Certified NITF/NSIF Module Guide

RSI
Research Systems Inc.

NITF Module Version 1.0
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Acknowledgments

Contents:

Chapter 1:
Introduction to NITF

This chapter provides an introduction to the NITF format. (For information on the NITF Module, see Chapter 3, “Introduction to the NITF Module”.) The following topics are discussed in this chapter:

Introduction to the Manual

The *Certified NITF/NSIF Module Guide* provides general information about the NITF and NSIF formats, and it describes how the Certified NITF/NSIF Module works with ENVI to provide NITF and NSIF support. The manual includes procedures for installing and using the NITF Module, as well as a technical reference for programmers. Additional information on the attributes of NITF datasets and Tagged Record Extensions (TREs) is also provided.

- If you are not familiar with the NITF/NSIF format, be sure to read Chapter 1, "Introduction to NITF" first.
- If you are a first-time ENVI user, be sure to familiarize yourself with ENVI by referring to the ENVI documentation first.
- If you are familiar with NITF and ENVI, you may want to start with Chapter 2, "Installing the Module" followed by Chapter 3, "Introduction to the NITF Module" and Chapter 4, "Using the Certified NITF/NSIF Module".
- If you plan to program with ENVI and the NITF Module, you will want to refer to the routines described in Chapter 5, "Programming Reference".

The Certified NITF/NSIF Module

The NITF (National Imagery Transmission Format) Standard is a raster format defined by the NITF Standard Technical Board (NTB).

Providing support for the NITF format in IDL and ENVI is a joint development project between RSI and Eastman-Kodak. Certified NITF support is provided via an ENVI module available at additional cost from RSI or your ENVI distributor.

The NITF format is controlled by the NTB. The Joint Interoperability Test Command (JITC) certifies systems implementing the NITF format for compliance with the standard. JITC has examined the Certified NITF/NSIF Module (hereafter referred to as the NITF Module) for compliance with this standard and has provided certification for the product. The NITF Module has been certified to complexity level 7 (the highest) for compliance with the NITF Standard.

For detailed information about the NITF certification program, including functional read/write breakdown and testing anomalies, contact JITC (http://jitc.fhu.disa.mil/).

For more information about the NITF Module, see Chapter 3, “Introduction to the NITF Module”.

The NITF/NSIF Format

NITF is a complex imagery and image exploitation information format capable of containing a wide variety of image and non-image information. An introduction to the format is included here along with some terminology that is used throughout this document. Currently, there are three different versions of the NITF specification: NITF 1.1, NITF 2.0, and NITF 2.1. Each is similar to the others in many ways, but each also has its own characteristics.

NSIF and NITF

NATO Secondary Image Format (NSIF) is a format used by the multinational members of the North Atlantic Treaty Organization (NATO). The NSIF 1.0 format is identical to the NITF 2.1 format, with the exception of the version name in the file header. In NSIF files, the version field contains NSIF01.00 instead of NITF02.10. In this document, general information about the NITF format, and specific information about the NITF 2.1 format, also applies to the NSIF format.

NITF Datasets

The terms *NITF file* and *NITF dataset* both refer to a disk file containing data stored according to the NITF standard, and these terms are used interchangeably in this document. Any valid NITF dataset provides a *main header* identifying the file as an NITF dataset and describing the contents of the file. The header is usually followed by one or more *data segments*. Each data segment consists of a segment *subheader* identifying the type and properties of the data, followed by the data itself.

Data segments can be any of the following types:

- image
- symbol
- label
- graphic
- text
- extension

Image, text, and extension segments are available in every version of NITF, while label and symbol segments can occur only in NITF 2.0 datasets, and graphic segments occur only in NITF 2.1 datasets, as shown in Figure 1-1.

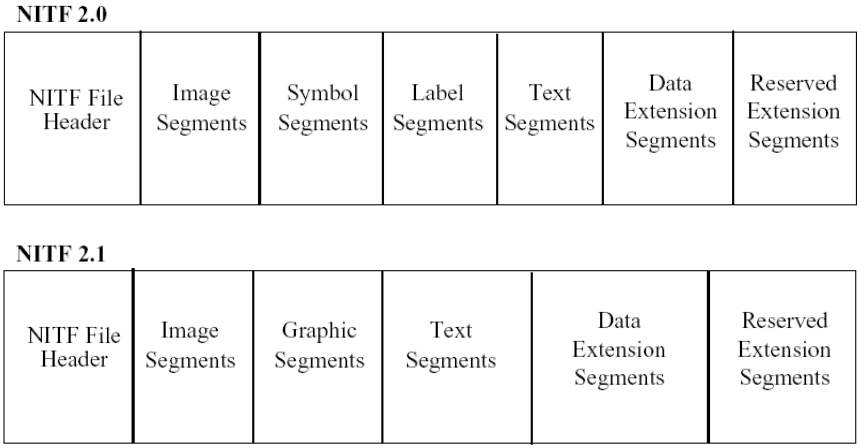

Figure 1-1: NITF File Structure

Image segments contain raster data, typically image data, intended for display or analysis (see "Image Segments" on page 13). NITF 2.1 files can contain *graphic segments* with Computer Graphics Metafile (CGM) graphic and graphical text elements (see "Graphic/Symbol Segments" on page 14), while NITF 2.0 files contain two segment types for the same purpose: *symbol segments* and *label segments*. Symbol segments can contain CGM, bitmap or object elements (see "Graphic/Symbol Segments" on page 14), while label segments contain graphical text elements (see "Label Segments" on page 14). *Text segments* contain text that is informational, not graphical (see "Text Segments" on page 15). The two types of *extension segments*, data and reserved, provide storage within the file structