Partial Exploit: ELT is capable of reading the CIB table of contents metadata to mosaic and the frames of a boundary rectangle rather than just displaying individual frame files. There are other metadata within the files (e.g. attributes) which ELT does not display or parse, therefore only partial support is indicated. Display: Yes Parse: Yes Generate: No, not as CIB, but will exports as single image product, with DIGEST TREs
CADRG	Interpret: Partial Exploit: ELT is capable of reading the CADRG table of contents metadata to mosaic and the frames of a boundary rectangle rather than just displaying individual frame files. There are other metadata within the files (e.g. attributes) which ELT does not display or parse, therefore only partial support is indicated. Display: Yes Parse: Yes Generate: No, not as CADRG, but will exports as single image product, with DIGEST TREs
NTM (legacy)	Interpret: No Generate: No
Airborne SDEs	Interpret: No Generate: No

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NITFS APPLICATION SUMMARY ELT/3500		
Commercial SDEs	Interpret:	Yes
	Exploit:	Yes
	Display:	Yes
	Parse:	Yes
	Generate:	Exports as a DIGEST Product not Commercial SDE
DIGEST TREs	Interpret:	Partial; GEOPS, GEOLO, MAPLO, PRJPS, REGPT
	Exploit:	Partial
	Display:	Yes
	Parse:	Partial
	Generate:	Partial; GEOPS, GEOLO, MAPLO, PRJPS, REGPT
Future Imagery Architecture (FIA):	Interpret:	No
	Generate:	No

NITFS Conversion Services

Reads: BMP, LANDSAT7, CADRG, JPEG/JFIF, CIB, TIFF/GEOTIFF, DTED, NITF, NSIF, ADF, ADRG, Compare Document, DOQ, ECW, ENVI, ERDAS, MDF, GeoSPOT, JPEG, JPEG 2000, Movie, MrSid, RAW, Remote View, Shape File, Stereo Document, Sun Raster and Symbol Library. Note: Supports NITF, NSIF, and TFRD as identified above. For other file formats, the ELT/3500 will display file formats as well as allowing exploitation of those formats that have exploitable information.

Writes: BMP, TIFF/GEOTIFF, NITF, NSIF, MDF, GeoSPOT, JPEG, JPEG 2000, RAW, and Sun Raster. Note: For other file formats that are exploitable, the ELT/3500 will export NITF and NSIF files with DIGEST TREs.

Other Pertinent Information

None

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NITFS APPLICATION SUMMARY GIV	
System Identifier:	Paragon GIV, release 1.0, build 210
NITFS Services:	Interprets/Displays: NITF 1.1, NITF 2.0, NITF 2.1, and NSIF 1.0 files with images, graphics, label and text segments. Generate/Exports: NITF 2.0, NITF 2.1, and NSIF 1.0 files with images, graphics, and text segments.
NITF/NSIF Version(s):	NITF versions 1.1(interpret only), 2.0, and 2.1 NSIF version 1.0
Reference Documents:	MIL-STD-2500A and 2500B, MIL-STD-2301 and 2301A, STANAG 4545
NITFS Compliance Test Report:	September 2004
System Description	
The GIV is a CLEVEL 07 imagery application that runs on Windows 2000 and Windows XP 32-bit hardware platforms. The application provides high performance, wide-area search, and negation tools for advanced ELT exploitation functionality, including support for many commercial imagery file formats. This support includes layering multiple images to one geo-referenced work area. The user has access to the NITF file format to easily bundle all of associated data into a single data file for distribution.	
Supported Operating Systems	
Windows 2000 and XP	
General Characteristics	
File Naming Convention	When exporting (saving) the file, the user can either use default assigned name or rename the file.
CLEVELs Supported	NITF 2.1/NSIF 1.0: CLEVEL 07 NITF 2.0: CLEVEL 06
Origination Station Identifier Convention	Using application desktop editor, the user can modify stored value before exporting files.
Security Marking Options Supported	Using application desktop editor, the user can modify stored value before exporting files.
Originator's Designated Background Color	Using application desktop editor, the user can modify stored value before exporting files.
Originator's Name Field Convention	Using application desktop editor, the user can modify stored value before exporting files.
Originator's Phone Number Convention	Using application desktop editor, the user can modify stored value before exporting files.

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NITFS APPLICATION SUMMARY GIV		
Image Segments Supported	Interpret:	Bounds of CLEVEL (100 segments) Single and Multi image segments
	Generate:	Single and Multi image segments
Symbol Segments Supported	Interpret:	Bounds of CLEVEL (2 Mb), CGM and Bit-Map
	Generate:	CGM only to bounds of CLEVEL
Text Segments Supported	Interpret:	Bounds of CLEVEL (32 segments), STA, UT1, U8S, and MTF as STA
	Generate:	STA only to bounds of CLEVEL
Data Extension Segments (DESs) Supported	Interpret:	Bounds of CLEVEL (10 segments), TRE_OVERFLOW, Controlled Extensions, Registered Extensions, PIX001 (Windows) and PIX002 (UNIX). PIX001-002 are non-standardized DES types used by Paragon Applications that were grandfathered by the NTB.
	Generate:	PIX001 for data the does not fit into an image, graphic, or text segment
	Preserve:	Yes
Reserved Extension Segments (RESs) Supported	Not yet defined	
File Header Tagged Record Extensions (TREs) Supported	Interpret:	PIAE, PIX005 (registered TRE)
	Generate:	PIAE, PIX005
	Preserve:	Yes
File Size/Range Supported	Interpret:	Bounds of CLEVEL
	Generate:	Bounds of CLEVEL
Image Segment Options Supported		
Image Identifier 1 (short ID)	Using application desktop editor, the user can modify stored value before exporting files.	
Image Identifier 2 (long ID)	Using application desktop editor, the user can modify stored value before exporting files.	
Target Identifier Field	Using application desktop editor, the user can modify stored value before exporting files.	
Image Source Field	Using application desktop editor, the user can modify stored value before exporting files.	
Image Comment Fields	Using application desktop editor, the user can modify stored value before exporting files.	

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NITFS APPLICATION SUMMARY GIV	
Image Characteristics	
Dimensions	Interpret: Bounds of CLEVEL Generate: Bounds of CLEVEL
Pixel Value Types (PVTYPEs) Supported	Application dependent, no user input. Interpret: B, INT, and SI Generate: INT and SI
Image Representation (IREP) Types	Application dependent, no user input. Interpret: All allowed representations Generate: MONO, RGB, YCbCr, MULTI
Image Categories (ICAT) Supported	Interpret: All allowed representations Generate: Drop menu of all 30 MIL-STD-2500B categories
Bounding Rectangle Coordinates	Interpret: Supports all allowed representations Generate: Geographic Only.
Decompression supported Compression Options	Interpret: JPEG DCT, (C3 and M3; 8 and 12-bit), DownSample (I1), VQ (C4 and M4), BI-Level (C1 and M1), JPEG Lossless (C5 and M5), and JPEG 2000 (C8) Generate: NC, I1, C3, and C8
Pixel Interleave(s)	Interpret: All allowed representations Generate: IMODE B and P
Blocking	Interpret: Single and multi block Generate: Single and multi block
Location offset supported	Interpret: Common Coordinate System (CCS) origin Generate: Common Coordinate System (CCS) origin
Attachment Level supported	Interpret: Not Supported Generate: All overlays assigned an attachment level of “000”.
Reduced Resolutions	Interpret: Yes Generate: Yes

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NITFS APPLICATION SUMMARY GIV		
Image Subheader TREs Supported	Interpret:	IOMAPA, Commercial SDE, and Digest TREs are processed; PIAE and other TREs can be displayed with user-supplied scripts
	Generate:	Digest and PIAE
	Preserves:	All others
Graphic Segment Options Supported		
Graphics Supported	Interpret:	Yes
	Generate:	Yes
Graphic Identifier Convention	Interpret:	No
	Generate:	No
Location offset supported	Interpret:	Yes
	Generate:	Yes
Attachment Level supported	Interpret:	Not Supported
	Generate:	All overlays assigned an attachment level of “000”.
Graphic Subheader TREs supported	Interpret:	Yes
	Generate:	No
Bitmap Supported	Interpret:	Yes
	Generate:	No
Degree of Bitmap Support	Interpret:	Fully Supported
	Generate:	No
CGM Supported	Interpret:	Yes
	Generate:	Yes
Degree of CGM Support	Interpret:	Full Support
	Generate:	Text, Polygons, Ellipses, Rectangles, and Polylines
Text Segment Options Supported		
Text Support	Interpret:	Yes
	Generate:	Yes
Text Identifier Convention	Using application desktop editor, the user can modify stored value before exporting files.	
Text Title Convention	Using application desktop editor, the user can modify stored value before exporting files.	

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NITFS APPLICATION SUMMARY GIV		
Attachment Level supported	Interpret:	Not Supported
	Generate:	All overlays assigned an attachment level of “000”.
Text Subheader TREs supported	Interpret:	Yes
	Generate:	No
STA (Basic Latin Character Set)	Interpret:	Yes
	Generate:	Yes
UT1 (Universal Multiple Octet Coded Character Set (UCS) Transformation Format 1)	Interpret:	Yes
	Generate:	No
U8S (Universal Multiple Octet Coded Character Set (UCS) Transformation Format 8 (UTF-8) Subset)	Interpret:	Yes
	Generate:	No
MTF (US Message Text Format)	Interpret:	Yes
	Generate:	No
Data Extension Segments Supported		
Controlled Extensions (NITF 2.0 only)	Interpret:	PIAE TREs
	Generate:	PIX001 (attached data file that do not fit characteristics of image, graphic or text segments)
	Preserves:	Yes
Registered Extensions (NITF 2.0 only)	Interpret:	RPF TREs
	Generate:	No
	Preserves:	Yes
TRE_OVERFLOW	Interpret:	PIAE TREs
	Generate:	PIX001 (attached data file that do not fit characteristics of image, graphic or text segments)
	Preserves:	Yes
STREAMING_FILE_HEADER	Interpret:	No
	Generate:	No
Reserved Extension Segments Supported		
None yet defined.	N/A	

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NITFS APPLICATION SUMMARY GIV		
Support for other Data Services		
DPPDB	Interpret:	No
	Generate:	No
CIB	Interpret:	Partial
	Exploit:	ELT is capable of reading the CIB table of contents metadata to mosaic and the frames of a boundary rectangle rather than just displaying individual frame files. There are other metadata within the files (e.g. attributes) which ELT does not display or parse, therefore only partial support is indicated.
	Display:	Yes
	Parse:	Yes
	Generate:	No, not as CIB, but will exports as single image product, with DIGEST TREs
CADRG	Interpret:	Partial
	Exploit:	ELT is capable of reading the CADRG table of contents metadata to mosaic and the frames of a boundary rectangle rather than just displaying individual frame files. There are other metadata within the files (e.g. attributes) which ELT does not display or parse, therefore only partial support is indicated.
	Display:	Yes
	Parse:	Yes
	Generate:	No, not as CADRG, but will exports as single image product, with DIGEST TREs
NTM (legacy)	Interpret:	No
	Generate:	No
Airborne SDEs	Interpret:	No
	Generate:	No

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NITFS APPLICATION SUMMARY GIV		
Commercial SDEs	Interpret:	Yes
	Exploit:	Yes
	Display:	Yes
	Parse:	Yes
	Generate:	Exports as a DIGEST Product not Commercial SDE
DIGEST TREs	Interpret:	Partial; GEOPS, GEOLO, MAPLO, PRJPS, REGPT
	Exploit:	Partial
	Display:	Yes
	Parse:	Partial
	Generate:	Partial; GEOPS, GEOLO, MAPLO, PRJPS, REGPT
Future Imagery Architecture (FIA):	Interpret:	No
	Generate:	No

NITFS Conversion Services
Reads: BMP, LANDSAT7, CADRG, JPEG/JFIF, CIB, TIFF/GEOTIFF, DTED, NITF, NSIF, ADF, ADRG, Compare Document, DOQ, ECW, ENVI, ERDAS, MDF, GeoSPOT, JPEG, JPEG 2000, Movie, MrSid, RAW, Remote View, Shape File, Stereo Document, Sun Raster and Symbol Library. Note: Supports NITF, NSIF, and TFRD as identified above. For other file formats, the GIV will display file formats as well as allowing exploitation of those formats that have exploitable information.
Writes: BMP, TIFF/GEOTIFF, NITF, NSIF, MDF, GeoSPOT, JPEG, JPEG 2000, RAW, and Sun Raster. Note: For other file formats that are exploitable, the GIV will export NITF and NSIF files with DIGEST TREs.

Other Pertinent Information
None

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NITFS APPLICATION SUMMARY ELT/1500	
System Identifier:	Paragon ELT/1500, release 3.0, build 210
NITFS Services:	Interprets/Displays: NITF 1.1, NITF 2.0, NITF 2.1, and NSIF 1.0 files with images, graphics, label and text segments. Generate/Exports: NITF 2.0, NITF 2.1, and NSIF 1.0 files with images, graphics, and text segments.
NITF/NSIF Version(s):	NITF versions 1.1(interpret only), 2.0, and 2.1 NSIF version 1.0
Reference Documents:	MIL-STD-2500A and 2500B, MIL-STD-2301 and 2301A, STANAG 4545
NITFS Compliance Test Report:	September 2004
System Description	
The ELT/1500 is a CLEVEL 07 imagery application that runs on Windows 2000 and Windows XP 32-bit hardware platforms. The application provides essential image processing functions for the tactical user. Designed especially for versatile field use, ELT/1500 supports most imagery formats, 30+ imagery algorithms, basic exploitation, standard graphics tools, and report attachments.	
Supported Operating Systems	
Windows 2000 and XP	
General Characteristics	
File Naming Convention	When exporting (saving) the file, the user can either use default assigned name or rename the file.
CLEVELs Supported	NITF 2.1/NSIF 1.0: CLEVEL 07 NITF 2.0: CLEVEL 06
Origination Station Identifier Convention	Using application desktop editor, the user can modify stored value before exporting files.
Security Marking Options Supported	Using application desktop editor, the user can modify stored value before exporting files.
Originator's Designated Background Color	Using application desktop editor, the user can modify stored value before exporting files.
Originator's Name Field Convention	Using application desktop editor, the user can modify stored value before exporting files.
Originator's Phone Number Convention	Using application desktop editor, the user can modify stored value before exporting files.

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NITFS APPLICATION SUMMARY ELT/1500		
Image Segments Supported	Interpret:	Bounds of CLEVEL (100 segments) Single and Multi image segments
	Generate:	Single and Multi image segments
Symbol Segments Supported	Interpret:	Bounds of CLEVEL (2 Mb), CGM and Bit-Map
	Generate:	CGM only to bounds of CLEVEL
Text Segments Supported	Interpret:	Bounds of CLEVEL (32 segments), STA, UT1, U8S, and MTF as STA
	Generate:	STA only to bounds of CLEVEL
Data Extension Segments (DESs) Supported	Interpret:	Bounds of CLEVEL (10 segments), TRE_OVERFLOW, Controlled Extensions, Registered Extensions, PIX001 (Windows) and PIX002 (UNIX). PIX001-002 are non-standardized DES types used by Paragon Applications that were grandfathered by the NTB.
	Generate:	PIX001 for data the does not fit into an image, graphic, or text segment
	Preserve:	Yes
Reserved Extension Segments (RESs) Supported	Not yet defined	
File Header Tagged Record Extensions (TREs) Supported	Interpret:	PIAE, PIX005 (registered TRE)
	Generate:	PIAE, PIX005
	Preserve:	Yes
File Size/Range Supported	Interpret:	Bounds of CLEVEL
	Generate:	Bounds of CLEVEL
Image Segment Options Supported		
Image Identifier 1 (short ID)	Using application desktop editor, the user can modify stored value before exporting files.	
Image Identifier 2 (long ID)	Using application desktop editor, the user can modify stored value before exporting files.	
Target Identifier Field	Using application desktop editor, the user can modify stored value before exporting files.	
Image Source Field	Using application desktop editor, the user can modify stored value before exporting files.	
Image Comment Fields	Using application desktop editor, the user can modify stored value before exporting files.	

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NITFS APPLICATION SUMMARY ELT/1500	
Image Characteristics	
Dimensions	Interpret: Bounds of CLEVEL Generate: Bounds of CLEVEL
Pixel Value Types (PVTYPEs) Supported	Application dependent, no user input. Interpret: B, INT, and SI Generate: INT and SI
Image Representation (IREP) Types	Application dependent, no user input. Interpret: All allowed representations Generate: MONO, RGB, YCbCr, MULTI
Image Categories (ICAT) Supported	Interpret: All allowed representations Generate: Drop menu of all 30 MIL-STD-2500B categories
Bounding Rectangle Coordinates	Interpret: Supports all allowed representations Generate: Geographic Only.
Decompression supported Compression Options	Interpret: JPEG DCT, (C3 and M3; 8 and 12-bit), DownSample (I1), VQ (C4 and M4), BI-Level (C1 and M1), JPEG Lossless (C5 and M5), and JPEG 2000 (C8) Generate: NC, I1, C3, and C8
Pixel Interleave(s)	Interpret: All allowed representations Generate: IMODE B and P
Blocking	Interpret: Single and multi block Generate: Single and multi block
Location offset supported	Interpret: Common Coordinate System (CCS) origin Generate: Common Coordinate System (CCS) origin
Attachment Level supported	Interpret: Not Supported Generate: All overlays assigned an attachment level of “000”.
Reduced Resolutions	Interpret: Yes Generate: Yes

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NITFS APPLICATION SUMMARY ELT/1500		
Image Subheader TREs Supported	Interpret:	IOMAPA, Commercial SDE, and Digest TREs are processed; PIAE and other TREs can be displayed with user-supplied scripts
	Generate:	Digest and PIAE
	Preserves:	All others
Graphic Segment Options Supported		
Graphics Supported	Interpret:	Yes
	Generate:	Yes
Graphic Identifier Convention	Interpret:	No
	Generate:	No
Location offset supported	Interpret:	Yes
	Generate:	Yes
Attachment Level supported	Interpret:	Not Supported
	Generate:	All overlays assigned an attachment level of “000”.
Graphic Subheader TREs supported	Interpret:	Yes
	Generate:	No
Bitmap Supported	Interpret:	Yes
	Generate:	No
Degree of Bitmap Support	Interpret:	Fully Supported
	Generate:	No
CGM Supported	Interpret:	Yes
	Generate:	Yes
Degree of CGM Support	Interpret:	Full Support
	Generate:	Text, Polygons, Ellipses, Rectangles, and Polylines
Text Segment Options Supported		
Text Support	Interpret:	Yes
	Generate:	Yes
Text Identifier Convention	Using application desktop editor, the user can modify stored value before exporting files.	
Text Title Convention	Using application desktop editor, the user can modify stored value before exporting files.	

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NITFS APPLICATION SUMMARY ELT/1500	
Attachment Level supported	Interpret: Not Supported Generate: All overlays assigned an attachment level of “000”.
Text Subheader TREs supported	Interpret: Yes Generate: No
STA (Basic Latin Character Set)	Interpret: Yes Generate: Yes
UT1 (Universal Multiple Octet Coded Character Set (UCS) Transformation Format 1)	Interpret: Yes Generate: No
U8S (Universal Multiple Octet Coded Character Set (UCS) Transformation Format 8 (UTF-8) Subset)	Interpret: Yes Generate: No
MTF (US Message Text Format)	Interpret: Yes Generate: No
Data Extension Segments Supported	
Controlled Extensions (NITF 2.0 only)	Interpret: PIAE TREs Generate: PIX001 (attached data file that do not fit characteristics of image, graphic or text segments) Preserves: Yes
Registered Extensions (NITF 2.0 only)	Interpret: No Generate: No Preserves: Yes
TRE_OVERFLOW	Interpret: PIAE TREs Generate: PIX001 (attached data file that do not fit characteristics of image, graphic or text segments) Preserves: Yes
STREAMING_FILE_HEADER	Interpret: No Generate: No
Reserved Extension Segments Supported	
None yet defined.	N/A

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NITFS APPLICATION SUMMARY ELT/1500	
Support for other Data Services	
DPPDB	Interpret: No Generate: No
CIB	Interpret: No Generate: No
CADRG	Interpret: No Generate: No
NTM (legacy)	Interpret: No Generate: No
Airborne SDEs	Interpret: No Generate: No
Commercial SDEs	Interpret: Yes Exploit: Yes Display: Yes Parse: Yes Generate: Exports as a DIGEST Product not Commercial SDE
DIGEST TREs	Interpret: Partial; GEOPS, GEOLO, MAPLO, PRJPS, REGPT Exploit: Partial Display: Yes Parse: Partial Generate: Partial; GEOPS, GEOLO, MAPLO, PRJPS, REGPT
Future Imagery Architecture (FIA):	Interpret: No Generate: No
NITFS Conversion Services	
Reads: BMP, LANDSAT7, JPEG/JFIF, TIFF/GEOTIFF, DTED, NITF, NSIF, ADF, ADRG, Compare Document, DOQ, ECW, ENVI, ERDAS, MDF, GeoSPOT, JPEG, JPEG 2000, Movie, MrSid, RAW, Remote View, Shape File, Stereo Document, Sun Raster and Symbol Library. Note: Supports NITF, NSIF, and TFRD as identified above. For other file formats, the ELT/1500 will display file formats as well as allowing exploitation of those formats that have exploitable information. Writes: BMP, TIFF/GEOTIFF, NITF, NSIF, MDF, GeoSPOT, JPEG, JPEG 2000, RAW, and Sun Raster. Note: For other file formats that are exploitable, the ELT/1500 will export NITF and NSIF files with DIGEST TREs.	

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NITFS APPLICATION SUMMARY ELT/1500
Other Pertinent Information
None

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NITFS APPLICATION SUMMARY ELT/View	
System Identifier:	Paragon ELT/1500, version 2.0, build 210
NITFS Services:	Interprets/Displays: NITF 1.1, NITF 2.0, NITF 2.1, and NSIF 1.0 files with images, graphics, label and text segments. Generate/Exports: No
NITF/NSIF Version(s):	NITF versions 1.1(interpret only), 2.0, and 2.1 NSIF version 1.0
Reference Documents:	MIL-STD-2500A and 2500B, MIL-STD-2301 and 2301A, STANAG 4545
NITFS Compliance Test Report:	September 2004
System Description	
The ELT/View is a CLEVEL 07 imagery application that runs on Windows 2000 and Windows XP 32-bit hardware platforms. The application provides essential and map viewing for the tactical user and is designed as a basic viewer. Designed especially for versatile field use, ELT/View supports most imagery formats and report attachments.	
Supported Operating Systems	
Windows 2000 and XP	
General Characteristics	
File Naming Convention	N/A Interpret only application.
CLEVELs Supported	NITF 2.1/NSIF 1.0: CLEVEL 07 NITF 2.0: CLEVEL 06
Origination Station Identifier Convention	Using application desktop editor, the user can modify stored value before exporting files.
Security Marking Options Supported	Using application desktop editor, the user can modify stored value before exporting files.
Originator's Designated Background Color	Using application desktop editor, the user can modify stored value before exporting files.
Originator's Name Field Convention	Using application desktop editor, the user can modify stored value before exporting files.
Originator's Phone Number Convention	Using application desktop editor, the user can modify stored value before exporting files.
Image Segments Supported	Interpret: Bounds of CLEVEL (100 segments) Single and Multi image segments Generate: No
Symbol Segments Supported	Interpret: Bounds of CLEVEL (2 Mb), CGM and Bit-Map Generate: No

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NITFS APPLICATION SUMMARY ELT/View	
Text Segments Supported	Interpret: Bounds of CLEVEL (32 segments), STA, UT1, U8S, and MTF as STA Generate: No
Data Extension Segments (DESs) Supported	Interpret: Bounds of CLEVEL (10 segments), TRE_OVERFLOW, Controlled Extensions, Registered Extensions, PIX001 (Windows) and PIX002 (UNIX). PIX001-002 are non-standardized DES types used by Paragon Applications that were grandfathered by the NTB. Generate: No
Reserved Extension Segments (RESs) Supported	Not yet defined
File Header Tagged Record Extensions (TREs) Supported	Interpret: PIAE, PIX005 (registered TRE) Generate: No
File Size/Range Supported	Interpret: Bounds of CLEVEL Generate: No
Image Segment Options Supported	
Image Identifier 1 (short ID)	Using application desktop editor, the user can modify stored value before exporting files.
Image Identifier 2 (long ID)	Using application desktop editor, the user can modify stored value before exporting files.
Target Identifier Field	Using application desktop editor, the user can modify stored value before exporting files.
Image Source Field	Using application desktop editor, the user can modify stored value before exporting files.
Image Comment Fields	Using application desktop editor, the user can modify stored value before exporting files.
Image Characteristics	
Dimensions	Interpret: Bounds of CLEVEL Generate: No
Pixel Value Types (PVTYPEs) Supported	Application dependent, no user input. Interpret: B, INT, and SI Generate: No
Image Representation (IREP) Types	Application dependent, no user input. Interpret: All allowed representations Generate: No

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NITFS APPLICATION SUMMARY ELT/View		
Image Categories (ICAT) Supported	Interpret:	All allowed representations
	Generate:	No
Bounding Rectangle Coordinates	Interpret:	No
	Generate:	No
Decompression supported Compression Options	Interpret:	JPEG DCT, (C3 and M3; 8 and 12-bit), DownSample (I1), VQ (C4 and M4), BI-Level (C1 and M1), JPEG Lossless (C5 and M5), and JPEG 2000 (C8)
	Generate:	No
Pixel Interleave(s)	Interpret:	All allowed representations
	Generate:	No
Blocking	Interpret:	Single and multi block
	Generate:	No
Location offset supported	Interpret:	Common Coordinate System (CCS) origin
	Generate:	No
Attachment Level supported	Interpret:	No
	Generate:	No
Reduced Resolutions	Interpret:	Yes
	Generate:	No
Image Subheader TREs Supported	Interpret:	IOMAPA, Commercial SDE, and Digest TREs are processed; PIAE and other TREs can be displayed with user-supplied scripts
	Generate:	No
Graphic Segment Options Supported		
Graphics Supported	Interpret:	Yes
	Generate:	No
Graphic Identifier Convention	Interpret:	No
	Generate:	No
Location offset supported	Interpret:	Yes
	Generate:	No
Attachment Level supported	Interpret:	No
	Generate:	No

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NITFS APPLICATION SUMMARY ELT/View	
Graphic Subheader TREs supported	Interpret: Yes Generate: No
Bitmap Supported	Interpret: Yes Generate: No
Degree of Bitmap Support	Interpret: Fully Supported Generate: No
CGM Supported	Interpret: Yes Generate: No
Degree of CGM Support	Interpret: Full Support Generate: No
Text Segment Options Supported	
Text Support	Interpret: Yes Generate: No
Text Identifier Convention	Using application desktop editor, the user can modify stored value before exporting files.
Text Title Convention	Using application desktop editor, the user can modify stored value before exporting files.
Attachment Level supported	Interpret: No Generate: No
Text Subheader TREs supported	Interpret: Yes Generate: No
STA (Basic Latin Character Set)	Interpret: Yes Generate: No
UT1 (Universal Multiple Octet Coded Character Set (UCS) Transformation Format 1)	Interpret: Yes Generate: No
U8S (Universal Multiple Octet Coded Character Set (UCS) Transformation Format 8 (UTF-8) Subset)	Interpret: Yes Generate: No
MTF (US Message Text Format)	Interpret: Yes Generate: No

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NITFS APPLICATION SUMMARY ELT/View		
Data Extension Segments Supported		
Controlled Extensions (NITF 2.0 only)	Interpret:	PIAE TREs
	Generate:	No
Registered Extensions (NITF 2.0 only)	Interpret:	RPF Extensions
	Generate:	No
TRE_OVERFLOW	Interpret:	PIAE TREs
	Generate:	No
STREAMING_FILE_HEADER	Interpret:	No
	Generate:	No
Reserved Extension Segments Supported		
None yet defined.	N/A	
Support for other Data Services		
DPPDB	Interpret:	No
	Generate:	No
CIB	Interpret:	No
	Generate:	No
CADRG	Interpret:	No
	Generate:	No
NTM (legacy)	Interpret:	No
	Generate:	No
Airborne SDEs	Interpret:	No
	Generate:	No
Commercial SDEs	Interpret:	Yes
	Exploit:	Yes
	Display:	Yes
	Parse:	Yes
	Generate:	No
DIGEST TREs	Interpret:	Partial; GEOPS, GEOLO, MAPLO, PRJPS, REGPT
	Exploit:	Partial
	Display:	Yes
	Parse:	Partial
	Generate:	No

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NITFS APPLICATION SUMMARY ELT/View	
Future Imagery Architecture (FIA):	Interpret: No Generate: No
NITFS Conversion Services	
Reads: BMP, LANDSAT7, CADRG, JPEG/JFIF, CIB, TIFF/GEOTIFF, DTED, NITF, NSIF, ADF, ADRG, Compare Document, DOQ, ECW, ENVI, ERDAS, MDF, GeoSPOT, JPEG, JPEG 2000, Movie, MrSid, RAW, Remote View, Shape File, Stereo Document, Sun Raster and Symbol Library.	
Other Pertinent Information	
None	

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NITFS APPLICATION SUMMARY ELT/NET and ELT/NETx	
System Identifier:	Paragon ELT/1500, version 2.0, build 210
NITFS Services:	Interprets/Displays: NITF 1.1, NITF 2.0, NITF 2.1, and NSIF 1.0 files with images, graphics, label and text segments. Generate/Exports: No
NITF/NSIF Version(s):	NITF versions 1.1(interpret only), 2.0, and 2.1 NSIF version 1.0
Reference Documents:	MIL-STD-2500A and 2500B, MIL-STD-2301 and 2301A, STANAG 4545
NITFS Compliance Test Report:	September 2004
System Description	
The ELT/NET (Netscape Navigator) and ELT/NETx (Microsoft Internet Explorer) are CLEVEL 03 software packages that run on Windows 2000 and Windows XP 32-bit hardware platforms. The applications are web browser plug-ins that provide easy viewing of NITF images, associated headers, and metadata, via the World Wide Web or an Intranet. They offer an easy-to-use interface, zooming capabilities, and mouse-based smooth pan and roam features for efficient viewing of NITF images.	
Supported Operating Systems	
Windows 2000 and XP	
General Characteristics	
File Naming Convention	N/A Interpret only application.
CLEVELs Supported	NITF 2.0, 2.1, and NSIF 1.0: CLEVEL 03
Origination Station Identifier Convention	Using application desktop editor, the user may view data.
Security Marking Options Supported	Using application desktop editor, the user may view data.
Originator's Designated Background Color	Using application desktop editor the user may view data.
Originator's Name Field Convention	Using application desktop editor, the user may view data.
Originator's Phone Number Convention	Using application desktop editor, the user may view data.
Image Segments Supported	Interpret: Bounds of CLEVEL (100 segments) Single and Multi image segments Generate: No
Symbol Segments Supported	Interpret: Bounds of CLEVEL (1 Mb), CGM and Bit-Map Generate: No

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NITFS APPLICATION SUMMARY ELT/NET and ELT/NETx	
Text Segments Supported	Interpret: Bounds of CLEVEL (32 segments), STA, UT1, U8S, and MTF as STA Generate: No
Data Extension Segments (DESs) Supported	Interpret: Bounds of CLEVEL (10 segments), TRE_OVERFLOW, Controlled Extensions, Registered Extensions, PIX001 (Windows) and PIX002 (UNIX). PIX001-002 are non-standardized DES types used by Paragon Applications that were grandfathered by the NTB. Generate: No
Reserved Extension Segments (RESs) Supported	Not yet defined
File Header Tagged Record Extensions (TREs) Supported	Interpret: PIAE, PIX005 (registered TRE) Generate: No
File Size/Range Supported	Interpret: Bounds of CLEVEL Generate: No
Image Segment Options Supported	
Image Identifier 1 (short ID)	Using application desktop editor, the user may view data.
Image Identifier 2 (long ID)	Using application desktop editor, the user may view data.
Target Identifier Field	Using application desktop editor, the user may view data.
Image Source Field	Using application desktop editor, the user may view data.
Image Comment Fields	Using application desktop editor, the user may view data.
Image Characteristics	
Dimensions	Interpret: Bounds of CLEVEL Generate: No
Pixel Value Types (PVTYPEs) Supported	Application dependent, no user input. Interpret: B, INT, and SI Generate: No
Image Representation (IREP) Types	Application dependent, no user input. Interpret: All allowed representations Generate: No

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NITFS APPLICATION SUMMARY ELT/NET and ELT/NETx		
Image Categories (ICAT) Supported	Interpret:	All allowed representations
	Generate:	No
Bounding Rectangle Coordinates	Interpret:	No
	Generate:	No
Decompression supported Compression Options	Interpret:	JPEG DCT, (C3 and M3; 8 and 12-bit), DownSample (I1), VQ (C4 and M4), BI-Level (C1 and M1), JPEG Lossless (C5 and M5), and JPEG 2000 (C8)
	Generate:	No
Pixel Interleave(s)	Interpret:	All allowed representations
	Generate:	No
Blocking	Interpret:	Single and multi block Generate: No
Location offset supported	Interpret:	Common Coordinate System (CCS) origin
	Generate:	No
Attachment Level supported	Interpret:	No
	Generate:	No
Reduced Resolutions	Interpret:	Yes
	Generate:	No
Image Subheader TREs Supported	Interpret:	IOMAPA; PIAE and other TREs can be displayed with user-supplied scripts
	Generate:	No
Graphic Segment Options Supported		
Graphics Supported	Interpret:	Yes
	Generate:	No
Graphic Identifier Convention	Interpret:	No
	Generate:	No
Location offset supported	Interpret:	Yes
	Generate:	No
Attachment Level supported	Interpret:	No
	Generate:	No
Graphic Subheader TREs supported	Interpret:	Yes
	Generate:	No

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NITFS APPLICATION SUMMARY ELT/NET and ELT/NETx	
Bitmap Supported	Interpret: Yes Generate: No
Degree of Bitmap Support	Interpret: Fully Supported Generate: No
CGM Supported	Interpret: Yes Generate: No
Degree of CGM Support	Interpret: Full Support Generate: No
Text Segment Options Supported	
Text Support	Interpret: Yes Generate: No
Text Identifier Convention	Using application desktop editor, the user may view data.
Text Title Convention	Using application desktop editor, the user may view data.
Attachment Level supported	Interpret: No Generate: No
Text Subheader TREs supported	Interpret: Yes Generate: No
STA (Basic Latin Character Set)	Interpret: Yes Generate: No
UT1 (Universal Multiple Octet Coded Character Set (UCS) Transformation Format 1)	Interpret: Yes Generate: No
U8S (Universal Multiple Octet Coded Character Set (UCS) Transformation Format 8 (UTF-8) Subset)	Interpret: Yes Generate: No
MTF (US Message Text Format)	Interpret: Yes Generate: No
Data Extension Segments Supported	
Controlled Extensions (NITF 2.0 only)	Interpret: PIAE TREs Generate: No
Registered Extensions (NITF 2.0 only)	Interpret: No Generate: No

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NITFS APPLICATION SUMMARY ELT/NET and ELT/NETx		
TRE_OVERFLOW	Interpret:	PIAE TREs
	Generate:	No
STREAMING_FILE_HEADER	Interpret:	No
	Generate:	No
Reserved Extension Segments Supported		
None yet defined.	N/A	
Support for other Data Services		
DPPDB	Interpret:	No
	Generate:	No
CIB	Interpret:	No
	Generate:	No
CADRG	Interpret:	No
	Generate:	No
NTM (legacy)	Interpret:	No
	Generate:	No
Airborne SDEs	Interpret:	No
	Generate:	No
Commercial SDEs	Interpret:	No
	Generate:	No
DIGEST TREs	Interpret:	No
	Generate:	No
Future Imagery Architecture (FIA):	Interpret:	No
	Generate:	No
NITFS Conversion Services		
Reads: NITF 1.1, NITF 2.0, NITF 2.1, and NSIF 1.0		
Other Pertinent Information		
None		

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NITFS APPLICATION SUMMARY ELT/4000	
System Identifier:	Paragon ELT/4000, release 2.4, build 18
NITFS Services:	Interprets/Displays: NITF 1.1, NITF 2.0, NITF 2.1, and NSIF 1.0 files with images, graphics, label and text segments. Generate/Exports: NITF 2.0, NITF 2.1, and NSIF 1.0 files with images, graphics, and text segments.
NITF/NSIF Version(s):	NITF versions 1.1(interpret only), 2.0, and 2.1 NSIF version 1.0
Reference Documents:	MIL-STD-2500A and 2500B, MIL-STD-2301 and 2301A, STANAG 4545
NITFS Compliance Test Report:	September 2004

System Description
The ELT/4000 is a CLEVEL 06 imagery application that runs on Solaris 2.7, 2.8, and 2.9 platforms. The application provides a Secondary Imagery Dissemination (SID) capability. It allows analysts to combine images with audio, video, documents, and any other user-defined data to create complex geospatial reports. This ELT/4000 provides the user with image manipulation, exploitation, and annotation capabilities, along with links to communication protocols for tactical users in the field.

Supported Operating Systems
Solaris 2.7, 2.8 and 2.9

General Characteristics	
File Naming Convention	When exporting (saving) the file, the user can either use default assigned name or rename the file.
CLEVELs Supported	NITF 2.1/NSIF 1.0: CLEVEL 06 NITF 2.0: CLEVEL 06
Origination Station Identifier Convention	Using application desktop editor, the user can modify stored value before exporting files.
Security Marking Options Supported	Using application desktop editor, the user can modify stored value before exporting files.
Originator's Designated Background Color	Using application desktop editor, the user can modify stored value before exporting files.
Originator's Name Field Convention	Using application desktop editor, the user can modify stored value before exporting files.
Originator's Phone Number Convention	Using application desktop editor, the user can modify stored value before exporting files.

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NITFS APPLICATION SUMMARY ELT/4000		
Image Segments Supported	Interpret:	Bounds of CLEVEL (100 segments) Single and Multi image segments
	Generate:	Single and Multi image segments
Symbol Segments Supported	Interpret:	Bounds of CLEVEL (2 Mb), CGM and Bit-Map
	Generate:	CGM only to bounds of CLEVEL
Text Segments Supported	Interpret:	Bounds of CLEVEL (32 segments), STA, UT1, U8S, and MTF as STA
	Generate:	STA only to bounds of CLEVEL
Data Extension Segments (DESs) Supported	Interpret:	Bounds of CLEVEL (10 segments), TRE_OVERFLOW, Controlled Extensions, Registered Extensions, PIX001 (Windows) and PIX002 (UNIX). PIX001-002 are non-standardized DES types used by Paragon Applications that were grandfathered by the NTB.
	Generate:	PIX002 for data the does not fit into an image, graphic, or text segment
	Preserve:	Yes
Reserved Extension Segments (RESs) Supported	Not yet defined	
File Header Tagged Record Extensions (TREs) Supported	Interpret:	PIAE, PIX005 (registered TRE)
	Generate:	PIAE, PIX005
	Preserve:	Yes
File Size/Range Supported	Interpret:	Bounds of CLEVEL
	Generate:	Bounds of CLEVEL
Image Segment Options Supported		
Image Identifier 1 (short ID)	Using application desktop editor, the user can modify stored value before exporting files.	
Image Identifier 2 (long ID)	Using application desktop editor, the user can modify stored value before exporting files.	
Target Identifier Field	Using application desktop editor, the user can modify stored value before exporting files.	
Image Source Field	Using application desktop editor, the user can modify stored value before exporting files.	
Image Comment Fields	Using application desktop editor, the user can modify stored value before exporting files.	
Image Characteristics		

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NITFS APPLICATION SUMMARY ELT/4000		
Dimensions	Interpret:	Bounds of CLEVEL
	Generate:	Bounds of CLEVEL
Pixel Value Types (PVTYPEs) Supported	Application dependent, no user input.	
	Interpret:	B, INT, and SI
	Generate:	INT
Image Representation (IREP) Types	Application dependent, no user input.	
	Interpret:	All allowed representations
	Generate:	MONO, RGB, and YCbCr
Image Categories (ICAT) Supported	Interpret:	All allowed representations
	Generate:	Drop menu of all 30 MIL-STD-2500B categories
Bounding Rectangle Coordinates	Interpret:	Supports all allowed representations
	Generate:	Geographic Only.
Decompression supported Compression Options	Interpret:	JPEG DCT, (C3 and M3; 8 and 12-bit), DownSample (I1), VQ (C4 and M4), BI-Level (C1 and M1), and JPEG Lossless (C5 and M5)
	Generate:	NC, I1, and C3
Pixel Interleave(s)	Interpret:	All allowed representations
	Generate:	IMODE B and P
Blocking	Interpret:	Single and multi block
	Generate:	Single and multi block
Location offset supported	Interpret:	Common Coordinate System (CCS) origin
	Generate:	Common Coordinate System (CCS) origin
Attachment Level supported	Interpret:	Not Supported
	Generate:	All overlays assigned an attachment level of “000”.
Reduced Resolutions	Interpret:	Yes
	Generate:	Yes
Image Subheader TREs Supported	Interpret:	IOMAPA is processed; PIAE and other TREs can be displayed with user-supplied scripts
	Generate:	PIAE
	Preserves:	All others

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NITFS APPLICATION SUMMARY ELT/4000	
Graphic Segment Options Supported	
Graphics Supported	Interpret: Yes Generate: Yes
Graphic Identifier Convention	Interpret: No Generate: No
Location offset supported	Interpret: Yes Generate: Yes
Attachment Level supported	Interpret: Not Supported Generate: All overlays assigned an attachment level of “000”.
Graphic Subheader TREs supported	Interpret: Yes Generate: No
Bitmap Supported	Interpret: Yes Generate: No
Degree of Bitmap Support	Interpret: Fully Supported Generate: No
CGM Supported	Interpret: Yes Generate: Yes
Degree of CGM Support	Interpret: Partial Support – does not support auxiliary color. Generate: Text, Polygons, Ellipses, Rectangles, and Polylines
Text Segment Options Supported	
Text Support	Interpret: Yes Generate: Yes
Text Identifier Convention	Using application desktop editor, the user can modify stored value before exporting files.
Text Title Convention	Using application desktop editor, the user can modify stored value before exporting files.
Attachment Level supported	Interpret: Not Supported Generate: All overlays assigned an attachment level of “000”.
Text Subheader TREs supported	Interpret: Yes Generate: No

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NITFS APPLICATION SUMMARY ELT/4000	
STA (Basic Latin Character Set)	Interpret: Yes Generate: Yes
UT1 (Universal Multiple Octet Coded Character Set (UCS) Transformation Format 1)	Interpret: Yes Generate: No
U8S (Universal Multiple Octet Coded Character Set (UCS) Transformation Format 8 (UTF-8) Subset)	Interpret: Yes Generate: No
MTF (US Message Text Format)	Interpret: Yes Generate: No
Data Extension Segments Supported	
Controlled Extensions (NITF 2.0 only)	Interpret: PIAE TREs Generate: PIX001 (attached data file that do not fit characteristics of image, graphic or text segments) Preserves: Yes
Registered Extensions (NITF 2.0 only)	Interpret: No Generate: No Preserves: Yes
TRE_OVERFLOW	Interpret: PIAE TREs Generate: PIX001 (attached data file that do not fit characteristics of image, graphic or text segments) Preserves: Yes
STREAMING_FILE_HEADER	Interpret: No Generate: No
Reserved Extension Segments Supported	
None yet defined.	N/A
Support for other Data Services	
DPPDB	Interpret: No Generate: No
CIB	Interpret: No Generate: No
CADRG	Interpret: No Generate: No

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NITFS APPLICATION SUMMARY ELT/4000	
NTM (legacy)	Interpret: No Generate: No
Airborne SDEs	Interpret: No Generate: No
Commercial SDEs	Interpret: No Generate: No
DIGEST TREs	Interpret: No Generate: No
Future Imagery Architecture (FIA):	Interpret: No Generate: No

NITFS Conversion Services
Reads: BMP, TIFF, NITF, NSIF, EPS, JPEG, RAW, TGA, PCX, GIF, and Sun Raster Writes: TIFF, NITF, NSIF, EPS, JPEG, RAW, TGA, PCX, GIF, and Sun Raster

Other Pertinent Information
None

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NITFS APPLICATION SUMMARY PocketELT	
System Identifier:	Paragon PocketELT, release 1.2, build 60
NITFS Services:	Interprets/Displays: NITF 1.1, NITF 2.0, NITF 2.1, and JPEG imagery formats. Generate/Exports: NITF 2.0, NITF 2.1, and JPEG imagery formats.
NITF/NSIF Version(s):	NITF versions 1.1(interpret only), 2.0, and 2.1
Reference Documents:	MIL-STD-2500A and 2500B, MIL-STD-2301 and 2301A, STANAG 4545
NITFS Compliance Test Report:	September 2004
System Description	
The PocketELT is a CLEVEL 03 application that runs on Windows CE 2002 and Windows CE 2003 platforms. The application is installed on a PDA and can be combined with a video or digital camera and up-link communications. Real time imagery can be captured and loaded into PocketELT, allowing the tactical user in the field to annotate, process, chip, compress, and disseminate the resulting products in the NITF file.	
Supported Operating Systems	
Windows CE 2002 and Windows CE 2003	
General Characteristics	
File Naming Convention	When exporting (saving) the file, the user can either use default assigned name or rename the file.
CLEVELs Supported	NITF 2.1/NSIF 1.0: CLEVEL 03 NITF 2.0: CLEVEL 03
Origination Station Identifier Convention	Using application desktop editor, the user can modify stored value before exporting files.
Security Marking Options Supported	Using application desktop editor, the user can modify stored value before exporting files.
Originator's Designated Background Color	Using application desktop editor, the user can modify stored value before exporting files.
Originator's Name Field Convention	Using application desktop editor, the user can modify stored value before exporting files.
Originator's Phone Number Convention	Using application desktop editor, the user can modify stored value before exporting files.
Image Segments Supported	Interpret: Bounds of CLEVEL (100 segments) Single and Multi image segments Generate: Single and Multi image segments

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NITFS APPLICATION SUMMARY PocketELT		
Symbol Segments Supported	Interpret:	Bounds of CLEVEL (1 Mb), CGM and Bit-Map
	Generate:	CGM only to bounds of CLEVEL
Text Segments Supported	Interpret:	Bounds of CLEVEL (32 segments), STA, UT1, U8S, and MTF as STA
	Generate:	STA only to bounds of CLEVEL
Data Extension Segments (DESs) Supported	Interpret:	Bounds of CLEVEL (10 segments), TRE_OVERFLOW, Controlled Extensions, Registered Extensions, PIX001 (Windows) and PIX002 (UNIX). PIX001-002 are non-standardized DES types used by Paragon Applications that were grandfathered by the NTB.
	Generate:	PIX002 for data the does not fit into an image, graphic, or text segment
	Preserve:	Yes
Reserved Extension Segments (RESs) Supported	Not yet defined	
File Header Tagged Record Extensions (TREs) Supported	Interpret:	PIAE, PIX005 (registered TRE)
	Generate:	PIAE, PIX005
	Preserve:	Yes
File Size/Range Supported	Interpret:	Bounds of CLEVEL
	Generate:	Bounds of CLEVEL
Image Segment Options Supported		
Image Identifier 1 (short ID)	Using application desktop editor, the user can modify stored value before exporting files.	
Image Identifier 2 (long ID)	Using application desktop editor, the user can modify stored value before exporting files.	
Target Identifier Field	Using application desktop editor, the user can modify stored value before exporting files.	
Image Source Field	Using application desktop editor, the user can modify stored value before exporting files.	
Image Comment Fields	Using application desktop editor, the user can modify stored value before exporting files.	

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NITFS APPLICATION SUMMARY PocketELT	
Image Characteristics	
Dimensions	Interpret: Bounds of CLEVEL Generate: Bounds of CLEVEL
Pixel Value Types (PVTYPEs) Supported	Application dependent, no user input. Interpret: B, INT, and SI Generate: INT
Image Representation (IREP) Types	Application dependent, no user input. Interpret: All allowed representations Generate: MONO, RGB, and YCbCr
Image Categories (ICAT) Supported	Interpret: All allowed representations Generate: Drop menu of all 30 MIL-STD-2500B categories
Bounding Rectangle Coordinates	Interpret: Supports all allowed representations Generate: Geographic Only.
Decompression supported Compression Options	Interpret: JPEG DCT, (C3 and M3; 8 and 12-bit), DownSample (I1), VQ (C4 and M4), BI-Level (C1 and M1), and JPEG Lossless (C5 and M5) Generate: NC, I1, and C3
Pixel Interleave(s)	Interpret: All allowed representations Generate: IMODE B and P
Blocking	Interpret: Single and multi block Generate: Single and multi block
Location offset supported	Interpret: Common Coordinate System (CCS) origin Generate: Common Coordinate System (CCS) origin
Attachment Level supported	Interpret: Not Supported Generate: All overlays assigned an attachment level of “000”.
Reduced Resolutions	Interpret: Yes Generate: Yes

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NITFS APPLICATION SUMMARY PocketELT		
Image Subheader TREs Supported	Interpret:	IOMAPA is processed; PIAE and other TREs can be displayed with user-supplied scripts
	Generate:	PIAE
	Preserves:	All others
Graphic Segment Options Supported		
Graphics Supported	Interpret:	Yes
	Generate:	Yes
Graphic Identifier Convention	Interpret:	No
	Generate:	No
Location offset supported	Interpret:	Yes
	Generate:	Yes
Attachment Level supported	Interpret:	Not Supported
	Generate:	All overlays assigned an attachment level of “000”.
Graphic Subheader TREs supported	Interpret:	Yes
	Generate:	No
Bitmap Supported	Interpret:	Yes
	Generate:	No
Degree of Bitmap Support	Interpret:	Fully Supported
	Generate:	No
CGM Supported	Interpret:	Yes
	Generate:	Yes
Degree of CGM Support	Interpret:	Partial Support – does not support auxiliary color.
	Generate:	Text, Polygons, Ellipses, Rectangles, and Polylines
Text Segment Options Supported		
Text Support	Interpret:	Yes
	Generate:	Yes
Text Identifier Convention	Using application desktop editor, the user can modify stored value before exporting files.	
Text Title Convention	Using application desktop editor, the user can modify stored value before exporting files.	

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NITFS APPLICATION SUMMARY PocketELT	
Attachment Level supported	Interpret: Not Supported Generate: All overlays assigned an attachment level of “000”.
Text Subheader TREs supported	Interpret: Yes Generate: No
STA (Basic Latin Character Set)	Interpret: Yes Generate: Yes
UT1 (Universal Multiple Octet Coded Character Set (UCS) Transformation Format 1)	Interpret: Yes Generate: No
U8S (Universal Multiple Octet Coded Character Set (UCS) Transformation Format 8 (UTF-8) Subset)	Interpret: Yes Generate: No
MTF (US Message Text Format)	Interpret: Yes Generate: No
Data Extension Segments Supported	
Controlled Extensions (NITF 2.0 only)	Interpret: PIAE TREs Generate: PIX001 (attached data file that do not fit characteristics of image, graphic or text segments) Preserves: Yes
Registered Extensions (NITF 2.0 only)	Interpret: No Generate: No Preserves: Yes
TRE_OVERFLOW	Interpret: PIAE TREs Generate: PIX001 (attached data file that do not fit characteristics of image, graphic or text segments) Preserves: Yes
STREAMING_FILE_HEADER	Interpret: No Generate: No
Reserved Extension Segments Supported	
None yet defined.	N/A

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NITFS APPLICATION SUMMARY PocketELT	
Support for other Data Services	
DPPDB	Interpret: No Generate: No
CIB	Interpret: No Generate: No
CADRG	Interpret: No Generate: No
NTM (legacy)	Interpret: No Generate: No
Airborne SDEs	Interpret: No Generate: No
Commercial SDEs	Interpret: No Generate: No
DIGEST TREs	Interpret: No Generate: No
Future Imagery Architecture (FIA):	Interpret: No Generate: No
NITFS Conversion Services	
Reads: NITF, JPEG Writes: NITF, JPEG	
Other Pertinent Information	
None	

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NITFS APPLICATION SUMMARY
Geo*View AFRL Imagery Viewer, Version 2.1, Build 935

System Identifier:	Geo*View AFRL Imagery Viewer, Version 2.1, Build 935
NITFS Services:	Interprets and displays: NITF 2.1, 2.0, 1.1, NSIF 1.0, Tagged Image File Format (TIFF), Discrete Cosine Transform (DCT) JPEG, JPEG 2000, Basic Multilingual Plane (BMP), Graphics Interchange Format (GIF), Portable Network Graphics (PNG), Sun Raster, and some MultiSpectral/HyperSpectral (MS/HS) imagery formats. Generates and Exports: NITF 2.1, NSIF 1.0, TIFF, DCT JPEG, JPEG 2000, BMP, and Sun Raster imagery formats

NITF/NSIF version(s):

File Type	Pack	Unpack
NITF 1.1		X
NITF 2.0		X
NITF 2.1	X	X
NSIF 1.0	X	X

Reference Documents:	Geo*View AFRL Imagery Viewer Software User's Manual and Installation Guide, Version 2.1, Build 935, 8 January 2004
NITFS Compliance Test Report:	August 2004

System Description

The Geo*View is a JAVA©-based, platform independent, geospatial imagery data viewer, and NITF metadata viewing and editing tool. The Geo*View is designed for use by the warfighter as well as the imagery analyst. Originally designed to support NITF data viewing and editing, Geo*View has since been augmented with tools supporting imagery and video exploitation. The Geo*View allows the user to view and edit existing NITF, NSIF, and a number of commercial product formats, as well as generating them as new NITF and NSIF products. Additionally, the users are able to add annotations and text to images, edit headers, delete TREs, or add informational TREs.

Supported Operating Systems

Windows based PC

General Characteristics

File Naming Convention	When exporting (saving) the file, the User must create a file name.
Complexity Levels (CLEVELs) Supported	NITF 2.1/NSIF 1.0: CLEVEL 07 NITF 2.0: CLEVEL 06
Origination Station Identifier Convention	Using Geo*View Product Editor, the User can modify stored values before exporting files.

**Geo*View did not implement all available options of these features.

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NITFS APPLICATION SUMMARY Geo*View AFRL Imagery Viewer, Version 2.1, Build 935		
File Title Convention	Using Geo*View Product Editor, the User can modify stored values before exporting files.	
Security Marking Options Supported	Using Geo*View Product Editor, the User can modify stored values before exporting files.	
Originator's Designated Background Color	Using Geo*View Product Editor, the User can modify stored values before exporting files.	
Originator's Name Field Convention	Using Geo*View Product Editor, the User can modify stored values before exporting files.	
Originator's Phone Number Convention	Using Geo*View Product Editor, the User can modify stored values before exporting files.	
Image Segments Supported	Interpret:	Single and multiple image segment
	Generate:	Single and multiple image segment
Symbol Segments Supported	Interpret:	CGM and Bitmap
	Generate:	CGM
Text Segments Supported	Interpret:	Standard American Standard Code for Information Interchange(ASCII) (STA), Universal Multiple Octet Coded Character Set (UCS) Transformation Format 1 (UT1), Universal Multiple Octet Coded Character Set (UCS) Transformation Format 8 (UTF-8) Subset (U8S), Message Text Formatting (MTF) as STA
	Generate:	STA
	Retain:	UT1, U8S
Data Extension Segments Supported	Interpret:	TRE_OVERFLOW (presents contents)
	Generate:	None
	Retain:	Yes
Reserved Extension Segments Supported	Interpret:	None
	Generate:	None
File Header TREs Supported	Interpret:	Display PIAPRC** and PIAPRD**
	Generate:	PIAPRC** and PIAPRD**
	Retain:	Yes
File Size/Range	Interpret:	Bounds of CLEVEL
	Generate:	Bounds of CLEVEL

**Geo*View did not implement all available options of these features.

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NITFS APPLICATION SUMMARY Geo*View AFRL Imagery Viewer, Version 2.1, Build 935		
Image Segment Options Supported		
Image Identifier 1 (short ID)	Using Geo*View Product Editor, the User can modify stored values before exporting files.	
Image Identifier 2 (long ID)	Using Geo*View Product Editor, the User can modify stored values before exporting files.	
Target Identifier Field	Using Geo*View Product Editor, the User can modify stored values before exporting files.	
Image Source Field	Using Geo*View Product Editor, the User can modify stored values before exporting files.	
Image Comment Fields	Using Geo*View Product Editor, the User can modify stored values before exporting files.	
Image Characteristics		
Dimensions	Interpret:	Bounds of CLEVEL
	Generate:	Bounds of CLEVEL
Pixel Value Types	Interpret:	Boolean (B), Integer (INT), Real (R)
	Generate:	INT
	Retain:	B, INT, and R
Image Representation Types	Interpret:	MONOchrome (MONO), Red, Green, Blue (RGB), MULTIband Imagery (MULTI)
	Generate:	MONO, RGB, MULTI
	Retain:	MULTI, NODISPLY, NVECTOR, POLAR, VPH
Image Categories	Interpret:	Will display all image categories that are marked as displayable for Pixel Value Types of Boolean, Integer and Signed Integer
	Generate:	VISible Imagery (VIS)
	Retain:	All other categories
Bounding Rectangle Coordinates	Interpret:	Supports all allowed representations
	Generate:	All allowed values through user input.
	Retain:	By default will retain.

**Geo*View did not implement all available options of these features.

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NITFS APPLICATION SUMMARY Geo*View AFRL Imagery Viewer, Version 2.1, Build 935		
Compression Options	Interpret:	JPEG DCT (C3 and M3, 8 and 12-bit), DownSample (I1), JPEG Lossless (C5 and M5), JPEG 2000 (C8), Bi-Level (C1 and M1), Vector Quantization (VQ) (C4 and M4)
	Generate:	None
	Retain:	All
Pixel Interleave(s)	Interpret:	All allowed interleaves
	Generate:	B and P (interleave by Pixel)
	Retain:	All interleaves
Blocking	Interpret:	Single and Multi block.
	Generate:	Single and Multi block.
Location offset supported	Interpret:	Supported
	Generate:	Always sets to 000.
Attachment Level supported	Interpret:	Not Supported
	Generate:	Supported
Reduced Resolutions	Interpret:	Can read individual resolutions, but does not apply them for zooming.
	Generate:	Can create individual resolutions, but not sets.
Image Subheader TREs Supported	Interpret:	applies IOMAPA**, displays information for PIAE's**, FACCB**, HISTOA**, ESD001**, NBLOCA**, and GEOLOB**; can view other ASCII TREs as an ASCII dump.
	Generate:	PIAE's**, IOMAPA**, FACCB**, ESD001**, NBLOCA**, and GEOLOB**
	Retain:	Maintains all other TREs.

Graphic Segment Options Supported		
Graphic Identifier Convention	Using Geo*View Product Editor, the User can modify stored values before exporting files.	
Graphic Name Convention	Using Geo*View Product Editor, the User can modify stored values before exporting files.	
Location offset supported	Interpret:	Yes
	Generate:	Yes

**Geo*View did not implement all available options of these features.

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NITFS APPLICATION SUMMARY Geo*View AFRL Imagery Viewer, Version 2.1, Build 935		
Attachment Level supported	Interpret:	Not Supported
	Generate:	Always sets to 000.
Graphic Subheader TREs (tags) supported	Retain only.	
Bitmap Supported	Interpret:	Yes
	Generate:	No
Degree of Bitmap Support	Interpret:	Partial (Cannot render black bitmap symbols in NITF 2.0, presents as transparent so user cannot view.)
CGM Supported	Interpret:	Yes
	Generate:	Yes
Degree of CGM Support	Interpret:	Full Support
	Generate:	Text, Polyline, Rectangle, and ellipse
	Retain:	All other CGM attributes.
Text Segment Options Supported		
Text Support		
STA (Basic Character Set)	Interpret:	Supported
	Generate:	Supported
UT1 (Extended Character Set)	Interpret:	Supported
	Retain:	UT1
U8S (UTF-8 Extended Characters)	Interpret:	Supported
	Retain:	U8S
MTF (US Message Text Format)	Interpret:	Supported as STA
	Note: Converts MTF to STA on export	
Text Identifier Convention	Using Geo*View Product Editor, the User can modify stored values before exporting files.	
Text Title Convention	Using Geo*View Product Editor, the User can modify stored values before exporting files.	
Attachment Level supported	Interpret:	Not Supported
	Generate:	Always sets to 000.
Text Subheader TREs (tags) supported	Retain only.	

**Geo*View did not implement all available options of these features.

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NITFS APPLICATION SUMMARY Geo*View AFRL Imagery Viewer, Version 2.1, Build 935	
Data Extension Segments Supported	
TRE_OVERFLOW	Interpret: Yes Generate: No Retain: Yes
STREAMING_FILE_HEADER	Interpret: No Generate: No
Registered Extensions (NITF 2.0 only)	Interpret: Yes Generate: No
Controlled Extensions (NITF 2.0 only)	Interpret: Yes Generate: No
Reserved Extension Segments Supported	
None yet defined.	N/A
Support for other Data Services	
DPPDB**	No
CIB**	No
CADRG**	No
National Technical Means (NTM) (legacy)**	No
Airborne Support Data Extensions (ASDEs)**	No
Commercial Support Data Extension (CSDEs)**	No
DIGEST**	No
NITFS Conversion Services	
Reads: NITF, TIFF, Sun Raster, NSIF, JPEG/JPEG File Interchange Format (JFIF), TIFF, BMP, JPEG 2000, GIF, PNG, LANDSAT, CADRG, CIB, Spatially Enhanced Broadband Array Spectrograph System (SEBASS), Digital Terrain Elevation Data (DTED), Hyperspectral Digital Imagery Collection Experiment (HYDICE), Interactive Retrieval Software (IRS), QUICKBIRD, Systeme Probatoire d'Observation (SPOT) Writes: NITF, TIF, Sun Raster, NSIF, JPEG/JFIF, TIFF, BMP, JPEG 2000	
Other Pertinent Information	
None	

**Geo*View did not implement all available options of these features.

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NITFS APPLICATION SUMMARY Synthetic Imagery Generation System	
System Identifier:	Synthetic Imagery Generation System (SIGS) version 6.0
NITFS Services:	Pack Only
NITF/NSIF Version(s):	NITF 2.0 and NITF 2.1
Reference Documents:	SIGS User Manual
NITFS Compliance Test Report:	April 2004

System Description
Functional NITFS Description: The SIGS is a computer-based system that provides rapid generation of photorealistic synthetic imagery that can be used in military exercises and training events when "live" imagery is not available. A user selects a background terrain image and manually inputs (or receives data from a simulator) the geographic location, number and status of Order-of-Battle equipment (i.e., vehicles, aircraft, ships), location of fixed objects (i.e., buildings), and basic reconnaissance platform attributes such as viewing angle and resolution data. The generation of these imagery products enhances the realism of the training activities and can be used to validate prototype secondary image dissemination networks. In order to create the synthetic imagery, the SIGS imports the first integer 8-bit or greater-than-8-bit monochrome image up to CLEVEL 06 files, and then exports CLEVEL 03 1024x1024 or less 8-bit monochrome with graphic overlays that represent training target products.

Supported Operating Systems
Sun Solaris version 8 and Windows XP

General Characteristics	
File Naming Convention	When exporting (saving) the file, the user can modify the file name before selecting save or use the default based on the Target Product Name.
CLEVELs Supported	CLEVEL 02 NITF 2.0 and CLEVEL 03 NITF 2.1
Origination Station Identifier Convention	The User can modify pre-set defaults before exporting files.
File Title Convention	The User can modify pre-set defaults before exporting files.
Security Marking Options Supported	The User can modify pre-set defaults before exporting files.
Originator's Designated Background Color	Defaulted to black
Originator's Name Field Convention	The User can modify pre-set defaults before exporting files.
Originator's Phone Number Convention	The User can modify pre-set defaults before exporting files.
Image Segments Supported	Yes

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NITFS APPLICATION SUMMARY Synthetic Imagery Generation System	
Symbol Segments Supported	Yes
Text Segments Supported	No
Data Extension Segments Supported	No
Reserved Extension Segments Supported	No
File Header TREs (tags) Supported	SIGS2A and SIGS3A
File Size/Range	For NITF 2.0, 5.128 Mbytes (5 images, 100 graphics) or less, for NITF 2.1, 21 Mbytes (20 images, 100 graphics) or less.
Image Segment Options Supported	
Image Identifier 1 (short ID)	The User can modify pre-set defaults before exporting files.
Image Identifier 2 (long ID)	The User can modify pre-set defaults before exporting files.
Target Identifier Field	The User can modify pre-set defaults before exporting files.
Image Source Field	The User can modify pre-set defaults before exporting files.
Image Comment Fields	No
Image Characteristics	
Dimensions	1024 pixels x 1024 pixels or less
Pixel Value Types	Integer (INT), 8-BPP
Image Representation Types	MONO
Image Categories	VIS, EO, IR and SAR
Bounding Rectangle Coordinates	Geodetic for NITF 2.0 and Geographic for NITF 2.1
Compression Options	Non-Compressed (NC), 8 BPP JPEG DCT Compressed (C3), 8 BPP
Pixel Interleave(s)	IMODE B
Blocking	Single block per image.
Location offset supported	Yes
Attachment Level supported	All overlays are attached to display level 1.
Reduced Resolutions	No
Image Subheader TREs (tags) Supported	Preserve on export: No

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NITFS APPLICATION SUMMARY Synthetic Imagery Generation System	
Symbol Segment Options Supported	
CGM Supported	All CGM Elements are supported in MIL-STD-2301.
Degree of CGM Support	Generates the following CGM Displayable Elements: Text, polyline, rectangle and circle. Fonts: Helvetica bold.
Symbol Identifier Convention	The User can modify pre-set defaults before exporting files.
Symbol Name Convention	The User can modify pre-set defaults before exporting files.
Location offset supported	Yes
Attachment Level supported	All overlays are attached to display level 1.
Symbol Subheader TREs (tags) supported	No
Text Segment Options Supported	
Text Support	None
STA (Basic Character Set)	No
UT1 (Extended Character Set)	No
U8S (UTF-8 Extended Characters)	No
MTF (US Message Text Format)	No
Text Identifier Convention	None
Text Title Convention	None
Attachment Level supported	No
Text Subheader TREs (tags) supported	No
Data Extension Segments Supported	
Controlled Extensions (NITF2.0 only)	No
Registered Extensions (NITF2.0 only)	No
TRE_OVERFLOW	No
STREAMING_FILE_HEADER	No
Reserved Extension Segments Supported	
None yet defined	N/A
Support for other Data Services	
DPPDB	No
CIB	No

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NITFS APPLICATION SUMMARY Synthetic Imagery Generation System	
CADRG	No
NTM (legacy)	No
Airborne SDEs	No
Commercial SDEs	No
DIGEST TREs	No
NITFS Conversion Services	
Reads TIFF, GEOTIFF, Sun Raster, JPEG, NITF 2.0 and NITF 2.1 for creation of NITF 2.0 and NITF 2.1 Target Products.	
Other Pertinent Information	
None	

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NITFS APPLICATION SUMMARY
VITecELT Version 6.1

System Identifier:	VITecELT Version 6.1
NITFS Services:	Interprets and displays: NITF 2.1, 2.0, 1.1, CIB, CADRG, TFRD, JPEG, TIIF, JPG, BMP and GIF imagery formats Generate/Exports: NITF 2.1, 2.0, 1.1, JPEG, TIIF, JPG, BMP and GIF imagery formats
NITF/NSIF Version(s):	NITF Versions 2.1, 2.0 and 1.1 NSIF Version 1.0
Reference Documents:	MIL STD 2500A and 2500B, STANAG 4545, MIL-STD 2301 and 2301A
NITFS Compliance Test Report:	Testing ongoing

System Description:

The VITec ELT is a SUN Solaris based off-the-shelf imagery workstation that provides tools for displaying, parsing and analyzing National Imagery Transmission Format Standards (NITFS) imagery. VITec ELT interprets NITFS 2.1, 2.0 and NSIF 1.0 Visible imagery, Synthetic Aperture Radar, Electro-Optical, Infrared and Multispectral imagery as well as, converts Tagged Image File Format (TIFF) and Tape Image Format Requirements Document (TFRD) imagery into NITF.

The VITec ELT supports a classified plug in library that provides a method to calculate measurements such as distance, area, and geodetic position in national imagery using the National Imagery and Mapping Agency's (NIMA) RULER mensuration engine.

VITec ELT provides NITF support of the Profile for Imagery Archives Extensions (PIAE). The operator may view, add, modify or delete PIAEs. The PIAE extension generation and display are supported through a GUI interface dropdown menu.

VITec ELT supports the generation and display of Computer Graphic Metafile (CGM) graphic annotations per MIL-STD 2301A. It is also capable of interpreting and displaying Bitmapped graphic annotations.

For image geo-positioning, the VITec ELT provides a suite of tools for generating image chips and generates an ICHIPB TRE.

VITec ELT supports multiband imagery, up to 999 bands, on ingest, an operator allow the application to automatically select marked bands for display when bands are marked for display or manually select or change the order of display of bands, when the bands are not marked. The VITec ELT does not export multiband imagery, it only supports the export of those bands displayed.

Supported Operating Systems

SUN Solaris

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NITFS APPLICATION SUMMARY VITecELT Version 6.1	
General Characteristics	
File Naming Convention	Keyboard entered during export by the operator
CLEVELs Supported	NITF 2.1/NSIF 1.0: CLEVEL 07 NITF 2.0: CLEVEL 06
Origination Station Identifier Convention	Keyboard entered during installation and setup into a script file
File Title Convention	Keyboard entered during installation and setup into a script file
Security Marking Options Supported	Keyboard entered during installation and setup into a script file. Security marking options are site specific.
Originator's Designated Background Color	Keyboard entered during installation and setup into a script file
Originator's Name Field Convention	Keyboard entered during installation and setup into a script file
Originator's Phone Number Convention	Keyboard entered during installation and setup into a script file
Image Segments Supported	Interpret: Single and multiple image segmented files Generate: Single and multiple image segmented files
Symbol Segments Supported	Interpret: CGM and Bitmap Generate: CGM **Note:** A base image must be associated with the file for the application to interpret or generate graphics.
Text Segments Supported	Interpret: STA Generate: STA **Note:** A base image must be associated with the file for the application to interpret or generate graphics.
Data Extension Segments Supported	Interpret: TRE OVERFLOW Generate: None Preserve: Yes
Reserved Extension Segments Supported	Interpret: None Generate: None Preserve: None

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NITFS APPLICATION SUMMARY VITecELT Version 6.1		
File Header TREs Supported	Interpret:	PIA suite of TREs
	Generate:	PIA suite of TREs
	Preserve:	PIAPR
File Size/Range Supported	Tested up to 3,317,768 Kbytes	
Image Segment Options Supported		
Image Identifier 1 (short ID)	Image # X, Operator Keyboard Entered	
Image Identifier 2 (long ID)	Image # X, Operator Keyboard Entered	
Target Identifier Field	Not Used.	
Image Source Field	Interpret:	Display if populated
	Generate:	Yes, Keyboard Entered
	Preserve:	Yes
Image Comment Fields	Interpret:	Display if populated
	Generate:	Yes, Keyboard Entered
	Preserve:	Yes
Image Characteristics		
Dimensions	61,000 pixels X 27,000 pixels	
Pixel Value Types Supported	Interpret:	1, 8, 12, 16 and 32-bit imagery data
	Generate:	1, 8 12 and 16-bit imagery data
Image Representation Types	Interpret:	Monochrome (MONO) 1-band 8 and 16-bit
		Color (Red, Green, Blue (RGB)): 3-band 8-bit per band
		RGB/LUT: 1-band 3-LUT 8-bit per band
		Multiband (MULTI) up to 999 bands.1, 8, 16, and 32-bit data
	Generate:	MONO 1-band 8 and 16-bit
		Color (RGB): 3-band 8-bit per band
Image Categories Supported	Interpret:	The operator is permitted to select any of the ICAT values identified in MIL-STD 2500B
	Generate:	The default ICAT is visible (VIS), however, the operator is able to change the ICAT value through a dropdown menu.

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NITFS APPLICATION SUMMARY VITecELT Version 6.1		
Bounding Rectangle Coordinates	Present, using geographic coordinates expressed as ddmmssXdddmmssY	
Compression Options Decompression supported	Interpret:	JPEG DCT, C3 and M3, 8 and 12-bit DownSample, I1 VQ, C4 and M4 Bi-Level, C1 and M1
	Generate:	JPEG DCT, C3, 8-bit MONO – VIS tables Color – Color tables Quality levels 1 - 5
Pixel Interleave(s)	Interpret:	MONO - IMODE P Color - IMODE P, B, S, R
	Generate:	MONO - IMODE B Color - IMODE P
Blocking	Interpret:	All blocking schemes are supported.
	Generate:	Blocking is implemented when the image file is greater than 8192 pixels horizontal or vertical. Blocks are 1024 x 1024 pixels.
Location offset supported	Yes	
Attachment Level supported	Interpret:	NITFS attachment level representation supported
	Generate:	All attachment values are "000"
	Preserves:	Supports retention of attachment level values on export.
Reduced Resolutions	Supports the generation of Rsets.	
Image Subheader TREs (tags) Supported	Interpret:	None
	Generate:	None
	Preserves:	All received

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NITFS APPLICATION SUMMARY VITecELT Version 6.1	
Graphic Segment Options Supported	
CGM Supported	Interpret: All CGM supported in MIL-STD 2301A Generate: Ellipse, Rectangle, Polygon (simplex and complex), Polyline Circular and Elliptical Arcs and Text
Degree of CGM Support	Interpret: Maps fonts that are not supported to one of the fonts supported for display. Generates the following CGM symbols and Fonts: Generate: Time Roman, Helvetica and Courier; Bold, Bold Italic, Italic, Normal Preserves: Retains original fonts when file is exported.
Graphic features not supported	Interpret: Transparency, Auxiliary Color, Hatched Interior Style (empty and solid) Generate: Transparency, Auxiliary Color, Hatched Interior Style, Circles, Edge (only solid) and Line sizes greater than 20 pixels
Graphic Identifier Convention	The graphic is identified by a sequence number.
Graphic Name Convention	Automatically inserted by the application. SID field contains a sequence number i.e. 0000000003 for the 3rd symbol applied in the file. SNAME field contains the symbol feature, i.e. line.cgm for a polyline
Location offset supported	SLOC and SLOC2 = 0000000000
Attachment Level supported	The graphics are always attached to the CCS. SALVL = 000
Graphic Subheader TREs (tags) supported	Interpret: None Generate: None
Text Segment Options Supported	
STA (Basic Character Set)	Interpret: Yes Generate: Yes
UT1 (Extended Character Set)	Interpret: No Generate: No

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NITFS APPLICATION SUMMARY VITecELT Version 6.1	
U8S (UTF-8 Extended Characters)	Interpret: No Generate: No
MTF (US Message Text Format)	Interpret: No, however, will display MTF text data as a continuous string of characters. Generate: No
Text Identifier Convention	Interpret: Unpacks and stores as received. Generate: Keyboard entered. The application generates a text file (name.txt) using an external text editor i.e. Windows Notepad and inserts the text file when exporting the NITF file.
Text Title Convention	Keyboard entered
Text Subheader TREs (tags) supported	None
Data Extension Segments Supported	
Controlled Extensions (NITF2.0 only)	Supported
Registered Extensions (NITF2.0 only)	Not Supported
TRE_OVERFLOW	Supported
STREAMING_FILE_HEADER	Not Supported
Reserved Extension Segments Supported	
None yet defined.	N/A
Support for other Data Services	
DPPDB	Interpret: Unknown Generate: No
CIB	Interpret: Unknown Generate: No
CADRG	Interpret: Unknown Generate: No
NTM (legacy)	Interpret: Exploit: Yes with the use of RULER Display: Yes Parse: Generate: NITF 2.0 from TFRD

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NITFS APPLICATION SUMMARY VITecELT Version 6.1	
Airborne SDEs	Interpret: Exploit: RPC00B Display: Parse: Generate: No
Profile for Imagery Archives SDEs	Interpret: Exploit: No Display: N/A Parse: Yes Generate: Yes, (PIAPRD, PIATGB, PIAPEB, PIAEVA, PIAEQA, PIAIMC)
Commercial SDEs	Interpret: Exploit: USE00A Display: Parse: Generate: No
DIGEST TREs	Interpret: No Generate: No
Future Imagery Architecture (FIA)	Interpret: No Generate: No

NITFS Conversion Services

The application is capable of converting the following imagery formats into NITF version 2.0 or 2.1 format:

TFRD to NITF 2.0

Commercial JPG, BMP, GIF, TIFF, and Sun Raster to NITF 2.0 or 2.1

Other Pertinent Information

None

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NITFS APPLICATION SUMMARY
VITecPC Version 4.1.1

System Identifier:	VITecPC Version 4.1.1
NITFS Services:	Interprets and displays: NITF 2.1, 2.0, 1.1, CIB, CADRG, JPEG, TIIF, JPG, BMP, and GIF imagery formats Generate/Exports: NITF 2.1, 2.0, 1.1, JPEG, TIIF, JPG, BMP and GIF imagery formats
NITF/NSIF Version(s):	NITF Versions 2.1, 2.0 and 1.1 NSIF Version 1.0
Reference Documents:	MIL STD 2500A and 2500B, STANAG 4545, MIL-STD 2301 and 2301A
NITFS Compliance Test Report:	Pending, being written

System Description:

The VITec PC is a MS Windows operating system based off-the-shelf imagery workstation that provides tools for displaying, parsing and analyzing National Imagery Transmission Format Standards (NITFS) imagery. VITec PC interprets NITFS 2.1, 2.0 and NSIF 1.0 Visible imagery, Synthetic Aperture Radar, Electro-Optical, Infrared and Multispectral imagery as well as, converts Tagged Image File Format (TIFF) and Tape Image Format Requirements Document (TFRD) imagery into NITF.

The VITec PC supports a classified plug in library that provides a method to calculate measurements such as distance, area, and geodetic position in national imagery using the National Imagery and Mapping Agency's (NIMA) RULER mensuration engine.

VITec PC provides NITF support of the Profile for Imagery Archives Extensions (PIAE). The operator may view, add, modify or delete PIAEs. The PIAE extension generation and display are supported through a GUI interface dropdown menu.

VITec PC supports the generation and display of Computer Graphic Metafile (CGM) graphic annotations per MIL-STD 2301A. It is also capable of interpreting and displaying Bitmapped graphic annotations.

For image geo-positioning, the VITec PC provides a suite of tools for generating image chips and generates an ICHIPB TRE.

VITec PC supports multiband imagery, up to 999 bands, on ingest, an operator can manually select or change the order of display of bands, when the bands are not marked. The VITec PC does not export multiband imagery, it only supports the export of those bands displayed.

Supported Operating Systems

Windows NT 4.0 with Service Pack 6A or greater. The application was also tested and performed the same as the NT 4.0 operating system on MS Windows 98, 2000, XP operating systems.

General Characteristics

File Naming Convention	Keyboard entered during export by the operator

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NITFS APPLICATION SUMMARY VITecPC Version 4.1.1	
CLEVELs Supported	NITF 2.1/NSIF 1.0: CLEVEL 07 NITF 2.0: CLEVEL 06
Origination Station Identifier Convention	Keyboard entered during installation and setup into a script file
File Title Convention	Keyboard entered during installation and setup into a script file
Security Marking Options Supported	Keyboard entered during installation and setup into a script file. Security marking options are site specific.
Originator's Designated Background Color	Keyboard entered during installation and setup into a script file
Originator's Name Field Convention	Keyboard entered during installation and setup into a script file
Originator's Phone Number Convention	Keyboard entered during installation and setup into a script file
Image Segments Supported	Interpret: Single and multiple image segmented files Generate: Single and multiple image segmented files
Symbol Segments Supported	Interpret: CGM and Bitmap Generate: CGM
Text Segments Supported	Interpret: STA,and UT1 Generate: STA
Data Extension Segments Supported	Interpret: TRE OVERFLOW Generates: None Preserves: Yes
Reserved Extension Segments Supported	Interpret: None Generates: None Preserves: None
File Header TREs (tags) Supported	Interpret: PIA suite of TREs Generates: PIA suite of TREs Preserves: PIAPR
File Size/Range Supported	Tested up to 3,317,768 Kbytes
Image Segment Options Supported	
Image Identifier 1 (short ID)	Image # X, Operator Keyboard Entered
Image Identifier 2 (long ID)	Image # X, Operator Keyboard Entered

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NITFS APPLICATION SUMMARY VITecPC Version 4.1.1	
Target Identifier Field	Not Used.
Image Source Field	Interpret: Display if populated Generates: Yes, Keyboard Entered Preserves: Yes
Image Comment Fields	Interpret: Display if populated Generates: Yes, Keyboard Entered Preserves: Yes
Image Characteristics	
Dimensions	61,000 pixels X 27,000 pixels
Pixel Value Types Supported	Interpret: 1, 8, 12 and 16-bit integer Generate: 1, 8 12 and 16-bit integer
Image Representation Types	Interpret: Monochrome (MONO) 1-band 8 and 16-bit Color (RGB) 3-band 8-bit per band (RGB/LUT) 1-band 3-LUT 8-bit per band Multiband (MULTI) up to 999 bands. Generate: Monochrome (MONO) 1-band 8 and 16-bit Color (RGB) 3-band 8-bit per band
Image Categories Supported	Interpret: The operator is permitted to select any of the ICAT values identified in MIL-STD 2500B Generate: The default ICAT is visible (VIS), however, the operator is able to change the ICAT value through a dropdown menu.
Bounding Rectangle Coordinates	Present, using geographic coordinates expressed as ddmmssXdddmmssY

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NITFS APPLICATION SUMMARY VITecPC Version 4.1.1		
Compression Options Decompression supported	Interpret:	JPEG DCT, C3 and M3, 8 and 12-bit DownSample, I1 VQ, C4 and M4 BI-Level, C1 and M1
	Generate:	JPEG DCT, C3, 8-bit MONO – VIS tables COLOR – Color tables Quality levels 1 - 5
Pixel Interleave(s)	Interpret:	For MONO – IMODE P For COLOR – IMODE P, B, S, R
	Generate:	For MONO -- IMODE B For COLOR – IMODE P
Blocking	Interpret:	All blocking schemes are supported.
	Generate:	Blocking is implemented when the image file is greater than 8192 pixels horizontal or vertical. Blocks are 1024 x 1024 pixels
Location offset supported	Yes	
Attachment Level supported	Interpret:	NITFS attachment level representation supported
	Generate:	All attachment values are "000"
	Preserves:	Supports retention of attachment level values on export.
Reduced Resolutions	Supports the generation of Rsets.	
Image Subheader TREs (tags) Supported	Interpret:	None
	Generate:	None
	Preserves:	All received
Graphic Segment Options Supported		
CGM Supported	Interpret:	All CGM supported in MIL-STD 2301A
	Generate:	Ellipse, Rectangle, Polygon (simplex and complex), Polyline and Text

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NITFS APPLICATION SUMMARY VITecPC Version 4.1.1	
Degree of CGM Support	Interpret: Maps fonts that are not supported to one of the fonts supported for display. Generates the following CGM symbols: Fonts: Generate: Time Roman, Helvetica and Courier Bold, Bold Italic, Italic, Normal Preserves: Retains original fonts when file is exported.
Graphic features not supported	Interpret: Transparency, Auxiliary Color, Hatched Interior Style, Closed Elliptical Arcs, Closed Circular Arcs Generate: Transparency, Auxiliary Color, Hatched Interior Style, Closed Elliptical Arcs, Closed Circular Arcs, Circles, Edge and Line sizes greater than 8 pixels
Graphic Identifier Convention	The graphic is identified by a sequence number.
Graphic Name Convention	Automatically inserted by the application SID field contains a sequence number i.e. 0000000003 for the 3rd symbol applied in the file. SNAME field contains the symbol feature, i.e. line.cgm for a polyline
Location offset supported	SLOC and SLOC2 = 0000000000
Attachment Level supported	The graphics are always attached to the CCS SALVL = 000
Graphic Subheader TREs (tags) supported	Interpret: None Generate: None
Text Segment Options Supported	
STA (Basic Character Set)	Interpret: Yes Generate: Yes
UT1 (Extended Character Set)	Interpret: Yes Generate: No
U8S (UTF-8 Extended Characters)	Interpret: No Generate: No

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NITFS APPLICATION SUMMARY VITecPC Version 4.1.1	
MTF (US Message Text Format)	Interpret: No, however, will display MTF text data as a continuous string of characters. Generate: No
Text Identifier Convention	Interpret: Unpacks and stores as received. Generate: Keyboard entered. The application generates a text file (name.txt) using an external text editor i.e. Windows Notepad and inserts the text file when exporting the NITF file.
Text Title Convention	Keyboard entered
Text Subheader TREs (tags) supported	None
Data Extension Segments Supported	
Controlled Extensions (NITF2.0 only)	Supported
Registered Extensions (NITF2.0 only)	Not Supported
TRE_OVERFLOW	Supported
STREAMING_FILE_HEADER	Not Supported
Reserved Extension Segments Supported	
None yet defined.	N/A
Support for other Data Services	
DPPDB	Interpret: Unknown Exploit: Display: Parse: Generate: No
CIB	Interpret: Unknown Exploit: Display: Parse: Generate: No
CADRG	Interpret: Unknown Exploit: Display: Parse: Generate: No

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NITFS APPLICATION SUMMARY VITecPC Version 4.1.1	
NTM (legacy)	Interpret: Unknown Exploit: Yes with the use of RULER Display: Yes Parse: Generate: NITF 2.0 from TFRD
Airborne SDEs	Interpret: Exploit: RPC00B Display: Parse: Generate: No
Profile for Imagery Archives SDEs	Interpret: Exploit: No Display: N/A Parse: Yes Generate: Yes (PIAPRD, PIATGB, PIAPEB, PIAEVA, PIAEQA, PIAIMC)
Commercial SDEs	Interpret: Exploit: USE00A Display: Parse: Generate: No
DIGEST TREs	Interpret: Exploit: No Display: No Parse: No Generate: No
Future Imagery Architecture (FIA)	Interpret: Exploit: No Display: No Parse: No Generate: No
NITFS Conversion Services	
The application is capable of converting the following imagery formats into NITF version 2.0 or 2.1 format: TFRD to NITF 2.0 Commercial JPG, BMP, GIF, TIFF, and Sun Raster to NITF 2.0 or 2.1	
Other Pertinent Information	

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Appendix M – Product Summaries & Archetypes for National Technical Means (NTM) Producers

This appendix provides implementation information for known National Imagery Transmission Format (NITF) data producers. Its purpose is to assist Program Managers/users and developers in understanding the NITF packaging of data that they may need to use in their products/sustems. The information is provided as a guide and is a snapshot based on publication time of this document.

Dissemination Element (DE). The DE is a system that is designed to provide users with National Imagery on a near-real-time basis. Desired imagery can be obtained in two manners: (1) brokered directly as National Imagery Transmission Format Standard (NITFS) products from the Enhanced Production System (EPS) and "passed through" unaltered to the requester, or (2) converted to NITFS format from Tape Format Requirements Document (TFRD) imagery from the EPS. Depending on the specific server or client configuration, the DE can generate full, image product, fast access format (FAF) chips, and R1-7 reduced resolution imagery in 8- or 11-bit uncompressed formats. (Note: The NITF "pass through" capability of JPEG compressed and uncompressed EPS products by the DE was not assessed during this test effort due to the reduced scope afforded a DE maintenance release and no previous anomalies encountered with this feature.)

Enhanced Production System (EPS). The EPS produces compressed and uncompressed, unexploited, single segment National Technical Means (NTM) images in NITF version 2.0 format files. Products also include the prescribed instances of National Support Data Extensions (NSDEs) and are disseminated via electronic means.

Low Cost Media (LCM). The LCM system produces compressed and uncompressed, unexploited, single segment NTM images in NITF version 2.0 format files. Products also include the prescribed instances of NSDEs. Dissemination of imagery files to the community is via 8mm and SVHS tape media.

Image Product Library (IPL). The IPL is a key component of the National Systems for Geospatial Intelligence (NSGI). It plays a significant role in the NSGI Architecture providing for the storage, cataloging, discovery, retrieval, and delivery of imagery products to users of the NSGI. A major objective of IPL version 2.5.1 build 01.13 is to support the NITF 2.1 file format. At this stage of NITF 2.1 implementation, developers implemented only the features in the NITF 2.1 that correspond with supported NITF 2.0 features. Additional features available in NITF 2.1 will be addressed in future releases of the IPL. The IPL 2.5.1 architecture is client/server based, with the IPL providing the library server functions. IPL used the Quick Query (Q2) application as a client to interface with the IPL for this NITFS compliance test. File manipulation and conversion services are provided to the IPL

via software libraries developed by the Common Architecture Support Services (CASS) program office. The IPL allows TFRD, NITF, and North Atlantic Treaty Organisation (NATO) Secondary Imagery Format (NSIF) files to be automatically ingested, populating the catalog upon ingest. The IPL will also allow any other data type to be ingested through the client interface, forcing the user to hand populate the catalog. When exporting files the user can convert between TFRD, NITF, Sun Raster, and Tagged Image File Format (TIFF), chip TFRD and NITF products, or select these products 'As-Is.' All other library products are exported 'As-Is' only.

National Imagery Transmission Format (NITF) Services Library (NSL). The NSL is a set of Application Program Interfaces (APIs) that will be used to provide NITF and imaging capabilities for the latest release of Defense Information Infrastructure (DII) Common Operating Environment (COE) software. This is in support of the Joint Department of Defense (DOD) community and specifically the Defense Information Systems Agency. Application developers will use the public APIs provided by the NSL to process, display, and create NITF products. The NSL is being included in the DII COE as a COE Component of the Imagery Toolkit (IMTK). The NSL will eventually become the mandated set of APIs to use when processing NITF, NSIF, and Basic Image Interchange Format (BIIF) imagery in the DII COE. Having a single set of DII COE NITF libraries and executables will help to ensure compliance and interoperability with other DII COE and non-DII COE systems.

The NSL Version 4.5.0.0 is a core component of the IMTK, which is included as a DII COE Component in the DII COE 4.x architecture. NSL 4.5.0.0 operates on the Solaris 2.1, Windows NT 4.0, and Windows 2000 platforms. This imagery toolkit will be available to all DII COE developers, and those developers will be encouraged to reuse the IMTK services in dealing with various imagery and video products. Application developers will use the public AIPs provided by the NSL to process, display, and create NITF products.

The NSL Version 3.5.0.0 is a mission application that is loaded on top of the DII COE 3.x architecture. The NSL 3.5.0.0 is used in the Global Command and Control System (GCCS), the GCCS Integrated Imagery and Intelligence (GCCS-I^3), and the GCCS - Maritime Variant (GCCS-M). The GCCS and GCCS-I^3 use the Solaris 2.5.1 configuration and the GCCS-M uses the HP-UX 10.20 configuration. This imagery software is available to select developers that have imagery requirements for GCCS, GCCS-I^3, and GCCS-M.

National Geospatial-Intelligence Agency (NGA) Library (NGL). The NGL is an essential component of the National Systems for Geospatial Intelligence (NSGI). It plays a significant role in the NSGI Architecture by providing for the storage, cataloging, discovery, retrieval, and delivery of imagery products to NSGI users. The NGL Program is chartered to plan, deliver, and operate a scaleable systems capability for the archive of imagery, imagery products, and geospatial information used by DOD components and civil agencies. The NGL architecture is client/server based, with the NGL providing the library server function to include imagery format

conversion services. The NGL is a component of the NGA Imagery Exploitation System (NIES) that will initially migrate Image Data Expoitation (IDEX) II legacy data holdings into the NGL archive, and eventually phase out the IDEX II completely. A Pixel Processor Based Services software library developed by TRW, Redondo Beach, CA, provides the file format conversion service for the NGL. When a user selects a desired conversion service, the NGL identifies and retrieves the applicable image file from its storage and forwards it to the NGL Pixel Processor Services to perform the requested conversion. Then the NGL server delivers the resulting file to the appropriate destination.

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Appendix N – Product Summaries & Archetypes for Airborne Producers

N.1 INTRODUCTION

Product summaries for the following Airborne Producers are located at:

Producer System	Page
CIP	N-3
ASARS-2	N-23
Block 1 TUAV GCS	N-37
SHARP	N-41
AIP	
SYERS2	
Joint STARS CGS	
TIS	
NG Screener	
Global Hawk (ACTD and Production)	
IPL	
PTW	
JTW`	
Etc.	

Archetypes for the following types of Airborne Producers are located at:

Archetype	Page
EO/VIS	
IR	
SAR	
SARIQ	
VPH	
Screener Outputs	

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NITFS APPLICATION SUMMARY
Common Imagery Processor (CIP)

System Identifier:	Common Imagery Processor (CIP)
NITFS Services:	Tactical NITFS File Processor
NITF/NSIF Version(s):	NITF 2.0 and 2.1. Selection of either format can be made for each product by changing the Product Configuration file at each customer site during installation. Unless stated otherwise, all NITF products are output by default using NITF2.1 with ASDE 1.1 Support Data Extensions (SDEs).
Reference Documents:	Common Imagery Processor (CIP) to Common Imagery Ground Surface System (CIGSS) Interface Control Document (ICD), 5A28773, Revision J, 15 August 2003. STDI-0002 version 2.0, Section 8.0, 4 March 1999, Airborne Support Data Extension (ASDE). STDI-0002 version 2.1, Section 8.0, 16 November 2000, Airborne Support Data Extension (ASDE).
NITFS Compliance Test Report:	Testing in progress

System Description

The Common Imagery Processor (CIP) is the primary sensor-processing element of the Common Imagery Ground/Surface System (CIGSS). The function of the CIP is to accept imagery and support data and process it in real time, with latency, into exploitable products and output them to other elements of the CIGSS. The CIGSS consists of a CIP, an Image Product Library (IPL), an Imagery Exploitation Support System (IESS), Exploitation Workstations, a Screener Workstation, a CIGSS System Manager, and other CIGSS-compliant elements. CIP imagery (full and reduced resolution data sets) and support data can be output to a Screening Workstation. The Screener Workstation provides an image selection capability that allows for the designation of targets within the imagery. Selected image target areas are either transmitted to the IPL or an exploitation workstation in NITF 2.0/2.1 formats with the appropriate Support Data Extensions (SDEs).

The current set of sensors supported by the CIP baseline is:

- ASARS-2 (SAR)
- SYERS (EO)
- ATARS (LAEO/MAEO/IRLS)
- APG-73 (SAR)
- SYERS-2 (Multispectral)
- Global Hawk (SAR/EO/IR)
- ASARS-2a (SAR)
- Dark Star (SAR/EO)
- SHARP (EO/IR)

This NITFS Application Summary describes the basic "footprint" of the NITFS products being output by the CIP. This information was gathered from data received by JITC from the CIP. The following description is not an exact representation of all CIP output products, but should provide a basic indication of the approach used by the CIP program when populating NITFS headers,

NITFS APPLICATION SUMMARY
Common Imagery Processor (CIP)

subheaders and Tagged Record Extensions (TREs). This information was obtained through reviewing image data from the ASARS-2, SYERS, ATARS and APG-73 sensors and therefore may not adequately describe the CIP output for SYERS-2, Global Hawk, and ASARS-2a. In cases where the sensor writes NITF on-board; e.g., SHARP, Global Hawk, and ASARS-2a, the CIP can pass the data on as-is and therefore it is best to review the NITFS Application Summary for that sensor.

The set of SDEs present in CIP output files varies depending on sensor type. For EO/IR NITF 2.0 or 2.1, STDI-0002 (Version 2.0 or 2.1), the CIP will provide the following SDEs:

- AIMIDB Additional Image Identification (required)
- ACFTB Aircraft Information (required)
- BANDSA Multispectral Band Parameters
- BLOCKA Image Block Information
- EXOPTA Exploitation Related Optical Information
- SENSRA EO-IR Sensor Parameters (required)
- MSTGTA Mission Target
- SECTGA Secondary Targeting Information

For SAR NITF 2.0 or 2.1, STDI-0002 (Version 2.0 or 2.1), the CIP will provide the following SDEs:

- AIMIDB Additional Image Identification (required)
- ACFTB Aircraft Information (required)
- MPDSRA Mensuration Data
- BLOCKA Image Block Information
- EXPLTB Exploitation Related Information
- MENSRB Airborne SAR Mensuration Data
- PATCHB Patch Information
- MSTGTA Mission Target
- SECTGA Secondary Targeting Information
- CMETTA Complex Metadata (only present with ASARS-2a complex data)

If supported by the sensor, all listed SDEs for EO/IR and SAR will be output with each NITF file with exception of MSTGTA and SECTGA, which will only be output for NITF files associated with Pre-Planned Targets and Secondary Targets respectively. Only the two required SDEs are described below. In general, the SDEs populated by the CIP are reported in a "local" verses "global" fashion; local meaning they describe a portion of a scene and global meaning they describe the whole scene. With CIP output, the data present in each SDE applies strictly to the pixels contained in its corresponding NITF IM segment, even if that image is really a small piece of a larger scene. There are often numerous images taken by the same sensor, to satisfy the same mission, all with the same scene/operation number. In these cases, the CIP provides the exact coverage of support data for the pixels contained in a single NITF file. The support data is updated for each separate "chunk" of pixels making up the full image scene. In some legacy applications, the SDE data applies to the complete set of pixels describing the scene and each NITF file may or may not have had the whole scene in it. This is not the case with CIP NITF output.

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NITFS APPLICATION SUMMARY Common Imagery Processor (CIP)	
NITF Header Characteristics – populated similarly for all sensors	
File Naming Convention (note: character fields listed to the right are separated by underscores)	FTP product filename: Product Type – 2 characters Processing Configuration – 2 characters Product Type ID – 3 characters Product Sequence # - 4 characters Sensor Setup Number – 4 characters Date (MMDDYY) – 6 characters Time (HHMMSS) – 6 characters Extension – .ntf see paragraph 3.1.5.2.1 of the CIP ICD for more explanation
CLEVELs Supported	Depends on sensor, but up to 06
Origination Station Identifier Convention	"CIPxxxx" where xxxx is a 4-digit serial number
File Title Convention	This field always contains a 37-character file name as defined in the CIP File Naming Convention.
Security Marking Options Supported	Depends on sensor, but FSCLAS is either U or S and all other security fields are space filled in both cases.
Originator's Designated Background Color	Hex 00 00 00
Originator's Name Field Convention	[spaces]
Originator's Phone Number Convention	[spaces]
Image Segments Supported	Depends on sensor: ATARS, ASARS-2, APG-73, ASARS-2a, SYERS, SYERS-2, Global Hawk, and SHARP Mosaic - 1 per file SHARP pass through files – 2 per file, (one full resolution and one thumbnail image)
Symbol Segments Supported	None
Text Segments Supported	None
Data Extension Segments Supported	None
Reserved Extension Segments Supported	None
File Header TREs (tags) Supported	None
File Size/Range	0.5 MByte to 1573 MByte Depends on Sensor – see image dimensions in paragraph 3.2.5 of the CIP ICD for a rough order of magnitude on a sensor by sensor basis.

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NITFS APPLICATION SUMMARY Common Imagery Processor (CIP)	
Image Segment Options Supported – populated similarly for all sensors	
Image Identifier 1 (short ID)	Contains the CIP product type, processing configuration and internal product sequence number. This string in conjunction with the product date/time of creation, uniquely defines each CIP product.
Image Identifier 2 (long ID)	This field always contains the 40-character AIMIDB mapping required by the ASDE 1.0 Specification. Also identical to FTITLE field.
Target Identifier Field	[spaces]
Image Source Field	[spaces]
Image Comment Fields	None
Image Characteristics	
Dimensions	Depends on Sensor and mode: Reference paragraph 3.2.5 of the CIP ICD for image dimensions for each sensor and mode.
Pixel Value Types	INT
Image Representation Types	MONO and MULTI
Image Categories	VIS, SAR, IR, MS
Bounding Rectangle Coordinates	Always present (ICORDS = G)
Compression Options	NC, NM, C3, or M3
Pixel Interleave(s)	IMODE B for single bands, IMODE S for multiple bands
Blocking	Unless otherwise stated, 1024 x 1024, but can be changed by editing the configuration during installation.
Location offset supported	Always 0000000000
Attachment Level supported	Always 000
Reduced Resolutions	DSR is dynamically calculated on a per product basis to fit a max of 1024 row by 1024 column size.
Image Subheader TREs (tags) Supported	Unless stated otherwise, all SAR and EO/IR imagery utilize ASDE 1.1 SDEs. By editing the product configuration file during installation, older or newer SDE versions can selectively be substituted. See below for a better explanation of SDEs present for each data type.

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NITFS APPLICATION SUMMARY Common Imagery Processor (CIP)	
Symbol Segment Options Supported	
CGM Supported	Not Supported
Degree of CGM Support	
Symbol Identifier Convention	
Symbol Name Convention	
Location offset supported	
Attachment Level supported	
Symbol Subheader TREs (tags) supported	
Text Segment Options Supported	
STA (Basic Character Set)	Not Supported
UT1 (Extended Character Set)	
U8S (UTF-8 Extended Characters)	
MTF (US Message Text Format)	
Text Identifier Convention	
Text Title Convention	
Attachment Level supported	
Text Subheader TREs (tags) supported	
Data Extension Segments Supported	
Controlled Extensions (NITF2.0 only)	Not Supported
Registered Extensions (NITF2.0 only)	
TRE_OVERFLOW	
STREAMING_FILE_HEADER	
Reserved Extension Segments Supported	
None yet defined.	Not Supported
AIMIDB--Additional Image ID Extension Format **The AIMIDB TRE is populated similarly for all EO/IR and SAR image data**	
ACQUISITION_DATE	Populated with acquisition date, updated for each image of a scene (same as IDATIM)
MISSION_NO	UNKN
MISSION_IDENTIFICATION	NOT AVAIL
FLIGHT_NO	00 (unavailable)

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NITFS APPLICATION SUMMARY Common Imagery Processor (CIP)	
OP_NUM	Populated the same as ACFTB: SCNUM. When the data collected for a single scene is broken into multiple images, there will be numerous images from the same sensor and date-time stamp that have the same OP_NUM/SCNUM. These images are related and could be treated as a single image even though they are broken-up. This will mostly happen when a sensor is in strip or search mode or it is a framing sensor.
CURRENT_SEGMENT	For Spot modes – AA; For Strip modes – each image in the scene is labeled AA, AB, AC…respectively
REPRO_NUM	00
REPLAY	000
(Reserved-001)	[1 space]
START_TILE_COLUMN	001
START_TILE_ROW	00001
END_SEGMENT	00 (unknown)
END_TILE_COLUMN	001
END_TILE_ROW	00001
COUNTRY	2 spaces
(Reserved-002)	[4 spaces]
LOCATION	Location, updated for each image in the scene
(Reserved-003)	[13 spaces]
ACFTB – Aircraft Information Extension **The ACFTB TRE is populated similarly for all EO/IR and SAR image data and is one of the only SDEs that get populated identically for all images in a scene.**	
AC_MSN_ID	NOT AVAILABLE
AC_TAIL_NO	10 spaces
AC_TO	Aircraft take-off date and time, or 12 spaces
SENSOR_ID_TYPE	Depends on sensor, see ASDE Specification
SENSOR_ID	
SCENE_SOURCE	
SCNUM	Populated the same as AIMIDB: OP_NUM.
PDATE	Identical to date in File Date & Time (FDT)
IMHOSTNO	000000

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NITFS APPLICATION SUMMARY Common Imagery Processor (CIP)	
IMREQID	00000
MPLAN	Depends on sensor, see ASDE Specification
ENTLOC	Populated with the planned entry location of the scene
LOC_ACCY	000.00
ENTELV	Populated with the planned entry elevation of the scene
ELV_UNIT	f (feet)
EXITLOC	Populated with the planned exit location of the scene, except for Spot mode - 25 spaces
EXITELV	Populated with the planned exit elevation of the scene, except for Spot mode - 6 spaces
TMAP	Populated with map angle of scene
ROW_SPACING	Populated with spacing across scene
ROW_SPACING_UNITS	f (feet)
COL_SPACING	Populated with spacing across scene
COL_SPACING_UNITS	f (feet)
FOCAL_LENGTH	999.99 (not available/not applicable)
SENSERIAL	6 spaces
ABSWVER	7 spaces
CAL_DATE	8 spaces
PATCH_TOT	0001 for SAR and 0000 for EO/IR
MTI_TOT	000

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The following table represents TREs that are optional and their fields that not required to be present depending on the sensor type.

Table N-1. TREs Dependent on Sensor Types

Field	ASARS-2	SYERS	ATARS	APG-73	Convention
ACFTB					
AC_MSN_ID	√	√	√	√	**NOT AVAILABLE**
AC_TAIL_NO	√	√	√	√	**[spaces]**
AC_TO	√	√	√	√	Aircraft take-off date and time, of [spaces] if unknown
SENSOR_ID_TYPE					Depends on sensor, see ASDE Specification
SENSOR_ID					
SCENE_SOURCE					
SCNUM	√	√	√	√	Populated the same as AIMIDB: OP_NUM.
PDATE	√	√	√	√	Identical to date in File Date & Time (FDT)
IMHOSTNO	√	√	√	√	**[zeros]**
IMREQID	√	√	√	√	
MPLAN	√	√	√	√	Depends on sensor, see ASDE Specification
ENTLOC	√	√	√	√	Populated with the planned entry location of the scene
LOC_ACCY	√	√	√	√	**[000.00]**
ENTELV	√	√	√	√	Populated with the planned entry elevation of the scene
ELV_UNIT	√	√	√	√	**f** (feet)

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Table N-1. TREs Dependent on Sensor Types (cont'd)

Field	ASARS-2	SYERS	ATARS	APG-73	Convention
EXITLOC	√	√	√	√	Populated with the planned exit location of the scene, except for Spot mode - 25 spaces
EXITELV	√	√	√	√	Populated with the planned exit elevation of the scene, except for Spot mode - 6 spaces
TMAP	√	√	√	√	map angle of scene
ROW_SPACING	√	√	√	√	Populated with spacing across scene
ROW_SPACING_UNITS	√	√	√	√	**f** (feet)
COL_SPACING	√	√	√	√	Populated with spacing across scene
COL_SPACING_UNITS	√	√	√	√	**f** (feet)
FOCAL_LENGTH	√	√	√	√	999.99 (not available/not applicable)
SENSERIAL	√	√	√	√	**[spaces]**
ABSWVER	√	√	√	√	
CAL_DATE	√	√	√	√	
PATCH_TOT	√	√	√	√	**0001**
MTI_TOT	√	√	√	√	**000**
AIMIDB					
ACQUISITION_DATE	√	√	√	√	Populated with acquisition date, updated for each image of a scene (same as IDATIM)
MISSION_NO	√	√	√	√	**UNKN**
MISSION_IDENTIFICATION	√	√	√	√	**NOT AVAIL.**

Table N-1. TREs Dependent on Sensor Types (cont'd)

Field	ASARS-2	SYERS	ATARS	APG-73	Convention
FLIGHT_NO	√	√	√	√	**00** (unavailable)
OP_NUM	√	√	√	√	Populated the same as ACFTB: SCNUM. When the data collected for a single scene is broken into multiple images, there will be numerous images from the same sensor and date-time stamp that have the same OP_NUM/SCNUM.
CURRENT_SEGMENT	√	√	√	√	For Spot modes – **AA**; For Strip modes – each image in the scene is labeled AA, AB, AC…respectively
REPRO_NUM	√	√	√	√	**00**
REPLAY	√	√	√	√	**000**
(Reserved-001)	√	√	√	√	**[space]**
START_TILE_COLUMN	√	√	√	√	**001**
START_TILE_ROW	√	√	√	√	**00001**
END_SEGMENT	√	√	√	√	**00** (unknown)
END_TILE_COLUMN	√	√	√	√	**001**
END_TILE_ROW	√	√	√	√	**00001**
COUNTRY	√	√	√	√	**[spaces]**
(Reserved-002)	√	√	√	√	**[spaces]**
LOCATION	√	√	√	√	Location, updated for each image in the scene
(Reserved-003)	√	√	√	√	**[spaces]**
BANDSA					
ROW_SPACING		√	√		Populated the same as in ACFTB: ROW_SPACING

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Table N-1. TREs Dependent on Sensor Types (cont'd)

Field	ASARS-2	SYERS	ATARS	APG-73	Convention
ROW_SPACING_UNITS		√	√		**f** (feet)
COL_SPACING		√	√		Populated the same as in ACFTB: COL_SPACING
COL_SPACING_UNITS		√	√		**f** (feet)
FOCAL_LENGTH		√	√		**999.99**
BANDCOUNT		√	√		**0001**
BANDPEAKn		√	√		**[spaces]**
BANDLBOUNDn		√	√		Upper and lower wavelength bounds
BANDUBOUNDn		√	√		
BANDWIDTHn		√	√		Difference between upper and lower wavelength bounds
BANDCALDRKn		√	√		**[spaces]**
BANDCALINCn		√	√		
BANDRESPn		√	√		Pixel size
BANDASDn		√	√		Pixel center-to-center distance
BANDGSDn		√	√		Ground sample distance
BLOCKA					
BLOCK_INSTANCE	√			√	**01**
N_GRAY	√			√	**00000**
L_LINES	√			√	Same as NROWS

Table N-1. TREs Dependent on Sensor Types (cont'd)

Field	ASARS-2	SYERS	ATARS	APG-73	Convention
LAYOVER_ANGLE	√			√	layover angle, updated for each image in the scene
SHADOW_ANGLE	√			√	shadow angle, updated for each image in the scene
(reserved-001)	√			√	**[spaces]**
FRLC_LOC	√			√	four corner locations, updated for each image in the scene
LRLC_LOC	√			√	
LRFC_LOC	√			√	
FRFC_LOC	√			√	
(reserved-002)	√			√	**[010.0]**
EXOPTA					
ANGLE_TO_NORTH		√	√		Angle to north, updated for each image in the scene
MEAN_GSD		√	√		GSD, updated for each image in the scene
(reserved-001)		√	√		**[1]**
DYNAMIC_RANGE		√	√		**00255**
(reserved-002)		√	√		**[spaces]**
OBL_ANG		√	√		Angles, updated for each image in the scene
ROLL_ANG		√	√		
PRIME_ID		√	√		Populated when provided
PRIME_BE		√	√		**[spaces]**
(reserved-003)		√	√		

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Table N-1. TREs Dependent on Sensor Types (cont'd)

Field	ASARS-2	SYERS	ATARS	APG-73	Convention
N_SEC		√	√		**000 - 250**
(reserved-004)		√	√		**[spaces]**
(reserved-005)		√	√		**0000001**
N_SEG		√	√		**001**
MAX_LP_SEG		√	√		Same as NROWS
(reserved-006)		√	√		**[12 spaces]**
SUN_EL		√	√		Angles, updated for each image in the scene
SUN_AZ		√	√		
EXPLTB					
ANGLE_TO_NORTH	√			√	Angle to north, updated for each image in the scene
ANGLE_TO_NORTH_ACCY	√			√	**00.000** (unknown)
SQUINT_ANGLE	√			√	Squint angle, updated for each image in the scene
SQUINT_ANGLE_ACCY	√			√	**00.000** (unknown)
MODE	√			√	Depends on sensor, see ASDE Specification
(reserved-001)	√			√	**[16 spaces]**
GRAZE_ANG	√			√	Graze angle, updated for each image in the scene
GRAZE_ANG_ACCY	√			√	**00.00** (unknown)
SLOPE_ANG	√			√	Slope angle, updated for each image in the scene
POLAR	√			√	HH

Table N-1. TREs Dependent on Sensor Types (cont'd)

Field	ASARS-2	SYERS	ATARS	APG-73	Convention
NSAMP	√			√	Same as NCOLS
(reserved-002)	√			√	**[0]**
SEQ_NUM	√			√	**[space]**
PRIME_ID	√			√	
PRIME_BE	√			√	
(reserved-003)	√			√	**[0]**
N_SEC	√			√	**01**
IPR	√			√	Varies, and is equivalent to MPDSRA: IPR
MENSRB					
ACFT_LOC		√	√		Aircraft location, updated for each image in the scene
ACFT_LOC_ACCY		√	√		**000.00** (unknown)
ACFT_ALT		√	√		Aircraft altitude, updated for each image in the scene
RP_LOC		√	√		Reference point, updated for each image in the scene
RP_LOC_ACCY		√	√		**000.00** (unknown)
RP_ELV		√	√		Reference point elevation, updated for each image in the scene
OF_PC_R		√	√		**+0000.0**
OF_PC_A		√	√		**+0000.0**
COSGRZ		√	√		Cosine of the graze angle, updated for each image in the scene
RGCRP		√	√		Slant range, updated for each image in the scene

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Table N-1. TREs Dependent on Sensor Types (cont'd)

Field	ASARS-2	SYERS	ATARS	APG-73	Convention
RLMAP		√	√		L or R
RP_ROW		√	√		Populated with the row containing the RP
RP_COL		√	√		Populated with the column containing the RP
Reference Point Unit Basis Vectors		√	√		Range and azimuth vectors representing North, East, Down, updated for each image in the scene
TOTAL_TILES_COLS		√	√		**[spaces]**
TOTAL_TILES_ROWS		√	√		
MPDSRA					
BLK_NUM	√			√	**01**
IPR	√			√	Varies, and is equivalent to EXPLTB: IPR
NBLKS_IN_WDG	√			√	**01**
ROWS_IN_BLK	√			√	Same as NROWS
COLS_IN_BLK	√			√	Same as NCOLS
ORP_X, Y, Z	√			√	Output reference point, updated for each image in the scene
ORP_ROW, COLUMN	√			√	Output reference point row and column, updated for each image in the scene
FOC_X, Y, Z	√			√	Focus plane normal point, updated for each image in the scene
ARP_TIME	√			√	Collection start time, updated for each image in the scene
(reserved-001)	√			√	**[14 spaces]**
Antenna Reference Point Position,	√			√	Updated for each image in the scene

Table N-1. TREs Dependent on Sensor Types (cont'd)

Field	ASARS-2	SYERS	ATARS	APG-73	Convention
Velocity and Acceleration					
(reserved-002)	√			√	**[000.0000001.0]**
MSTGTA					
TGT_NUM	√	√	√	√	Target number
TGT_ID	√	√	√	√	**[spaces]**
TGT_BE	√	√	√	√	
TGT_PRI	√	√	√	√	
TGT_REQ	√	√	√	√	
TGT_LTIOV	√	√	√	√	
TGT_TYPE	√	√	√	√	**0-2**
TGT_COLL	√	√	√	√	**0-4**
TGT_CAT	√	√	√	√	**[spaces]**
TGT_UTC	√	√	√	√	
TGT_ELEV	√	√	√	√	
TGT_ELEV_UNIT	√	√	√	√	**f** (feet)
TGT_LOC	√	√	√	√	Target location
PATCHB					
PAT_NO	√			√	**01** – un-numbered
LAST_PAT_FLAG	√			√	Strip – 0 or 1

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Table N-1. TREs Dependent on Sensor Types (cont'd)

Field	ASARS-2	SYERS	ATARS	APG-73	Convention
					Spot – **1**
LNSTRT and LNSTOP	√			√	Starting and ending line of patch, updated for each image in the scene
AZL, NVL and FVL	√			√	Total number of azimuth lines, valid and starting point, updated for each image in the scene
NPIXEL and FVPIX	√			√	Number of image pixels and first valid pixel, updated for each image in the scene
FRAME	√			√	Frame number, updated for each image in the scene
UTC	√			√	UTC updated for each image in the scene
SHEAD	√			√	Heading, updated for each image in the scene
GRAVITY	√			√	Local gravity, updated for each image in the scene
INS_V_NC, EC and DC	√			√	North, East, Down velocity vector, updated for each image in the scene
OFFLAT, LONG	√			√	Geodetic Lat/Long, updated for each image in the scene
TRACK	√			√	Track heading, updated for each image in the scene
GSWEEP	√			√	Sweep angle, updated for each image in the scene
SHEAR	√			√	Shear factor, updated for each image in the scene
BATCH_NO	√			√	Consecutive number of files, updated for each image in the scene
SECTGA					
SEC_ID	√	√	√	√	**[spaces]**
SEC_BE	√	√	√	√	**[spaces]**
(reserved-001)	√	√	√	√	**[0]**

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Table N-1. TREs Dependent on Sensor Types (cont'd)

Field	ASARS-2	SYERS	ATARS	APG-73	Convention
SENSRA					
REF_ROW		√	√		**00000000**
REF_COL		√	√		**00000000**
SENSOR_MODEL		√	√		Identification of sensor
SENSOR_MOUNT		√	√		Sensor mounted pitch angle
SENSOR_LOC		√	√		Sensor location, updated for each image in the scene
SENSOR_ALT_SOURCE		√	√		**B** (barometric altimeter)
SENSOR_ALT		√	√		Sensor altitude, updated for each image in the scene
SENSOR_ALT_UNIT		√	√		**f** (feet)
SENSOR_AGL		√	√		Sensor Altitude, updated for each image in the scene
SENSOR_PITCH		√	√		Angles, updated for each image in the scene
SENSOR_ROLL		√	√		
SENSOR_YAW		√	√		
PLATFORM_PITCH		√	√		
PLATFORM_ROLL		√	√		
PLATFORM_HDG		√	√		
GROUND_SPD_SOURCE		√	√		**N** (Navigation System)
GROUND_SPD		√	√		Speed, updated for every image in the scene

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Table N-1. TREs Dependent on Sensor Types (cont'd)

Field	ASARS-2	SYERS	ATARS	APG-73	Convention
GROUND_SPD_UNIT		√	√		**k** (knots)
GROUND_TRACK		√	√		Track, updated for every image in the scene
VERT_VEL		√	√		Velocity, updated for every image in the scene
VERT_VEL_UNIT		√	√		**f** (feet)
SWATH_FRAMES		√	√		**[spaces]**
N_SWATHS		√	√		
SPOT_NUM		√	√		

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NITFS APPLICATION SUMMARY

ASARS-2 Improvement Program

System Identifier:	ASARS-2 Improvement Program (AIP)
NITFS Services:	Airborne Synthetic Aperture Radar Image Data Producer
NITF/NSIF Version(s):	NITF 2.1
Reference Documents:	Interface Control Document for the AIP Airborne Radar Set to Ground ICD40042-166
NITFS Compliance Test Report:	Dated November 2001

System Description

The ASARS-2A sensor is the Advanced Synthetic Aperture Radar System (ASARS) designed for the high altitude U.S. Air Force U-2 aircraft. It is near real-time, high-resolution reconnaissance system with all-weather, day night, long-range mapping capabilities. ASARS-2A sensor detects and accurately locates fixed and moving ground targets. It gathers detailed information, formats the data, and transmits high-resolution images. The ASARS-2 Improvement Program (AIP) was designed to bring the latest commercial-off-the shelf (COTS) technology to the warfighter. The AIP brings operational capabilities, including near real-time, precision targeting; broad area synoptic coverage; on-board processing; ground moving target indications; and complex imagery for measurement intelligence applications.

The AIP Image Processing Assemblies provide the capability to export Synthetic Aperture Radar (SAR) to the National Imagery Transmission Format Standard (NITFS). There are two platforms that make up the Image Processing Assemblies, the On-Board Processor (OBP) and the Ground Station (GS). The OBP generates complex SAR, compressed or uncompressed detected SAR and Ground Moving Target Indicator (GMTI) hit data. The GS has the same NITF file generation capabilities as the OBP except it does not generate complex image or GMTI files. The OBP receives raw radar data in the form of Video Phase History (VPH) and breaks it up into numerous tiles as shown in figure 17-3 and 17-4 of STDI-0002, Version 2.1, CMETAA TRE (section 17). Sponsored by the Air Force Aeronautical System Center, Raytheon Company of El Segundo developed both the OBP and GS.

The ASARS-2A sensor collects SAR data in several different modes; Search, Canted Search, Point, Repetitive Point Imaging, and GMTI. When the sensor is in either of the search modes, it collects its data in one of the three sub-modes: High, Medium or Coarse. If the sensor is in Point Imaging mode, it collects in either Point Imaging or Repetitive Point Imaging sub-mode. If the sensor is in GMTI mode, it collects in either Swath MTI (SMTI) or Wide Area MTI (WAMTI) sub-mode.

Sensor Type(s)

ASARS-2A

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NITFS APPLICATION SUMMARY ASARS-2 Improvement Program	
General Characteristics	
File Naming Convention	*For Search and Point Imaging Modes*: m(followed by Mission Name)_s(followed by Scene #)_seg(followed by Segment#)_f(followed by Frame#)_row(followed by Row #)_col(followed by Col #)_c(followed by Copy #)_r(followed by Reduction # - For Minification use only 1= Full Resolution - Not Minified, 14 ,15, 36).ntf_detected or .ntf_complex or .ntf_detected_compressed *For example*: maa39_s11_seg1_f1_row12_col5_c1_r1.ntf_detected (for detected uncompressed data) maa39_s11_seg1_f1_row12_col5_c1_r1.ntf_complex (for complex uncompressed data) maa39_s11_seg1_f1_row12_col5_c1_r1.ntf_detected_compressed (for detected compressed data) *For GMTI Modes*: The filename format is as follows: m(followed by Mission Name)_s(followed by Scene #)_(Year in 4 digits)(Months in 2 digits)(Day in 2 digits)(Hours in 2 digits)(Minutes in 2 digits)(Seconds in 2 digits)_c(followed by copy #). ntf_mti *For example*: maa39_s11_20011225123001_c1.ntf_mti
CLEVELs Supported	Complex - CLEVEL 06; Detected and MTI - CLEVEL 03
Origination Station Identifier Convention	ARS (Airborne Radar System)
File Title Convention	Uses AIMIDB mapping of fields Acquisition_Date through END_TILE_ROW
Security Marking Options Supported	The following Security fields are populated in all AIP files: FSCLAS - S, FSCLSY - US, FSCTLH - UO, FSREL - country codes per FIPS PUB 10-4, all other Security fields are defaulted according to MIL-STD-2500B
Originator's Designated Background Color	0x303030
Originator's Name Field Convention	Spaces
Originator's Phone Number Convention	Spaces

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NITFS APPLICATION SUMMARY ASARS-2 Improvement Program	
Image Segments Supported	SAR - 001; MTI - 000
Symbol Segments Supported	000
Text Segments Supported	000
Data Extension Segments Supported	000
Reserved Extension Segments Supported	000
File Header TREs (tags) Supported	Complex and Detected SAR - no TREs supported; GMTI - ACFTB, MTIRPB and MTXFIL
File Size/Range	Typical file sizes demonstrated during testing were: Complex ≈ 4-6 MB Search (Detected) ≈ 2-4 MB Point (Detected) ≈ 2-3 MB Search (Detected) JPEG < 1 MB Point (Detected) JPEG < 1/2 MB SMTI/WAMTI ≈ 20k
Image Segment Options Supported	
Image Identifier 1 (short ID)	AIP
Image Identifier 2 (long ID)	Same as FTITLE
Target Identifier Field	Spaces
Image Source Field	AIP
Image Comment Fields	No image comments used
Image Characteristics	
Dimensions	Complex - columns usually less than 20000, rows usually less than 400; Detected - slightly ≤ 2048 x 2048 and usually not square
Pixel Value Types	INT
Image Representation Types	Complex - POLAR, Detected - MONO
Image Categories	SAR
Bounding Rectangle Coordinates	Decimal Degrees
Compression Options	NC or C3 (Complex data are always NC)
Pixel Interleave(s)	Complex - IMODE S; Detected - IMODE B

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NITFS APPLICATION SUMMARY ASARS-2 Improvement Program	
Blocking	Complex - single pixel blocks in row dimension, and generally one to four blocks in column dimension; Detected - single block
Location offset supported	0000000000
Attachment Level supported	000
Reduced Resolutions	IMAG is always 1.0
Image Subheader TREs (tags) Supported	Complex - AIMIDB, ACFTB, AIPBCA, BLOCKA, CMETAA, EXPLTB, MENSRB, MTXFIL; Detected - AIMIDB, ACFTB, BLOCKA, EXPLTB, MENSRB, MTXFIL
Symbol Segment Options Supported	
CGM Supported	NOT SUPPORTED
Degree of CGM Support	
Symbol Identifier Convention	
Symbol Name Convention	
Location offset supported	
Attachment Level supported	
Symbol Subheader TREs (tags) supported	
Text Segment Options Supported	
STA (Basic Character Set)	NOT SUPPORTED
UT1 (Extended Character Set)	
U8S (UTF-8 Extended Characters)	
MTF (US Message Text Format)	
Text Identifier Convention	
Text Title Convention	
Attachment Level supported	
Text Subheader TREs (tags) supported	
Data Extension Segments Supported	
Controlled Extensions (NITF 2.0 only)	N/A
Registered Extensions (NITF 2.0 only)	
TRE_OVERFLOW	NOT SUPPORTED

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NITFS APPLICATION SUMMARY ASARS-2 Improvement Program	
STREAMING_FILE_HEADER	
Reserved Extension Segments Supported	
None yet defined.	N/A
Other Pertinent Information	
AIMIDB—Additional Image ID Extension Format	
ACQUISITION_DATE	populated
MISSION_NO	'UNKN'
MISSION_IDENTIFICATION	alphanumeric string, convention unknown
FLIGHT_NO	'00'
OP_NUM	same as ACFTB: SCNUM
CURRENT_SEGMENT	'00'
REPRO_NUM	'00'
REPLAY	'000'
(reserved-001)	[1 space]
START_TILE_COLUMN	these fields provide the row/col of the data in each file relative to the full image operation.
START_TILE_ROW	
END_SEGMENT	'00'
END_TILE_COLUMN	populated identically to START_TILE_COLUMN and ROW
END_TILE_ROW	
COUNTRY	spaces
(reserved-002)	[4 spaces]
LOCATION	populated
(reserved-003)	[13 spaces]
ACFTB—Aircraft Information Extension Format	
AC_MSN_ID	alphanumeric string, unknown convention
AC_TAIL_NO	spaces
AC_TO	spaces
SENSOR_ID_TYPE	'SAR'
SENSOR_ID	'AIP'

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NITFS APPLICATION SUMMARY ASARS-2 Improvement Program	
SCENE_SOURCE	‘1’
SCNUM	populated
PDATE	populated
IMHOSTNO	spaces
IMREQID	spaces
MPLAN	populated
ENTLOC	populated
LOC_ACCY	spaces
ENTELV	populated
ELV_UNIT	‘m’
EXITLOC	Point – spaces; Search – populated
EXITELV	populated
TMAP	populated
ROW_SPACING	populated
ROW_SPACING_UNITS	‘f’
COL_SPACING	populated
COL_SPACING_UNITS	‘f’
FOCAL_LENGTH	‘999.99’
SENSERIAL	spaces
ABSWVER	spaces
CAL_DATE	spaces
PATCH_TOT	‘0000’
MTI_TOT	‘000’
BLOCKA—Image Block Information Extension Format	
BLOCK_INSTANCE	‘01’
N_GRAY	spaces
L_LINES	same as NROWS
LAYOVER_ANGLE	populated
SHADOW_ANGLE	populated
(reserved-001)	[16 spaces]
FRLC_LOC	same as IGEOLO 2 (w/more precision)
LRLC_LOC	same as IGEOLO 3 (w/more precision)

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NITFS APPLICATION SUMMARY ASARS-2 Improvement Program	
LRFC_LOC	same as IGEOLO 4 (w/more precision)
FRFC_LOC	same as IGEOLO 1 (w/more precision)
(reserved-002)	010.0
EXPLTB—Exploitation Related Information Extension Format	
ANGLE_TO_NORTH	populated
ANGLE_TO_NORTH_ACCY	‘00.000’
SQUINT_ANGLE	populated
SQUINT_ANGLE_ACCY	’00.000’
MODE	populated
(reserved-001)	[16 spaces]
GRAZE_ANG	populated
GRAZE_ANG_ACCY	’00.00’
SLOPE_ANG	populated
POLAR	‘HH’
NSAMP	populated same as NCOLS
(reserved-002)	[0]
SEQ_NUM	spaces
PRIME_ID	spaces
PRIME_BE	spaces
(reserved-003)	[0]
N_SEC	‘00’
IPR	spaces
MENSRB—Airborne SAR Mensuration Data Extension Format	
ACFT_LOC	populated
ACFT_LOC_ACCY	populated
ACFT_ALT	populated
RP_LOC	populated
RP_LOC_ACCY	populated
RP_ELV	populated
OF_PC_R	‘+0000.0’
OF_PC_A	‘+0000.0’

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NITFS APPLICATION SUMMARY ASARS-2 Improvement Program	
COSGRZ	populated
RGCRP	populated
RLMAP	populated
RP_ROW	populated
RP_COL	populated
C_R_NC	populated
C_R_EC	populated
C_R_DC	populated
C_AZ_NC	populated
C_AZ_EC	populated
C_AZ_DC	populated
C_AL_NC	populated
C_AL_EC	populated
C_AL_DC	populated
TOTAL_TILES_COLS	provides the total number of files in the full image operation.
TOTAL_TILES_ROWS	
CMETAA	
100 – RELATED_TRES	2 or 3
200 – ADDITIONAL_TRES	AIMIDB, AIPBCE and / or MTXFIL
300 – RD_PRC_NO	populated
400 – IF_PROCESS	‘RM’
500 – RD_CEN_FREQ	‘X’
600 – RD_MODE	populated
700 – RD_PATCH_NO	populated
800 – CMPLX_DOMAIN	‘MP’
900 – CMPLX_MAG_REMAP_TYPE	‘LLM’
1000 – CMPLX_LIN_SCALE	‘1.00000’
1100 – CMPLX_AVG_POWER	‘0000000’
1200 – CMPLX_LINLOG_TP	‘00117’
1300 – CMPLX_PHASE_QUANT_FLAG	‘NS’
1400 – CMPLX_PHASE_QUANT_BIT_DEPTH	‘00’

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NITFS APPLICATION SUMMARY ASARS-2 Improvement Program	
1500 – CMPLX_SIZE_1	‘08’
1600 – CMPLX_IC_1	‘NC’
1700 – CMPLX_SIZE_2	‘08’
1800 – CMPLX_IC_2	‘NC’
1900 – CMPLX_IC_BPP	‘00000’
2000 – CMPLX_WEIGHT	‘UWT’
2100 – CMPLX_AZ_SLL	‘00’
2200 – CMPLX_RNG_SLL	‘00’
2300 – CMPLX_AZ_TAY_NBAR	‘00’
2400 – CMPLX_RNG_TAY_NBAR	‘00’
2500 – CMPLX_WEIGHT_NORM	SPACES
2600 – CMPLX_SIGNAL_PLANE	‘S’
2700 – IF_DC_SF_ROW	POPULATED
2800 – IF_DC_SF_COL	POPULATED
2900 – IF_PATCH_1_ROW	POPULATED
3000 – IF_PATCH_1_COL	POPULATED
3100 – IF_PATCH_2_ROW	POPULATED
3200 – IF_PATCH_2_COL	POPULATED
3300 – IF_PATCH_3_ROW	POPULATED
3400 – IF_PATCH_3_COL	POPULATED
3500 – IF_PATCH_4_ROW	POPULATED
3600 – IF_PATCH_4_COL	POPULATED
3700 – IF_DC_IS_ROW	POPULATED
3800 – IF_DC_IS_COL	POPULATED
3900 – IF_IMG_ROW_DC	PROVIDES LOCATION OF FILE RELATIVE TO FULL IMAGE OPERATION
4000 – IF_IMG_COL_DC	
4100 – IF_TILE_1_ROW	INDICATES WHAT DATA IS VALID IN THIS FILE – FOUR CORNERS
4200 – IF_TILE_1_COL	
4300 – IF_TILE_2_ROW	
4400 – IF_TILE_2_COL	
4500 – IF_TILE_3_ROW	
4600 – IF_TILE_3_COL	

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NITFS APPLICATION SUMMARY ASARS-2 Improvement Program	
4700 – IF_TILE_4_ROW	
4800 – IF_TILE_4_COL	
4900 – IF_RD	SEARCH – ‘O’; POINT – ‘Y’
5000 – IF_RGWLK	‘O’
5100 – IF_KEYSTN	‘O’
5200 – IF_LINSFT	‘Y’
5300 – IF_SUBPATCH	SPACE
5400 – IF_GEODIST	‘O’
5500 – IF_RGFO	‘Y’
5600 – IF_BEAM_COMP	‘Y’
5700 – IF_RGRES	POPULATED
5800 – IF_AZRES	POPULATED
5900 – IF_RSS	POPULATED
6000 – IF_AZSS	POPULATED
6100 – IF_RSR	POPULATED
6200 – IF_AZSR	POPULATED
6300 – IF_RFFT_SAMP	POPULATED
6400 – IF_AZFFT_SAMP	POPULATED
6500 – IF_RFFT_TOT	POPULATED
6600 – IF_AZFFT_TOT	POPULATED
6700 – IF_SUBP_ROW	POPULATED
6800 – IF_SUBP_COL	POPULATED
6900 – IF_SUB_RG	‘0001’
7000 – IF_SUB_AZ	USED TO COUNT PATCHES NOT SUBPATCHES
7100 – IF_RFFTS	SEARCH – ‘+’; POINT – ‘-‘
7200 – IF_AFFTS	SEARCH – ‘+’; POINT – ‘-‘
7300 – IF_RANGE_DATA	‘ROW_DEC’ OR ‘ROW_INC’
7400 – IF_INCPH	POPULATED
7500 – IF_SR_NAME1	SPACES
7600 – IF_SR_AMOUNT1	’01.00000’
7700 – IF_SR_NAME2	SPACES
7800 – IF_SR_AMOUNT2	’01.00000’

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NITFS APPLICATION SUMMARY ASARS-2 Improvement Program	
7900 – IF_SR_NAME3	SPACES
8000 – IF_SR_AMOUNT3	’01.00000’
8100 – AF_TYPE1	‘PHDIF’
8200 – AF_TYPE2	‘N’
8300 – AF_TYPE3	‘N’
8400 – POL_TR	‘H’
8500 – POL_RE	‘H’
8600 – POL_REFERENCE	‘ANT’
8700 – POL	‘N’
8800 – POL_REG	SPACE
8900 – POL_ISO_1	‘00000’
9000 – POL_BAL	SPACE
9100 – POL_BAL_MAG	‘00000000’
9200 – POL_BAL_PHS	‘00000000’
9300 – POL_HCOMP	SPACE
9400 – POL_HCOMP_BASIS	‘0000000000’
9500 – POL_HCOMP_COEF_1	‘0000000000’
9600 – POL_HCOMP_COEF_2	SPACES
9700 – POL_HCOMP_COEF_3	SPACES
9800 – POL_AFCOMP	SPACE
9900 – POL_SPARE_A	SPACES
10000 – POL_SPARE_N	‘000000000’
10100 – T_UTC_YYYYMMMDD	MATCHES IDATIM
10200 – T_HHMMSSUTC	MATCHES IDATIM
10300 – T_HHMMSSLOCAL	SPACES
10400 – CG_SRAC	POPULATED
10500 – CG_SLANT_CONFIDENCE	‘0000000’
10600 – CG_CROSS	POPULATED
10700 – CG_CROSS_CONFIDENCE	‘0000000’
10800 – CG_CAAC	POPULATED
10900 – CG_CONE_CONFIDENCE	‘000000’
11000 – CG_GPSAC	POPULATED

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NITFS APPLICATION SUMMARY ASARS-2 Improvement Program	
11100 – CG_GPSAC_CONFIDENCE	‘000000’
11200 – CG_SQUINT	POPULATED
11300 – CG_GAAC	POPULATED
11400 – CG_GAAC_CONFIDENCE	‘000000’
11500 – CG_INCIDENT	POPULATED
11600 – CG_SLOPE	POPULATED
11700 – CG_TILT	POPULATED
11800 – CG_LD	POPULATED
11900 – CG_NORTH	POPULATED
12000 – CG_NORTH_CONFIDENCE	‘000000’
12100 – CG_EAST	POPULATED
12200 – CG_RLOS	POPULATED
12300 – CG_LOS_CONFIDENCE	‘000000’
12400 – CG_LAYOVER	POPULATED
12500 – CG_SHADOW	POPULATED
12600 – CG_OPM	‘0000000’
12700 – CG_MODEL	‘ECEF’
12800 – CG_AMPT_X	POPULATED
12900 – CG_AMPT_Y	POPULATED
13000 – CG_AMPT_Z	POPULATED
13100 – CG_AP_CONF_XY	‘000000’
13200 – CG_AP_CONF_Z	‘000000’
13300 – CG_APCEN_X	POPULATED
13400 – CG_APCEN_Y	POPULATED
13500 – CG_APCEN_Z	POPULATED
13600 – CG_APER_CONF_XY	POPULATED
13700 – CG_APER_CONF_Z	POPULATED
13800 – CG_FPNUV_X	POPULATED
13900 – CG_FPNUV_Y	POPULATED
14000 – CG_FPNUV_Z	POPULATED
14100 – CG_IDPNUVX	POPULATED
14200 – CG_IDPNUVY	POPULATED

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NITFS APPLICATION SUMMARY ASARS-2 Improvement Program	
14300 – CG_IDPNUVZ	POPULATED
14400 – CG_SCECN_X	POPULATED
14500 – CG_SCECN_Y	POPULATED
14600 – CG_SCECN_Z	POPULATED
14700 – CG_SC_CONF_XY	POPULATED
14800 – CG_SC_CONF_Z	POPULATED
14900 – CG_SWWD	POPULATED
15000 – CG_SNVEL_X	POPULATED
15100 – CG_SNVEL_Y	POPULATED
15200 – CG_SNVEL_Z	POPULATED
15300 – CG_SNACC_X	POPULATED
15400 – CG_SNACC_Y	POPULATED
15500 – CG_SNACC_Z	POPULATED
15600 – CG_SNATT_ROLL	POPULATED
15700 – CG_SNATT_PITCH	POPULATED
15800 – CG_SNATT_YAW	POPULATED
15900 – CG_GTP_X	POPULATED
16000 – CG_GTP_Y	POPULATED
16100 – CG_GTP_Z	POPULATED
16200 – CG_MAP_TYPE	‘GEOD’
16300 – CG_PATCH_LAT_CEN	POPULATED
16400 – CG_PATCH_LNG_CEN	POPULATED
16500 – CG_PATCH_LTC_ORUL	POPULATED
16600 – CG_PATCH_LGC_ORUL	POPULATED
16700 – CG_PATCH_LTC_ORUR	POPULATED
16800 – CG_PATCH_LGC_ORUR	POPULATED
16900 – CG_PATCH_LTC_ORLR	POPULATED
17000 – CG_PATCH_LGC_ORLR	POPULATED
17100 – CG_PATCH_LTC_ORLL	POPULATED
17200 – CG_PATCH_LNGCOLL	POPULATED
17300 – CG_PATCH_LAT_CONFIDENCE	POPULATED
17400 – CG_PATCH_LONG_CONFIDENCE	POPULATED

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NITFS APPLICATION SUMMARY ASARS-2 Improvement Program	
17500 – CG_MGRS_CENT	NOT PRESENT
17600 – CG_MGRSCORUL	NOT PRESENT
17700 – CG_MGRSCORUR	NOT PRESENT
17800 – CG_MGRSCORLR	NOT PRESENT
17900 – CG_MGRCORLL	NOT PRESENT
18000 – CG_MGRS_CONFIDENCE	NOT PRESENT
18100 – CG_MGRS_PAD	NOT PRESENT
18150 – CG_MAP_TYPE_BLANK	NOT PRESENT
18200 – CG_SPARE_A	SPACES
18300 – CA_CALPA	‘0000000’
18400 – WF_SRTFR	POPULATED
18500 – WF_ENDFR	POPULATED
18600 – WF_CHRPRT	POPULATED
18700 – WF_WIDTH	POPULATED
18800 – WF_CENFRQ	POPULATED
18900 – WF_BW	POPULATED
19000 – WF_PRF	POPULATED
19100 – WF_PRI	POPULATED
19200 – WF_CDP	POPULATED
19300 – WF_NUMBER_OF_PULSES	POPULATED
19400 – VPH_COND	‘N’

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NITFS APPLICATION SUMMARY
Block 1 TUAV GCS

System Identifier:	Tactical Unmanned Aerial Vehicle (TUAV) Ground Control System (GCS) Block 1
NITFS Services:	Tactical NITFS File Producer
NITF/NSIF Version(s):	NITF02.10
Reference Documents:	Block 1 National Imagery Transmission Format (NITF) Data Production Specification (DPS) for the Tactical Unmanned Aerial Vehicle (TUAV) Ground Control System (GCS), Document Number TUAV-203, 01/18/01 TUAV System Operational Requirements Document (ORD)
NITFS Compliance Test Report:	Test is pending.

System Description

The TUAV system provides intelligence collection and targeting capability as a direct support asset to the Brigade Commander and his staff. The TUAV GCS provides for two-operator control of a single TUAV Shadow 200 air vehicle, including flight management, mission management, sensor/payload control, and C4I interface management. Defined by the TUAV system Operational Requirements Document (ORD), the TUAV system integrates with typical Brigade TOC C4I systems, specifically the Advanced Field Artillery Tactical Data System (AFATDS), the All-Source Analysis System Remote Workstation (ASAS-RWS), and the Joint STARS CGS.

The TUAV GCS receives an NTSC analog motion imagery signal and associated air vehicle and payload telemetry from the Shadow 200 air vehicle. The telemetry information includes situation awareness parameters defining the air vehicle status, position, and attitude, as well as including sensor setting and pointing parameters. The TUAV GCS combines the video and telemetry data producing an NTSC closed caption analog video product that is disseminated into the Joint STARS CGS and to other mission-appropriate C4I systems. TUAV GCS operators can create still imagery products directly from the analog motion imagery feed. These still imagery products are captured in data files conforming to MIL-STD-2500B, National Imagery Transmission Format (Version 2.1). Following capture, these NITF files can be transferred into other connected C4I systems per the TUAV system ORD.

The TUAV GCS operator can request NITF 2.1 still imagery files to be generated while viewing the video imagery down-linked from the Shadow 200. On request, the NITF files are built and displayed to the requesting operator using the Paragon ELT software component of the TUAV GCS, which can be used to annotate the image for feature-of-interest (FOI) identification.

Selected air vehicle and sensor parameters are collected into the File Header and a single Text Data Segment as defined in Section 5.6 of MIL-STD-2500B. No Support Data Extensions (SDEs) or Tagged Record Extensions (TRE) are defined within the Block 1 implementation of the TUAV GCS NITF file interface although implementation of SDE is reserved for a future TUAV GCS Block definition.

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NITFS APPLICATION SUMMARY Block 1 TUAV GCS	
Sensor Type(s)	
EO/IR Payload Sensor Camera: IAI / TAMAM POP-200 (NTSC closed caption video and frame captured digital still imagery)	
General Characteristics	
File Naming Convention	MMDDYYYY_HHMMSS.ntf
CLEVELs Supported	03
Origination Station Identifier Convention	TUAV CGS A
File Title Convention	File name and directory path; e.g., /h/data/local/TUAV/MMDDYYYY_HHMMSS.ntf
Security Marking Options Supported	All files marked as Unclassified with no additional security control or handling codes.
Originator's Designated Background Color	All files marked OxFFFFFF (white)
Originator's Name Field Convention	Unknown (followed by 17 spaces)
Originator's Phone Number Convention	Field left blank (18 spaces)
Image Segments Supported	001
Symbol Segments Supported	000
Text Segments Supported	001
Data Extension Segments Supported	000
Reserved Extension Segments Supported	000
File Header TREs (tags) Supported	None
File Size/Range	All files are approximately 1Mb
Image Segment Options Supported	
Image Identifier 1 (short ID)	PIO0000000 (fixed value for all files)
Image Identifier 2 (long ID)	Shadow 200 Image (followed by 64 spaces)
Target Identifier Field	Not used. Filled with 17 spaces.
Image Source Field	Shadow 200 (followed by 32 spaces)
Image Comment Fields	One image comment field populated with 80 spaces.
Image Characteristics	
Dimensions	480 rows x 704 cols x 3 bands
Pixel Value Types	8-bit Integer in each of 3 bands
Image Representation Types	RGB (24-bit color)
Image Categories	VIS and IR

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NITFS APPLICATION SUMMARY Block 1 TUAV GCS	
Bounding Rectangle Coordinates	Present, using geographic coordinates expressed as ddmmssXdddmmssY
Compression Options	No Compression (NC)
Pixel Interleave(s)	IMODE B (Band interleaved by block)
Blocking	Single block per image only; 720h X 480v
Location offset supported	None. Image always placed at CCS origin.
Attachment Level supported	Always unattached (AL=000)
Reduced Resolutions	None. IMAG = 1.0
Image Subheader TREs (tags) Supported	None. Plan to support ASDEs in future.
Symbol Segment Options Supported	
CGM Supported	Not supported.
Degree of CGM Support	N/A
Symbol Identifier Convention	N/A
Symbol Name Convention	N/A
Location offset supported	N/A
Attachment Level supported	N/A
Symbol Subheader TREs (tags) supported	N/A
Text Segment Options Supported	
STA (Basic Character Set)	Supported. The text segment contains telemetry data from the aircraft pending future system releases that will use the Airborne SDEs to contain this type of data. See the pertinent information section below for a sample of the telemetry data.
UT1 (Extended Character Set)	Not supported.
U8S (UTF-8 Extended Characters)	Not supported.
MTF (US Message Text Format)	Not supported.
Text Identifier Convention	TEXT000 (fixed value for all files)
Text Title Convention	Untitled (followed by 72 spaces)
Attachment Level supported	Always unattached (AL = 000)
Text Subheader TREs (tags) supported.	None.

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NITFS APPLICATION SUMMARY
Block 1 TUAV GCS

Data Extension Segments Supported	
Controlled Extensions (NITF 2.0 only)	N/A
Registered Extensions (NITF 2.0 only)	N/A
TRE_OVERFLOW	Not supported.
STREAMING_FILE_HEADER	Not supported.
Reserved Extension Segments Supported	
None yet defined.	N/A

Other Pertinent Information

Sample contents of the 'Metadata.dat' text file content placed in the Text Segment.

AV Time: 20010115225408
Target Location Error: 80 meters
AV Latitude: 0 radians
AV Longitude: 0 radians
AV Barometric Altitude: 118 meters
AV True Heading: 0 radians
AV Airspeed: 0 meters/sec
AV Roll: 0 radians
AV Pitch: 0 radians
Payload Azimuth: 0 radians
Payload Field of View: 0.4 radians
Payload Depression Angle: 1.5708 radians
Payload LOS Range to Target: 118 meters
Payload CFOV Latitude: -8.29404e-13 radians
Payload CFOV Longitude: 1.01573e-28 radians
AV Current Navigation Position Source: B
Payload Pointing Mode: B

NOTE: The data will be variable in length since the values are not space filled or zero filled.

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NITFS APPLICATION SUMMARY
SHAred Reconnaissance Pod (SHARP)

System Identifier:	SHAred Reconnaissance Pod (SHARP)
NITFS Services:	Tactical NITFS File Producer
NITF/NSIF Version(s):	02.10
Reference Documents:	F/A-18 SHARP to Distributed Common Ground Station (DCGS) Interface Control Document Release 12.0.
NITFS Compliance Test Report:	None. Pending compliance testing.

System Description

The SHAred Reconnaissance Pod (SHARP) is carried by an F/A-18 E/F Super Hornet. The SHARP system is comprised of the CA-279 suite of imaging sensors, a SHARP Reconnaissance Management System (SRMS), a common data link (CDL)-compliant data link, a solid state data storage system (DSS), a mission load PMCIA card and other weapon replaceable assemblies necessary for system operations. The CA-279 provides high and medium altitude digital framing imagery by using two mission- specific, interchangeable Stabilized Imaging Units (SIU). Both the high altitude SIU (HAS) and the medium altitude SIU (MAS) can image in the visible spectral band, the InfraRed (IR) spectral band, or both spectral bands simultaneously.

The CA-279 is a step-frame camera that steps the camera field of view perpendicular to aircraft ground track. Multiple cross-track swaths are imaged as the aircraft moves forward. Each “scene” is generally composed of a varying number of overlapping image frames. In dual band mode, imagery is collected simultaneously in both bands and output in a alternating sequence of electro-optical (EO) and IR images, respectively, yielding twice the number of NITF frames for a given frame rate. The CA-279 employs frame rates of 2, and 4, and 5.5 (HAS) or 7.5 (MAS) frames per second (fps). Four fps is the standard rate for EO and IR; dual band operates at a two fps rate..

SHARP can operate in either spot (point) or search (area or strip) mode. The Tactical Automated Mission Planning System (TAMPS) defines target types and boundaries using up to four latitude/longitude combinations and a target width. SRMS defines a Minimum Enclosed Area (MEA) around strip and area targets to assure adequate ground coverage. The SRMS recalculates the MEA as necessary to account for target approaches that are different from the planned mission.

SHARP- generated imagery is encapsulated in NITF 2.1 files for DSS storage and/or downlink via CDL to a DCGS. Each NITF file contains a file header, two image segments with applicable tagged record extensions, and one text segment. The first image segment is a low-resolution thumbnail. The second image segment contains the full resolution sensor image (one frame) compressed by the Advanced Reconnaissance Compression Hardware (ARCH) suite and resulting sizes will vary.

Sensor Type(s)

Recon Optical, Inc. CA-279 Electro-Optical (EO) and InfraRed (IR) Camera suites: MAS & HAS.

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NITFS APPLICATION SUMMARY
SHAred Reconnaissance Pod (SHARP)

General Characteristics

File Naming Convention	Uses the internal convention below:

Imagery File: *TargetID_ObservationNumber_UMAC_TargetType_TargetName*_IMAGE
DFD File: *TargetID_ObservationNumber_UMAC_TargetType_TargetName*_COMPANION (not yet implemented)

Parameter	Auto Mode	Manual Mode
TargetID	Leading zero plus 2 digits (01-99) from TAMPS file	"TOO"
ObservationNumber	Incrementing 3 digit independent count of observations for each target.	Incrementing 3 digit count of each manual imaging session
UMAC	U(naccepable), M(arginal), A(cceptable), or C(omplete) (see DFD Header definitions)	Default is "C"; set to "U" when SRMS detects hardware failure
TargetType	AREA, STRIP, or POINT	STRIP or POINT
TargetName	Extracted from TAMPS file; spaces are replaced by underscores (0x5F) and trailing	"MANUAL"

CLEVELs Supported	EO = 05; IR = 03
Origination Station Identifier Convention	“SHARP”
File Title Convention	Sequential frame number followed by 70 spaces.
Security Marking Options Supported	Secret and Unclassified.
Originator's Designated Background Color	0x000000 (black)
Originator's Name Field Convention	default is spaces; provided by mission load
Originator's Phone Number Convention	default is spaces; provided by mission load
Image Segments Supported	2 per file (1 thumbnail, 1 full resolution)
Symbol Segments Supported	None.
Text Segments Supported	001 (but not used in SHARP baseline)
Data Extension Segments Supported	None.
Reserved Extension Segments Supported	None.
File Header TREs (tags) Supported	None.
File Size/Range	EO ≈ 1-5MB IR ≈ 4K-1MB

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NITFS APPLICATION SUMMARY SHAred Reconnaissance Pod (SHARP)	
Image Segment Options Supported	
Image Identifier 1 (short ID)	Frame number (e.g. “0000000008”) which resets to zero on roll-over or power cycle.
Image Identifier 2 (long ID)	First 40 bytes mapped from AIMIDB. The second 40 bytes contain the frame number within the swath, depression angle, heading, velocity, altitude, plane's mapping side and percent forward frame overlap.
Target Identifier Field	BE and Country identification (country matches AIMIDB)
Image Source Field	SHARP
Image Comment Fields	1 (but currently filled with spaces).
Image Characteristics	
Dimensions	Thumbnail: 504 x 504. Full Resolution EO: 5040 x 5040 or (2520 x 2520 if>4 fps) Full Resolution IR: 2016 x 2016 or (1008x1008 if >4 fps).
Pixel Value Types	INT
Image Representation Types	MONO
Image Categories	EO or IR
Bounding Rectangle Coordinates	Calculated by the camera. Default is 450000N1600000E 450000N1610000E 440000N1610000E 440000N1600000Espace-filled LAT/LONG coordinates, preserving the cardinal heading designators.
Compression Options	Thumbnail: IC = NC (no compression). Full Resolution: IC = C3 (JPEG compression).
Pixel Interleave(s)	IMODE B (Band interleaved by block).
Blocking	Thumbnail: none. Full Resolution: EO: 632x5040, 320x2528 (>4fps); IR: 256x2016, 128x1008 (>4fps).
Location offset supported	None. Image always placed at CCS origin.
Attachment Level supported	Thumbnail always overlays the full resolution image and has IALVL = 001 Full resolution image is always on the bottom and attached to the NITFS common coordinate system

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NITFS APPLICATION SUMMARY SHAred Reconnaissance Pod (SHARP)	
Reduced Resolutions	Thumbnail: EO: IMAG = 0.1 at 2 & 4 frames per second (fps) and 0.2 at >4 fps; IR: IMAG = 0.25 at 2 & 4 fps and 0.5 > 4 fps. Full resolution: IMAG = 1.0
Image Subheader TREs (tags) Supported	ENGRDA, ACFTB, AIMIDB, MSTGTA, and SENSRA
Symbol Segment Options Supported	
CGM Supported	Not Supported
Degree of CGM Support	
Symbol Identifier Convention	
Symbol Name Convention	
Location offset supported	
Attachment Level supported	
Symbol Subheader TREs (tags) supported	
Text Segment Options Supported	
STA (Basic Character Set)	Supported.
UT1 (Extended Character Set)	Not supported.
U8S (UTF-8 Extended Characters)	Not supported.
MTF (US Message Text Format)	Not supported.
Text Identifier Convention	ARCHTXT
Text Title Convention	Mission description text.
Attachment Level supported	000
Text Subheader TREs (tags) supported	None.
Data Extension Segments Supported	
Controlled Extensions (NITF2.0 only)	Not Supported
Registered Extensions (NITF2.0 only)	
TRE_OVERFLOW	
STREAMING_FILE_HEADER	
Reserved Extension Segments Supported	
None yet defined.	Not Supported

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NITFS APPLICATION SUMMARY SHAred Reconnaissance Pod (SHARP)		
Other Pertinent Information		
AIMIDB—Additional Image ID Extension Format		
ACQUISITION_DATE	same as IDATIM	
MISSION_NO	UNKN	
MISSION_IDENTIFICATION	The ATO Mission number or default of "NOT AVAIL."	
FLIGHT_NO	00 (unavailable)	
OP_NUM	count of each frame, roll-over to 000 after 999	
CURRENT_SEGMENT	AA	
REPRO_NUM	00	
REPLAY	spaces	
(reserved-001)	[1 space]	
START_TILE_COLUMN	001	The convention to the left is the current implementation. The SHARP program is considering using these fields to indicate location of each frame relative to the full scene.
START_TILE_ROW	00001	
END_SEGMENT	AA (not segmented)	
END_TILE_COLUMN	001	
END_TILE_ROW	00001	
COUNTRY	spaces	
(reserved-002)	[4 spaces]	
LOCATION	center of image defined in IGEOLO, otherwise default is 4430N16030E space-fill, retaining LAT/LONG designators	
(reserved-003)	[13 spaces]	
ACFTB—Aircraft Information Extension Format		
AC_MSN_ID	Mission number, otherwise default of NOT AVAILABLE	
AC_TAIL_NO	6-digit bureau number from F/A-18 mission computer.	
AC_TO	spaces	
SENSOR_ID_TYPE	EO: VMFR or VHFR. IR: IMFR or IHFR.	
SENSOR_ID	CA279M (MAS) or CA279H (HAS)	

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NITFS APPLICATION SUMMARY SHAred Reconnaissance Pod (SHARP)	
SCENE_SOURCE	0 when preplanned or 2 when in manual mode
SCNUM	Running count of imaging sessions (not number of targets) from SRMS. Currently set to 000000 during imaging of manual targets. SHARP is considering and will likely implement the combination of SCNUM, IMHOSTNO and IMREQID for numbering manual/immediate scenes.
PDATE	Date image file is created or default of --------
IMHOSTNO	000000 = preplanned imaging session. 999999 = manual imaging session.
IMREQID	000000 = preplanned imaging session. 99999 = manual imaging session.
MPLAN	005 – EO Point 006 – EO Strip (SHARP strip & area targets) 015 – IR Point 016 – IR Strip (SHARP strip & area targets) SHARP is currently using 005 and 006 for dual band mode Point and Strip respectively (even for IR data), but new values have been registered: 007 EO Defined Area Target 008 EO Strip Target 017 – IR Defined Area Target 018 – IR Strip Target 024 – Dual Band Spot 025 – Dual Band Point Target 026 – Dual Band Wide Area Search 027 – Dual Band Defined Area Target 028 – Dual Band Strip Target * "Defined Area" refers to a target w/ four corner points in the collection request. "Wide Area" is interpreted as unbounded collection (ie – turn sensor on indefinitely)
ENTLOC	Entry elevation. Default is spaces.
LOC_ACCY	000000 (unknown)
ENTELV	Entry elevation. Default is spaces.
ELV_UNIT	f
EXITLOC	Populated with exit location. Default is spaces.
EXITELV	Populated with exit elevation. Spaces for manual and point targets.
TMAP	Populated with map angle. Default is spaces.

NITFS APPLICATION SUMMARY SHAred Reconnaissance Pod (SHARP)	
ROW_SPACING	EO – 0039.3721.87 or 00780043.74 if > 4 fps (MAS); thumbnail value = 0218.72 0004.69 or 0009.37 if > 4 fps (HAS); thumbnail value = 0046.87 IR – 0098.0054.68 or 0196.00109.36 if > 4 fps (MAS); thumbnail value = 0218.72 0019.69 or 0039.37 if > 4 fps (HAS); thumbnail value = 0078.74
ROW_SPACING_UNITS	r
COL_SPACING	EO – 0039.3721.87 or 00780043.74 if > 4 fps (MAS); thumbnail value = 0218.72 0004.69 or 0009.37 if > 4 fps (HAS); thumbnail value = 0046.87 IR – 0098.0054.68 or 0196.00109.36 if > 4 fps (MAS); thumbnail value = 0218.72 0019.69 or 0039.37 if > 4 fps (HAS); thumbnail value = 0078.74
COL_SPACING_UNITS	r
FOCAL_LENGTH	EO: 045.72 (MAS), 213.36 (HAS). IR: 045.72 (MAS), 127.00 (HAS).
SENSERIAL	serial number from camera.
ABSWVER	Spacessensor IPU firmware release (populates ~85% of NITF content)
CAL_DATE	spaces
PATCH_TOT	0000
MTI_TOT	000
MSTGTA—Mission Target Information Extension Format	
Note: SHARP currently provides the MSTGTA TRE even for manual/immediate scenes where there is no "planned" target information. The current implementation of this TRE is described below, however changes are expected in the near term. JITC recommended the TRE be left out all together for manual/immediate scenes, but if that is not feasible, the JITC will register the value of 00000 for the TGT_NUM field to serve as a flag that the TRE is "empty" (does not contain target information). Other fields affected: TGT_LOC be as described below or just contain a standard default location; TGT_COLL would be "4" for both preplanned and manual. As of the date of this version of the IPON, the implementation described above is not yet approved by the SHARP program.	
TGT_NUM	00001 – 00099 for preplanned 99999 – for manual
TGT_ID	target ID for preplanned spaces for manual

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NITFS APPLICATION SUMMARY SHAred Reconnaissance Pod (SHARP)	
TGT_BE	target BE for preplanned spaces for manual
TGT_PRI	spaces
TGT_REQ	target requestor for preplanned spaces for manual
TGT_LTIOV	spaces
TGT_TYPE	0-9 for preplanned spaces for manual
TGT_COLL	4 for preplanned 9 for manual
TGT_CAT	target functional category code using DIAM-65-3-1 spaces for manual
TGT_UTC	planned time at target for preplanned spaces for manual
TGT_ELEV	target elevation for preplanned spaces for manual
TGT_ELEV_UNIT	f
TGT_LOC	1st coordinate in TAMPS load for preplanned 1st coordinate of default IGEOLO field for Manual
SENSRA— EO-IR Sensor Parameters Extension Format	
REF_ROW	reference row, default is spaces
REF_COL	reference column, default is spaces
SENSOR_MODEL	CA279M (MAS) or CA279H (HAS)
SENSOR_MOUNT	spaces
SENSOR_LOC	ddmmss.ssXdddmmss.ssY or 443000.00N1603000.00E for EO and 443000.00N1603000.00E for IR for defaults
SENSOR_ALT_SOURCE	B (barometric altimeter)
SENSOR_ALT	Mean sea level altitude from INS, default is spaces
SENSOR_ALT_UNIT	f (feet)
SENSOR_AGL	Radar altitude from INS
SENSOR_PITCH	from CA279, default is spaces
SENSOR_ROLL	from CA279, default is spaces
SENSOR_YAW	from CA279, default is spaces

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NITFS APPLICATION SUMMARY SHAred Reconnaissance Pod (SHARP)	
PLATFORM_PITCH	from pod INS, default is spaces
PLATFORM_ROLL	from pod INS, default is spaces
PLATFORM_HDG	from pod INS, default is spaces
GROUND_SPD_SOURCE	N
GROUND_SPD	from INS, default is spaces
GROUND_SPD_UNIT	f
GROUND_TRACK	from INS, default is spaces
VERT_VEL	spaces
VERT_VEL_UNIT	f
SWATH_FRAMES	current number of cross-track frames, provides “M” for N of M
N_SWATHS	spaces
SPOT_NUM	current frame number within swath; provides “N” for N of M; JITC has recommended this field not be used for this purpose.
ENGRDA-- Engineering Data Extension Format - TBD	

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Appendix O – Product Summaries & Archetypes for Geospatial Information (GI) Producers

O.1 INTRODUCTION

Product summaries for the following GI Producers are located at:

Producer System	Page
CIB	O-3
CADRG	O-7
DPPDB	O-11
SRTM	
Etc.	

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O.2 CIB and CADRG

O.2.1 CIB

NITFS APPLICATION SUMMARY Controlled Image Base	
System Identifier:	Controlled Image Base (CIB)
NITFS Services:	Geospatial Information Product
NITF/NSIF Version(s):	NITF02.00
Reference Documents:	MIL-STD-2411 Raster Product Format (RPF) MIL-STD-2411-1 Registered Data Values for RPF MIL-STD-2411-2 Integration of RPF Files into the NITF MIL-C-89041 CIB Product Specification
NITFS Compliance Test Report:	NITFS compliance testing conducted on a periodic basis as production system updates or modifications are made. Contact JITC.
System Description	
Controlled Image Base (CIB) is a data set of orthophotos made from rectified grayscale aerial images. CIB supports various weapons, C3I theater battle management, mission planning, digital moving map, terrain analysis, simulation, and intelligence systems. CIB data are produced from digital source images that can be converted to meet the requirements of the CIB Specification (MIL-C-89041) at one of the registered resolutions defined in the Registered Data Values For Raster Product Format (RPF) (MIL-STD-2411-1). CIB data are derived directly from digital images and are compressed and reformatted to conform to the Raster Product Format Military Standard (MIL-STD-2411). CIB files are physically formatted within a National Imagery Transmission Format (NITF) file format.	
Sensor Type(s)	
Electro-Optical, Grayscale	
General Characteristics	
File Naming Convention	Table of Contents files: Frame files:
CLEVELs Supported	03
Origination Station Identifier Convention	
File Title Convention	
Security Marking Options Supported	Unclassified with LIMDIS control.
Originator's Designated Background Color	Not used.
Originator's Name Field Convention	

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NITFS APPLICATION SUMMARY Controlled Image Base	
Originator's Phone Number Convention	
Image Segments Supported	001
Symbol Segments Supported	000
Text Segments Supported	000
Data Extension Segments Supported	001
Reserved Extension Segments Supported	000
File Header TREs (tags) Supported	RPFHDR
File Size/Range	
Image Segment Options Supported	
Image Identifier 1 (short ID)	
Image Identifier 2 (long ID)	
Target Identifier Field	
Image Source Field	
Image Comment Fields	
Image Characteristics	
Dimensions	1536 rows x 1536 cols x 1 band
Pixel Value Types	8-bit Integer, single band
Image Representation Types	Monochrome
Image Categories	VIS
Bounding Rectangle Coordinates	
Compression Options	Vector Quantization
Pixel Interleave(s)	IMODE B (Interleave by block)
Blocking	Multiple blocks, all blocks 256 x 256
Location offset supported	None. Image always placed at CCS origin.
Attachment Level supported	Always unattached (AL=000)
Reduced Resolutions	None. IMAG = 1.0
Image Subheader TREs (tags) Supported	RPFIMG RPFDES (located in Registered Extensions DES)
Symbol Segment Options Supported	
CGM Supported	Not Supported.
Degree of CGM Support	N/A

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NITFS APPLICATION SUMMARY Controlled Image Base	
Symbol Identifier Convention	N/A
Symbol Name Convention	N/A
Location offset supported	N/A
Attachment Level supported	N/A
Symbol Subheader TREs (tags) supported	N/A
Text Segment Options Supported	
STA (Basic Character Set)	N/A
UT1 (Extended Character Set)	N/A
U8S (UTF-8 Extended Characters)	N/A
MTF (US Message Text Format)	N/A
Text Identifier Convention	N/A
Text Title Convention	N/A
Attachment Level supported	N/A
Text Subheader TREs (tags) supported	N/A
Data Extension Segments Supported	
Controlled Extensions (NITF 2.0 only)	Not supported.
Registered Extensions (NITF 2.0 only)	Supported. Contains RPFDES TRE.
TRE_OVERFLOW	N/A
STREAMING_FILE_HEADER	Not supported.
Reserved Extension Segments Supported	
None yet defined.	N/A
Other Pertinent Information	

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O-2.2 CADRG

NITFS APPLICATION SUMMARY Compressed ARC Digitized Raster Graphic	
System Identifier:	Compressed ARC Digitized Raster Graphic (CADRG)
NITFS Services:	Geospatial Information Product
NITF/NSIF Version(s):	NITF02.00
Reference Documents:	MIL-STD-2411 Raster Product Format (RPF) MIL-STD-2411-1 Registered Data Values for RPF MIL-STD-2411-2 Integration of RPF Files into the NITF MIL-C- CADRG Product Specification
NITFS Compliance Test Report:	NITFS compliance testing conducted on a periodic basis as production system updates or modifications are made. Contact JITC.
System Description	
CADRG is a general-purpose product, comprising computer-readable digital map and chart images. It supports various weapons, C3I theater battle management, mission planning, and digital moving map systems. CADRG data is derived directly from ADRG and other digital sources through downsampling filtering, compression, and reformatting to the RPF Standard. CADRG files are physically formatted within National Imagery Transmission Format (NITF) files.	
Sensor Type(s)	
Electro-Optical, Grayscale and Color	
General Characteristics	
File Naming Convention	Table of Contents files: Frame files:
CLEVELs Supported	03
Origination Station Identifier Convention	
File Title Convention	
Security Marking Options Supported	Unclassified with LIMDIS control.
Originator's Designated Background Color	Not used.
Originator's Name Field Convention	
Originator's Phone Number Convention	
Image Segments Supported	001
Symbol Segments Supported	000

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NITFS APPLICATION SUMMARY Compressed ARC Digitized Raster Graphic	
Text Segments Supported	000
Data Extension Segments Supported	001
Reserved Extension Segments Supported	000
File Header TREs (tags) Supported	RPFHDR
File Size/Range	
Image Segment Options Supported	
Image Identifier 1 (short ID)	
Image Identifier 2 (long ID)	
Target Identifier Field	
Image Source Field	
Image Comment Fields	
Image Characteristics	
Dimensions	1536 rows x 1536 cols x 1 band
Pixel Value Types	8-bit Integer, single band
Image Representation Types	Monochrome and RGB/LUT
Image Categories	VIS
Bounding Rectangle Coordinates	
Compression Options	Vector Quantization
Pixel Interleave(s)	IMODE B (Interleave by block)
Blocking	Multiple blocks, all blocks 256 x 256
Location offset supported	None. Image always placed at CCS origin.
Attachment Level supported	Always unattached (AL=000)
Reduced Resolutions	None. IMAG = 1.0
Image Subheader TREs (tags) Supported	RPFIMG RPFDES (located in Registered Extensions DES)
Symbol Segment Options Supported	
CGM Supported	Not Supported.
Degree of CGM Support	N/A
Symbol Identifier Convention	N/A
Symbol Name Convention	N/A
Location offset supported	N/A

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NITFS APPLICATION SUMMARY Compressed ARC Digitized Raster Graphic	
Attachment Level supported	N/A
Symbol Subheader TREs (tags) supported	N/A
Text Segment Options Supported	
STA (Basic Character Set)	N/A
UT1 (Extended Character Set)	N/A
U8S (UTF-8 Extended Characters)	N/A
MTF (US Message Text Format)	N/A
Text Identifier Convention	N/A
Text Title Convention	N/A
Attachment Level supported	N/A
Text Subheader TREs (tags) supported	N/A
Data Extension Segments Supported	
Controlled Extensions (NITF 2.0 only)	Not supported.
Registered Extensions (NITF 2.0 only)	Supported. Contains RPFDES TRE.
TRE_OVERFLOW	N/A
STREAMING_FILE_HEADER	Not supported.
Reserved Extension Segments Supported	
None yet defined.	N/A
Other Pertinent Information	

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O.3 DPPDB Format Structure

Figure O-2 depicts the sequential arrangement of a DPPDB. The first file is the Master Product File, with numerous subheader files that provide information about the DPPDB and the reference graphic. Following the Master Product File (MPF) are the files that comprise the reference graphic frames. The rest of the files contained on the DPPDB are image files.

a. The MPF contains a directory of the image files on that tape, the reference graphic directory, and the exploitation product support data that applies to the entire product. Figure O-3 shows the file structure of the MPF, showing only the primary components of the file.

b. The reference graphic files are unmodified CADRG frame files. They are extracted from the CADRG media and recorded to the DPPDB product tape without further processing.

c. The files following the reference graphic files contain single compressed images and the associated support data for each of the overview and full resolution data set images comprising the DPPDB. The image files are arranged in groups of four (left and right overview image segments, followed by the full resolution left and right image segments), with each group pertaining to a single DPPDB model. Figures O-4 and O-5 shows the file structure for the overview and full resolution image segments.

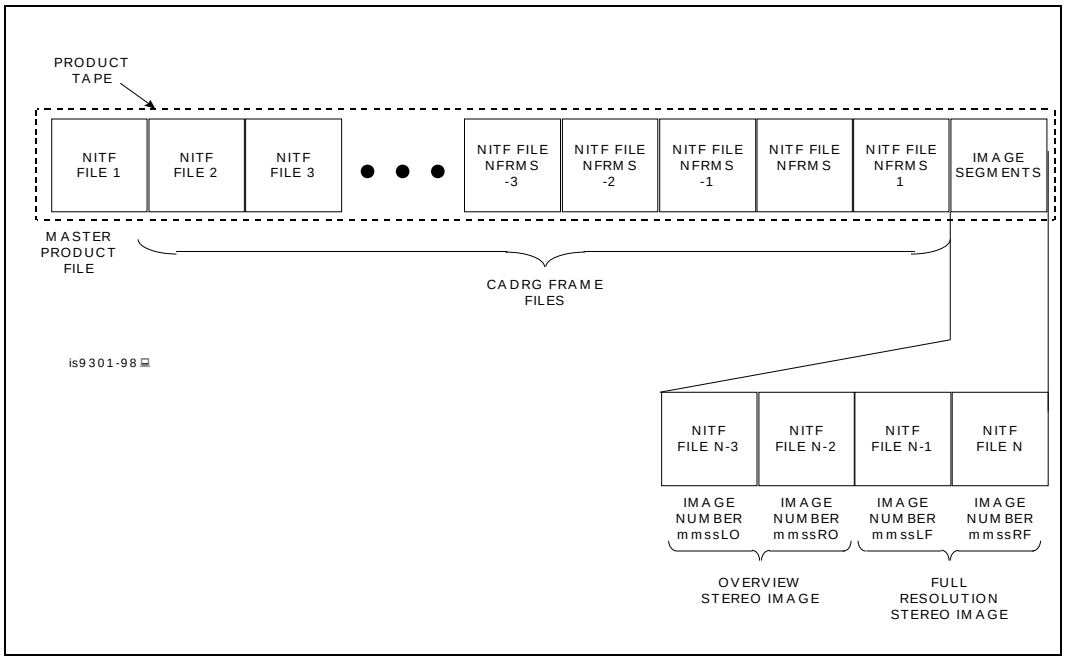

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Figure O-2. DPPDB File Organization

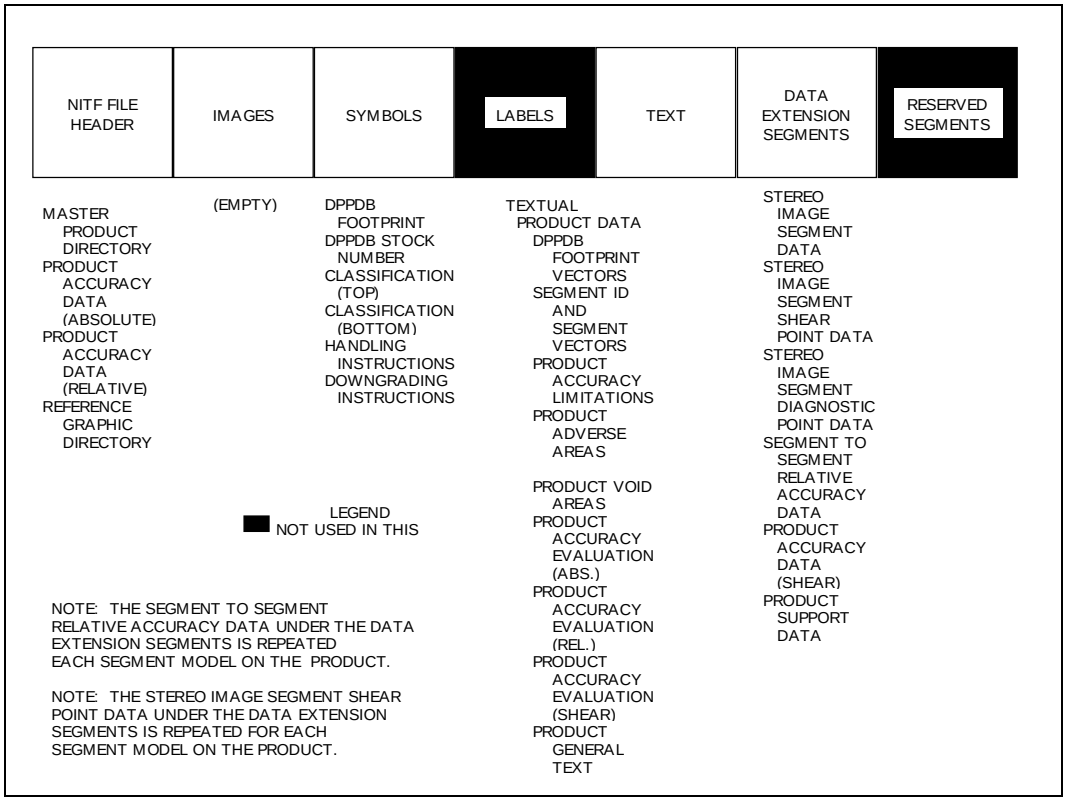

Figure O-3. Master Product File Structure

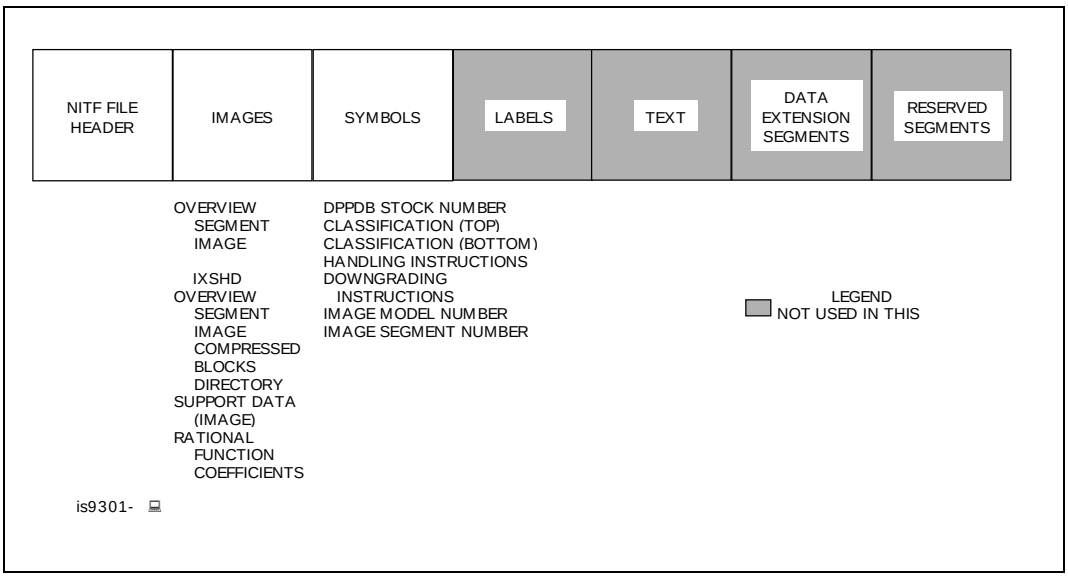

Figure O-4. DPPDB Overview Segment Image File

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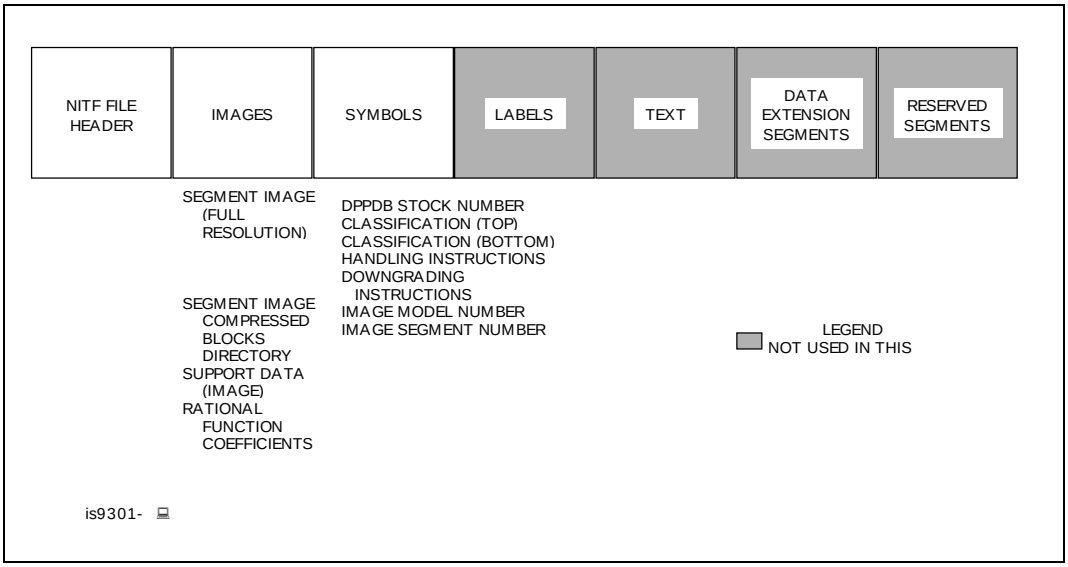

Figure O-5. DPPDB Full Resolution Image File

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Appendix P – Product Summaries & Archetypes for Commercial Producers

This appendix provides implementation information for known National Imagery Transmission Format (NITF) Commercial data producers. Its purpose is to assist Program Managers/users and developers in understanding the NITF packaging of dta that they may need to use in their products/sustems. The information is provided as a guide and is a snapshot based on publication time of this document.

Producer System	**Page**
DigitalGlobe QuickBird2	P-3
Space Imaging IKONOS	P-9
Orbimage ORBVIEW 3	P-15

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NITFS APPLICATION SUMMARY
DigitalGlobe QuickBird 02

System Identifier:	DigitalGlobe QuickBird (QB) 02
NITFS Services:	Commercial NITFS File Producer
NITF/NSIF Version(s):	NITF02.00 and 02.10
Reference Documents:	To obtain information on a DigitalGlobe product, log onto their web site (www.digitalglobe.com).
NITFS Compliance Test Report:	July 28, 2003

System Description

The QuickBird is a collection and production system that produces high-resolution earth images in a variety of processing levels. The lowest available processing level above raw data, Level 1, is divided into two sub-levels termed 1A considered Raw and 1B that is called Basic. 1A imagery is delivered in individual Detector Chip Array (DCA) files that can be ordered with or without radiometric correction and with or without non-responsive detector fill. 1B images are virtual linear arrays that have been generated from the DCA strips and are radiometrically and geometrically corrected. 1B images have been resampled to a map grid but not projected onto the Earth. 1A data is geometrically raw, whereas 1B data will include "sensor corrections," accounting for image artifacts due to optical distortion and detector geometry. The level 2A or Rectified product is rectified product to a customer selectable map projection and datum.

The QuickBird sensor is a pushbroom imager and therefore acquires image data one line at a time by sweeping across the earth's surface. The QuickBird platform supports 12 detector chip assemblies (DCAs) or detector arrays. There are 6 DCAs for the panchromatic (PAN) band, and 6 DCAs for the multispectral (MS) bands. Each PAN DCA contains 1 linear detector array. Each MS DCA contains 4 linear arrays representing the colors blue, green, red, and near infrared.

To obtain further information log onto the DigitalGlobe web site (www.digitalglobe.com).

Sensor Type(s)

Pushbroom = Panchromatic (single band) and Multispectral (4 band)

General Characteristics

File Naming Convention	YYMONDDHHMMSS-b-id-t-nnnnnnnnnnnn_nn_nnnn.NTF YYMONDDHHMMSS = acquisition time b <band> = P for panchromatic, M for multispectral, S for pan sharpened, and X for non-images. id <image identifier> = 1A, 1B or 2A t <tile identifier> = S for Scene and M for Mosaic nnnnnnnnnnnn_nn_nnnn = Product Order # **NOTE:** The dash("-") delimits the file name components. The components themselves will not include a dash. YYMONDDHHMMSS = acquisition time
CLEVELs Supported	For NITF 2.0: up to CLEVEL06 For NITF 2.1: up to CLEVEL07

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NITFS APPLICATION SUMMARY DigitalGlobe QuickBird 02	
Origination Station Identifier Convention	DG (meaning DigitalGlobe)
File Title Convention	Collector Identification = QB02 Applied Corrections = Name of particular product line such as Raw, Basic or Rectified acquisition date = YYYY-MM-DD acquisition time = Thh:mm.ssddddZ
Security Marking Options Supported	All files marked as Unclassified with no additional security control or handling codes.
Originator's Designated Background Color	**For NITF 2.0**—CN2 option for FBKGC not used. ONAME is not split into two fields (3-bytes for FBKGC and 24-bytes for ONAME). **For NITF 2.1**—All files are marked with a FBKGC of Ox000000 (black)
Originator's Name Field Convention	DigitalGlobe (followed by 12 spaces)
Originator's Phone Number Convention	+1(800)496-1225 (followed by 3 spaces)
Image Segments Supported	Single Image Segment per file Products **Panchromatic =** single band (1A, 1B and 2A) **Multispectral =** four band (1B, 2A) **Pan-sharpened =** three band, Natural Color (2A) three band, Color Infrared Composite (2A) Four Image Segment per file Products **Multispectral** = one band in each of four image segments (1A)
Symbol Segments Supported	000
Text Segments Supported	000
Data Extension Segments Supported	000
Reserved Extension Segments Supported	000
File Header TREs (tags) Supported	None
File Size/Range	1A, Panchromatic = 233 Mb each DCA file Multispectral = 67 Mb each DCA file 1B, Panchromatic = 1.2 Gb Multispectral = 650 Mb 2A, Panchromatic = up to 1.2 Gbytes Multispectral = up to 650 MB Pan sharpened = up to 4 Gbytes

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NITFS APPLICATION SUMMARY DigitalGlobe QuickBird 02	
Image Segment Options Supported	
Image Identifier 1 (short ID)	An 8 digit numeric value (catalog record number)
Image Identifier 2 (long ID)	Same as File Title Convention (FTITLE)
Target Identifier Field	Not used. Filled with 17 spaces.
Image Source Field	QB02
Image Comment Fields	5 image comment fields populated with image data ownership, licensing and purchasing information
Image Characteristics	
Dimensions	**Panchromatic** = 27,552 x 27,424 pixels, 1 band and 6 DCAs **Multispectral** = 6,892 x 6,856 pixels, 4 bands and 6 DCAs
Pixel Value Types	**Panchromatic** = 8 or 16-bit integer (8/8 and 11/16) **Multispectral** = 8 or 16-bit Integer (8/8 and 11/16) **Pan-sharpened** = 8 bit Integer (8/8)
Image Representation Types	**Panchromatic:** IREP=MONO, IREPBANDn = M (1A, 1B and 2A) **Multispectral:** IREP=MONO, IREPBANDn = M (1A) IREP=MULTI, IREPBANDn = M, B, G, R, N (1B, 2A) **Pan-sharpened:** IREP = RGB, IREPBANDn = R, G, B and N, R, G (2A)
Image Categories	**Panchromatic:** ICAT = Visual (VIS) for single band MONO **Multispectral:** ICAT = Multispectral (MS) **Pan-sharpened:** ICAT = VIS for Natural Color and Color Infrared Composite
Bounding Rectangle Coordinates	Present, using geographic coordinates expressed as ddmmssXdddmmssY
Compression Options	No Compression (NC)

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NITFS APPLICATION SUMMARY DigitalGlobe QuickBird 02	
Pixel Interleave(s)	**Panchromatic** = IMODE B (1A, 1B and 2A) **Multispectral** = IMODE B (1A) for the single band per image segment file and IMODE S (1B and 2A) for 4-band per image segment file **Pan-sharpened** = IMODE P (2A), 3-band per image segment file B (Band interleaved by block) P (Band interleaved by Pixel) S (Band Sequential)
Blocking	Multi blocked (1024x1024)
Location offset supported	None. Image always placed at CCS origin.
Attachment Level supported	Always unattached (AL=000)
Reduced Resolutions	None. IMAG = 1.0
Image Subheader TREs (tags) Supported	RPC00B, STDIDC, and USE00A Future products will support ICHIPB
Symbol Segment Options Supported	
CGM Supported	Not supported.
Degree of CGM Support	N/A
Symbol Identifier Convention	N/A
Symbol Name Convention	N/A
Location offset supported	N/A
Attachment Level supported	N/A
Symbol Subheader TREs (tags) supported	N/A
Text Segment Options Supported	
STA (Basic Character Set)	Not supported.
UT1 (Extended Character Set)	Not supported.
U8S (UTF-8 Extended Characters)	Not supported.
MTF (US Message Text Format)	Not supported.
Text Identifier Convention	N/A
Text Title Convention	N/A
Attachment Level supported	N/A
Text Subheader TREs (tags) supported.	N/A

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NITFS APPLICATION SUMMARY DigitalGlobe QuickBird 02	
Data Extension Segments Supported	
Controlled Extensions (NITF 2.0 only)	None
Registered Extensions (NITF 2.0 only)	None
TRE_OVERFLOW	None
STREAMING_FILE_HEADER	None
Reserved Extension Segments Supported	
None yet defined.	N/A
Other Pertinent Information	

The DigitalGlobe product list is included in tables P-1 through P-3. The table provides the NITF products produced by DigitalGlobe, to include critical NITF field values.

Table P-1. Multispectral

PROCESSING LEVEL	**1B**	**2A**	**1A**	**2A**
NITF 2.0	X		X	X
NITF 2.1		X		
NITF FIELDS				
NUMI	1	1	4	1
IREP	MULTI	MULTI	MONO	MULTI
ICAT	MS	MS	MS	MS
IREPBANDn	B, G, R, N	B, G, R, N	M	B, G, R, N
ISUBCATn	485, 560, 660, 830	485, 560, 660, 830	485, 560, 660, 830	485, 560, 660, 830
IMODE	S	S	B	S
NBPP	16	16	16	8
ABPP	11	11	11	8
ICORDS	G	G	G	G
NICOM	5	5	5	5
TREs				
STDIDC	X	X	X	X
RPC00B	X	X	X	X
USE00A	X	X	X	X

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Table P-2. Monochrome, Panchromatic

PROCESSING LEVEL	1B	1B	2A	1A
NITF 2.0	X		X	
NITF 2.1		X		X
NITF FIELDS				
NUMI	1	1	1	1
IREP	MONO	MONO	MONO	MONO
ICAT	VIS	VIS	VIS	VIS
IREPBANDn	M	M	M	M
ISUBCATn	675	675	675	675
IMODE	B	B	B	B
NBPP	8	16	16	16
ABPP	8	11	11	11
ICORDS	G	G	G	G
NICOM	5	5	5	5
TREs				
STDIDC	X	X	X	X
RPC00B	X	X	X	X
USE00A	X	X	X	X

Table P-3. Color, Pan-Sharpened

PROCESSING LEVEL	2A (RGB)	2A (NRG)	2A (RGB)	
NITF 2.0		X	X	
NITF 2.1	X			
NITF FIELDS				
NUMI	1	1	1	
IREP	RGB	RGB	RGB	
ICAT	MS	MS	MS	
IREPBANDn	R, G, B	R, G, B	R, G, B	
ISUBCATn	660, 560, 485	830, 660, 560	660, 560, 485	
IMODE	S	S	S	
NBPP	8	8	16	
ABPP	8	8	11	
ICORDS	G	G	G	
NICOM	5	5	5	
TREs				
STDIDC	X	X	X	
RPC00B	X	X	X	
USE00A	X	X	X	

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NITFS APPLICATION SUMMARY
Space Imaging IKONOS Block 1 Ground Station

System Identifier:	Space Imaging IKONOS Block I Ground Station
NITFS Services:	Ground Station NITF File Producer
NITF/NSIF Version(s):	NITF 2.0
Reference Documents:	National Imagery Transmission Format (Version 2.0): MIL-STD-2500A Space Imaging National Imagery TransmissionFormat (NITF) ImplementationRequirements Document: S-NITFIRD Version GS-2, 11 Feb 2003
NITFS Compliance Test Report:	May -3, 2004

System Description

Space Imaging's IKONOS earth imaging satellite provides a reliable stream of image data for commercial high-resolution satellite data products. IKONOS produces 1-meter black-and-white (panchromatic) and 4-meter multispectral (red, green, blue, near infrared) imagery that can be combined in a variety of ways to accommodate a wide range of high-resolution imagery applications. All Space Imaging imagery products are either processed at the Ground Station in Thornton, Colorado and/or at the Regional Operational Centers at various locations around the world. The Ground Station software used to process all Space Imaging System products is developed and maintained by Raytheon System Company.

The Ground Station Software can output a number of file formats including NITF 2.0. When requested, the Ground Station Software will process imagery and produce data files conforming to MIL-STD-2500A Change Notice 3, National Imagery Transmission Format (Version 2.0). The same Ground Station Software is used by all regional affiliates.

Sensor Type(s)

Satellite Pushbroom (Panchromatic and Multispectral)

General Characteristics

File Naming Convention	File Name = PRODUCT_ID_IMAGETYPE_COMPONENTNUMBER.IMAGEEXTENSION (e.g. po_13563_pan_000000.ntf)
CLEVELs Supported	05,06
Origination Station Identifier Convention	Thornton

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NITFS APPLICATION SUMMARY Space Imaging IKONOS Block 1 Ground Station	
File Title Convention	IMAGEID: (59-bytes, 1st 59 chars of the STDID TRE) SENSOR: (1-byte, P for PAN or M for MSI) ALGORITHM: (2-bytes, PR for Projective Pan or BCS spaces) PRODTYPE: (5-bytes, Product Level Implementation code) BANDCOMPRESSION: (3 bytes, J08 for 8-bit JPEG, J12 for 12-bit JPEG, UCT for Uncompressed Tiled) RESERVED (10-bytes BCS spaces reserved) (e.g. 20030604191441SI_CARTERRA_0101279AA00 00000100001AA01700020MPRSSGC UCT)
Security Marking Options Supported	Presently all products are marked UNCLASS.
Originator's Designated Background Color	SI applies a black hexadecimal value (0x00, 0x00, 0x00) as the background color
Originator's Name Field Convention	Space Imaging
Originator's Phone Number Convention	1-888-ONE-METER
Image Segments Supported	001
Symbol Segments Supported	000
Text Segments Supported	000
Data Extension Segments Supported	None
Reserved Extension Segments Supported	000
File Header TREs (tags) Supported	000
File Size/Range	< 2 gigabytes
Image Segment Options Supported	
Image Identifier 1 (short ID)	IM
Image Identifier 2 (long ID)	0000000000
Target Identifier Field	17 bytes of Spaces
Image Source Field	SPACE IMAGING SATELLITE remaining bytes are spaces
Image Comment Fields	Configurable per processing facility based on Receiver's License. Sample Values are: "License is Company Agency", "License is Corp Multi-Agency", "License is U.S. Federal Civil", "License is U.S. Federal DoD", "License is International Agency"

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NITFS APPLICATION SUMMARY Space Imaging IKONOS Block 1 Ground Station	
Image Characteristics	
Dimensions	The Dimensions very with AOI order. Lines X Columns: 138160 X 138160 34540 X 34540
Pixel Value Types	Integer Format ABPP=11 and NBPP=16
Image Representation Types	MONO for PAN or single band files RGB for 3 bands (RGB) MULTI for 3 band (RGB or BGR) and 4 band (BGRN or RGBN)
Image Categories	VIS for Panchromatic and Mosaic or MS for Multispectral
Bounding Rectangle Coordinates	If ICORDS is “G” express geographic as ddmmssXdddmmssY (4 times) or if ICORDS is “U” express UTM (MGRS) as zzBJKeeeeennnnn (4 times)
Compression Options	NC = No Compression or C3 = JPEG DCT
Pixel Interleave(s)	IMODE=B; IMODE=P B = interleaved by block P = interleaved by pixel Always B except for RGB cases in which it can be P or B.
Blocking	256x256 pixels
Location offset supported	None. First Pixel is not offset.
Attachment Level supported	Always unattached (AL=000);
Reduced Resolutions	None
Image Subheader TREs (tags) Supported	PIAIMC = 6 fields populated • CLOUDCVR = 999 (unknown) • MEANGSD = 00039.4 • IDATUM = WGE • IELLIP = WE_ (_=BCS space) • PREPPROC = 2G • IPROJ = TC RPC00B = Populated with appropriate values STDIDC = Populated completely IAW STDI-0002 USE00A = All required fields populated IAW STD 0002 NBLOCA STREOB

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NITFS APPLICATION SUMMARY Space Imaging IKONOS Block 1 Ground Station	
Symbol Segment Options Supported	
CGM Supported	None
Degree of CGM Support	NA
Symbol Identifier Convention	NA
Symbol Name Convention	NA
Location offset supported	NA
Attachment Level supported	NA
Symbol Subheader TREs (tags) supported	NA
Text Segment Options Supported	
STA (Basic Character Set)	None
UT1 (Extended Character Set)	NA
U8S (UTF-8 Extended Characters)	NA
MTF (US Message Text Format)	NA
Text Identifier Convention	NA
Text Title Convention	NA
Attachment Level supported	NA
Text Subheader TREs (tags) supported	NA
Data Extension Segments Supported	
Controlled Extensions (NITF2.0 only)	None
Registered Extensions (NITF2.0 only)	None
TRE_OVERFLOW	No overflow required
STREAMING_FILE_HEADER	Not used
Reserved Extension Segments Supported	
None yet defined.	N/A
Other Pertinent Information	
None	

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Table P-4. NITF 2.0 Multiband Image Product

TEST CASES	po_113429_red_0000000 po_113429_blu_0000000 po_113429_grn_0000000 po_113429_nir_0000000	po_113427_red_0000000 po_113427_blu_0000000 po_113427_grn_0000000 po_113427_nir_0000000	po_118919_red_0000000 po_118919_blu_0000000 po_118919_grn_0000000 po_118919_nir_0000000	po_118918_red_0000000 po_118918_blu_0000000 po_118918_grn_0000000 po_118918_nir_0000000
CHARACTERISTICS				
NUMI	1	1	1	1
IREP	MONO	MONO	MONO	MONO
ICAT	MS	MS	MS	MS
IC	NC	NC	NC	NC
IREPBANDn	Space	Space	Space	Space
ISUBCATn	Spaces	Spaces	Spaces	Spaces
IMODE	B	B	B	B
NBPP	16	16	16	16
ABPP	11	11	11	11
ICORDS	Geodetic	Geodetic	UTM	UTM
NICOM	1	1	1	1
SIZE	3.2MB	3.2MB	44MB	44MB
TREs				
PIAIMC	X	X	X	X
STDIDC	X	X	X	X
RPC00B	X	X	X	X
USE00A	X	X	X	X
NBLOCA			X	
STREOB				

(Note: Each file consists of a single band, single segment. There are 4 associated files that make up the SI multiband image product.)

Table P-5. NITF 2.0 Color, Pan Sharpened Image Product

TEST CASES	po_114503_rgb_0000000	po_118958_rgb_0000000	po_139281_rgb_0000000 po_139281_rgb_0010000
CHARACTERISTICS			
NUMI	1	1	1
IREP	RGB	RGB	RGB
ICAT	MS	MS	MS
IC	NC	NC	C3
IREPBANDn	R,G,B	R,G,B	R, G, B
ISUBCATn	Spaces	Spaces	Spaces
IMODE	P	P	P
NBPP	8	8	8
ABPP	8	8	8
ICORDS	Geodectic	UTM	UTM
NICOM	1	1	1
SIZE	66MB	66MB	226MB/114MB
TREs			
PIAIMC	X	X	X
STDIDC	X	X	X
RPC00B	X	X	X
USE00A	X	X	X
NBLOCA			X
STREOB			

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Table P-6. NITF 2.0 Monochrome, Panchromatic Image Product

TEST CASES	po_113427_pan_0000000 po_113426_pan_0000000 po_113430_pan_0000000 po_113853_pan_0000000 po_113430_pan_0000000	po_119266_pan_0000010000 po_118919_pan_0000000 po_118920_pan_0000000 po_118925_pan_0000000 po_118925_pan_0000002 po_118926_pan_0000000 po_118815_pan_0000000 po_118960_pan_0000000	po_118860_pan_0000000 po_138970_pan_0000000	po_15559_pan_0000000 po_15558_pan_0000000 po_15558_pan_0000001 po_15558_pan_0000002 po_15558_pan_0000003 po_100356_pan_0010000000 po_100356_pan_0000010000 po_100358_pan_0010000 po_100358_pan_0000000	po_120113_pan_0010000000 po_120113_pan_0000010000 po_120377_pan_0000000 po_120377_pan_0000001	po_302796_pan_0000000 po_302796_pan_0000001 po_302796_pan_0000002 po_302796_pan_0000003 po_134497_pan_0000000
CHARACTERISTICS						
NUMI	1	1	1	1	1	1
IREP	MONO	MONO	MONO	MONO	MONO	MONO
ICAT	VIS	VIS	VIS	VIS	VIS	VIS
IC	NC	NC	C3	NC	NC	NC
IREPBANDn	Space	Space	Space	Space	Space	Space
ISUBCATn	Spaces	Spaces	Spaces	Spaces	Spaces	Spaces
IMODE	B	B	B	B	B	B
NBPP	16	16	12	16	16	16
ABPP	11	11	11	11	11	11
ICORDS	UTM/ Geodectic	UTM/ Geodectic	Geodectic	UTM	UTM/ Geodectic	UTM
NICOM	1	1	1	1	1	1
SIZE	8MB, 44MB	8MB, 22MB, 44MB, 74MB, 525MB,	8MB, 22MB, 44MB, 74MB, 525MB,	52MB, 368MB, 538MB	76MB, 1.1GB	58KB, 519MB, 531MB
TREs						
PIAIMC	X	X	X	X	X	X
STDIDC	X	X	X	X	X	X
RPC00B	X	X	X	X	X	X
USE00A	X	X	X	X	X	X
NBLOCA		X	X			
STREOB				X po_100356_pan_0010000000 po_100356_pan_0000010000	X po_120113_pan_0010000000 po_120113_pan_0000010000	

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NITFS APPLICATION SUMMARY
OV-3 Special Products Generation Systems (SPGS and SPGS-lite)

System Identifier:	OV-3 Special Products Generation Systems
NITFS Services:	Commercial NITFS File Producer
NITF/NSIF Version(s):	NITF02.00 and 02.10
Reference Documents:	To obtain information on an ORBIMAGE product, log onto their web site (www.orbimage.com).
NITFS Compliance Test Report:	September 2004

System Description

The OV-3 Special Products Generation Systems (SPGS and SPGS-lite), employing ORBIMAGE SPGS software version 4_2, processes OrbView-3 satellite image data into National Imagery Transmission Format (NITF) versions 2.1 and 2.0 formatted data. Files are produced at an ORBIMAGE ground station in St. Louis, Missouri, and at various other locations around the world. ORBIMAGE's ground stations provide ORBView BASIC one-meter black and white (panchromatic) and four-meter multispectral (red, green, blue, and near infrared) imagery that can be combined in a variety of ways to accommodate a wide range of high-resolution imagery applications. The OV-3 data is available to both commercial and government communities, and will. Some user applications include environmental impact assessment, infrastructure planning, habitat monitoring and mission planning for National Agencies.

Sensor Type(s)

Satellite Pushbroom (Panchromatic (single band) and Multispectral (4 band))

General Characteristics

File Naming Convention	SSYYMMDDbAAAAAAAAAPPPPPiiiiiiiivv_o S: Sensor (3v) YYMMDD: Date of Acquisition b: band (P-Panchromatic/M-Multispectral) A: Source Archive ID P: Product ID i: Sub-image ID (two 4-digit identifiers) v: Processing Version o: Order identifier (variable length field)
CLEVELs Supported	05 (NITF 2.1) 06 (NITF 2.0)
Originating Station Identifier Convention	10 characters indicating generating ORBIMAGE facility Dulles St. Louis
File Title (FTITLE) Convention	Same character string as the File Naming Convention
Security Marking Options Supported	All files marked as Unclassified with no additional security control or handling codes.

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NITFS APPLICATION SUMMARY OV-3 Special Products Generation Systems (SPGS and SPGS-lite)	
Originator's Designated Background Color	All files are marked with a FBKGC of 303030
Originator's Name Field Convention	ORBIMAGE followed 16 spaces
Originator's Phone Number Convention	Varies by generating ORBIMAGE facility (314) 991-3095 (703) 480-7539
Image Segments Supported	001
Symbol Segments Supported	000
Text Segments Supported	001
Data Extension Segments Supported	000
Reserved Extension Segments Supported	000
File Header TREs (tags) Supported	NA
File Size/Range	24,584KB - 376,840KB
Image Segment Options Supported	
File Part Type	IM
Image ID1	ID of input image (assigned by tasking system)
Image ID2	Characters 1-16: DDMMMYYOV03000003Vxxx…xxx DDMMMYY = Image Acquisition date OV03 = Satelite ID 00 = Image pass 000 = Image ops Characters 17-64: 3Vxxx…xxx = File name Characters 65-80: BCS spaces
Target Identifier Field	Varies from all spaces to filled
Image Title (ITITLE) Convention	Characters 1-16: DDMMMYYOV03000003Vxxx…xxx DDMMMYY = Image Acquisition date OV03 = Satelite ID 00 = Image pass 000 = Image ops Characters 17-64: 3Vxxx…xxx = File name Characters 65-80: BCS spaces
Image Source Field	ORBVIEW3
Image Comment Fields	Two 80-character text fields that contain ORBIMAGE Inc. Licensing Information

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NITFS APPLICATION SUMMARY OV-3 Special Products Generation Systems (SPGS and SPGS-lite)	
Image Characteristics	
Dimensions	
Pixel Value Types	Unsigned Integer data Panchromatic = 8 or 16-bit (8/8 and 11/16) Multispectral = 8 or 16-bit (8/8 and 11/16)
Image Representation Types	Panchromatic = IREP = MONO, IREPBANDn = M/BCS spaces Multispectral = IREP = MULTI, IREPBANDn = B, G, R, N
Image Categories	Panchromatic = Visual (VIS) Multispectral = Multispectral (MS)
Bounding Rectangle Coordinates	Present, using geographic coordinates expressed in degrees as ddmmssXdddmmssY
Compression Options	No Compression (NC)
Pixel Interleave(s)	Panchromatic = IMODE B (Band interleaved by block) Multispectral = IMODE P (Band interleaved by pixel)
Blocking	Multi blocked (1024x1024)
Location offset supported	None. Image always placed at CCS origin.
Attachment Level supported	Always attached to the origin of Common Coordinate System (CCS); i.e., unattached (AL = 000).
Reduced Resolutions	None. IMAG = 1.0
Image Subheader TREs (tags) Supported	RPC00B, STDIDC, USE00A, and STREOB
Symbol Segment Options Supported	
CGM Supported	Not supported.
Degree of CGM Support	N/A
Symbol Identifier Convention	N/A
Symbol Name Convention	N/A
Location offset supported	N/A
Attachment Level supported	N/A
Symbol Subheader TREs (tags) supported	N/A

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NITFS APPLICATION SUMMARY OV-3 Special Products Generation Systems (SPGS and SPGS-lite)	
Text Segment Options Supported	
STA (Basic Character Set)	Yes
UT1 (Extended Character Set)	NA
U8S (UTF-8 Extended Characters)	NA
MTF (US Message Text Format)	NA
Text Identifier Convention	Field contains the value "License" (containing image ownership and distribution privileges)
Text Title Convention	<license type>_license.txt Clearview_license.txt Custom_license.txt
Attachment Level supported	NITF 2.1 = 000 NITF 2.0 = NA
Text Subheader TREs (tags) supported	NA
Data Extension Segments Supported	
Controlled Extensions (NITF2.0 only)	NA
Registered Extensions (NITF2.0 only)	NA
TRE_OVERFLOW	NA
STREAMING_FILE_HEADER	NA
Reserved Extension Segments Supported	
None yet defined.	N/A
Other Pertinent Information	

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Table P-7. ORBIMAGE NITF 2.1 and 2.0 Image Products

NITF FIELDS	3V040612P000039363 1A1100001 000810_00 101390.ntf	3V040623P000039321 1A0200001 002310_00 203720.ntf	3V031230P000023776 2A0200006 001310_00 131970.ntf	3V031230P000023777 2A0200006 001310_00 131990.ntf	3V040708M000042064 1A0100001 000310_00 133500.ntf	3V040708M000042064 1A0100001 000310_00 133500.ntf	3V040716M000041782 1A0200001 000310_00 133620.ntf
FORMAT	2.1	2.0	2.0	2.0	2.1	2.0	2.0
CLEVEL	05	06	05	05	05	06	06
NUMI	1	1	1	1	1	1	1
IREP	MONO	MONO	MONO	MONO	MULTI	MULTI	MULTI
ICAT	VIS	VIS	VIS	VIS	MS	MS	MS
IREPBANDn	M	spaces	spaces	spaces	B, G, R, N	B, G, R, N	B, G, R, N
ISUBCATn	Spaces	spaces	spaces	spaces	485, 560, 660, 830	485, 560, 660, 830	485, 560, 660, 830
NBANDS	1	1	1	1	4	4	4
IMODE	B	B	B	B	P	P	P
NBPP	8	16	16	16	16	8	16
ABPP	8	11	11	11	11	8	11
ICORDS	G	G	G	G	G	G	G
NICOM	2	2	2	2	2	2	2
IC	NC	NC	NC	NC	NC	NC	NC
NBPR/C	8/8	8/23	8/8	8/8	2/3	2/3	2/3
SIZE	65,544KB	376,840KB	131,081KB	131,081KB	49,160KB	24,584KB	49,160KB
TEXT SEG	STA	STA	STA	STA	STA	STA	STA
RPC00B	X	X	X	X	X	X	X
STDIDC	X	X	X	X	X	X	X
USE00A	X	X	X	X	X	X	X
STREOB			X	X			
NBLOCA	The ORBIMAGE Compliance Test Request forms, received by JITC, indicated that the ORBIMAGE SPGS software produces these five TREs. None of the files generated by the OV-3 SPGS and SPGS-lite contained these TREs. Therefore, no compliance evaluation occurred.						
GEOPS							
PRJPS							
GEOLO							
MAPLO							

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Appendix Q – Product Summaries & Archetypes for Weather Products

This appendix provides implementation information for known National Imagery Transmission Format (NITF) data producers. Its purpose is to assist Program Managers/users and developers in understanding the NITF packaging of dta that they may need to use in their products/systems. The information is provided as a guide and is a snapshot based on publication time of this document.

Producer System	**Page**
LEADS	Q-3
N-TFS	

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NITFS APPLICATION SUMMARY **Operational Weather Squadron Production System Phase II Leading Environmental Analysis and Display System (LEADS)**	
System Identifier:	Operational Weather Squadron Production System Phase II Leading Environmental Analysis and Display System (LEADS), Version 3.0.1
NITFS Services:	Provides the Air Force Weather Agency customer's commercial-off-the-shelf software products for weather forecasting.
NITF/NSIF Version(s):	NITF02.01
Reference Documents:	MIL-STD 2500B, Notice 2 and DIGEST Part 2, Edition 2.1, Appendix D September 2000.
NITFS Compliance Test Report:	July 03

System Description

The Operational Weather Squadron Production System Phase II Leading Environmental Analysis and Display System (LEADS) software ingests, analyzes and displays radar, satellite, National Oceanic and Atmospheric Administration (NOAA), World Meteorological Organization (WMO), and Air Force Weather Agency (AFWA) data for meteorological support products. Additionally, LEADS generates meteorological products in the National Imagery Transmission Format Standard. LEADS is a Windows 2000 –based weather workstation satellite ingest system. LEADS converts all data it receives to a common coordinate reference system, so that the data is properly superimpose (overlay) when displayed. Lambert Conformal Conic, Mercator, and Polar Stereographic projections are supported.

Primarily, LEADS generates meteorological support products using three fundamental steps:

- Area of Interest (AOI) Definition: Operators may define any size AOI anywhere in the world
- Data Retrieval: This step is transparent to the operator and will happen automatically when the operator employs the LEADS tools. After an AOI is selected, the operator either chooses data to retrieve into the AOI or selects a tool that will cause the data to be retrieved into an AOI. All data types are projected into the various AOIs chosen by the operator and overlay when displayed together.
- Application of Tools: The LEADS tools are applied to data in AOIs to produce meteorological products. For example, operators using the LEADS tools can add contours and grids to weather observations in a given AOI to enhance the image.
- LEADS interprets and generates NITF meteorological products with the Geospatial Support Data Extensions (GeoSDEs) PRJPSB, GEOPSB and MAPLO DIGEST Tagged Record Extensions (TREs).

These TREs described below define the format for the support information within the NITF file containing geo-referenced image data such as that defined in DIGEST. Systems using DIGEST imagery data formatted according to NITF will be able to extract the needed data from the following for spatial locations:

PRJPSB - for complimentary geo-referencing parameters defining projections.

GEOLO - for image data rectified consistently with cartographic (E, N) coordinate systems.

MAPLO – for image data rectified consistently with cartographic (E, N) coordinate systems

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NITFS APPLICATION SUMMARY Operational Weather Squadron Production System Phase II Leading Environmental Analysis and Display System (LEADS)	
Sensor Type(s)	
Geostationary, Meteorological, and Polar Satellites.	
General Characteristics	
File Naming Convention	None Implemented- Operator naming convention allowed.
CLEVELs Supported	03
Origination Station Identifier Convention	AMIS_XX: Advance Meteorological Information System
File Title Convention	Meteorological Product expiration day and time: Valid_06/1332Z
Security Marking Options Supported	All files marked as Unclassified with no additional security control or handling codes
Originator's Designated Background Color	All files are marked with a FBKGC of Ox000000 (black)
Originator's Name Field Convention	Field left blank (24 spaces)
Originator's Phone Number Convention	Field left blank (18 spaces)
Image Segments Supported	001
Symbol Segments Supported	000
Text Segments Supported	001
Data Extension Segments Supported	000
Reserved Extension Segments Supported	None
File Header TREs (tags) Supported	GEOPSB and PRJPSB
File Size/Range	1024 X1024
Image Segment Options Supported	
Image Identifier 1 (short ID)	IMAGE1
Image Identifier 2 (long ID)	Blank (80 spaces)
Target Identifier Field	Not used.
Image Source Field	Blank (42 spaces)
Image Comment Fields	Blank (80 spaces)
Image Characteristics	
Dimensions	1024 X 1024
Pixel Value Types	8-bit Integer in each of 3 bands
Image Representation Types	RGB/LUT

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NITFS APPLICATION SUMMARY Operational Weather Squadron Production System Phase II Leading Environmental Analysis and Display System (LEADS)	
Image Categories	VIS
Bounding Rectangle Coordinates	Present, using geographic coordinates expressed as ddmmssXdddmmssY
Compression Options	No Compression (NC)
Pixel Interleave(s)	IMODE B (Band interleaved by block)
Blocking	Single block per image only; 800h X 850v
Location offset supported	None. Image always placed at CCS origin.
Attachment Level supported	Always attached (AL=000) to the CCS
Reduced Resolutions	None. IMAG = 1.0
Image Subheader TREs (tags) Supported	MAPLOB
Symbol Segment Options Supported	
CGM Supported	None
Degree of CGM Support	N/A
Symbol Identifier Convention	N/A
Symbol Name Convention	N/A
Location offset supported	N/A
Attachment Level supported	N/A
Symbol Subheader TREs (tags) supported	N/A
Text Segment Options Supported	
STA (Basic Character Set)	Supported. The text segment contains weather projection data.
UT1 (Extended Character Set)	Not supported.
U8S (UTF-8 Extended Characters)	Not supported.
MTF (US Message Text Format)	Not supported.
Text Identifier Convention	TEXT000 (fixed value for all files)
Text Title Convention	Untitled (followed by 72 spaces)
Attachment Level supported	Always unattached (AL = 000)
Text Subheader TREs (tags) supported	None.
Data Extension Segments Supported	
Controlled Extensions (NITF2.0 only)	N/A
Registered Extensions (NITF2.0 only)	N/A

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NITFS APPLICATION SUMMARY Operational Weather Squadron Production System Phase II Leading Environmental Analysis and Display System (LEADS)	
TRE_OVERFLOW	Not supported.
STREAMING_FILE_HEADER	Not supported.
Reserved Extension Segments Supported	
None yet defined.	N/A
Other Pertinent Information	

Sample lines of the text file placed in the Text Segment.

Weather Projection Data

PROJ 0m : Valid parameters for PROJ is 00-02:00=>Secant Mercator, 01=>Secant Polar Stereographic, 02=>Secant Lambert Conformal.

STDPAR1 xx.yyyyN/S: } STDPAR1 and STDPAR2 will have value 00.000 to

STDPAR2 xx.yyyyN/S: } 90.00 with either N or S at the end of the string to indicate North or South, respectively. If the projection does not need the second parallel, then the value will be filled with space with only STDPAR2 in the line.

EARTHRAD xxxxxxx.y: The earth radius in meters used for the projection.

XAXIS xxx.yyE/W: This is the reference longitude for the projection and will have a value 00.000 to 180.00 with either E or W at the end of the string to indicate East or West, respectively.

DATUM WGS84: This field contains the Geodetic Datum Name in which the image segment refers. Default value is WGS84.

The following is a LEADS sample Standard ASCII single text segment used to describe geographic information for legacy applications:

Weather Projection Data

PROJ 01

STDPAR1 60.000N

STDPAR2

EARTHRAD 6378137.0

XAXIS 097.000W

DATUM WGS84

These parameters, along with the image coordinates (as found in the Image Geographic Location (IGEOLO)) NITF image subheader, determines the projection of the image. These parameters are not as complete as GeoSDEs, and are intended to provide backward compatibility for certain systems.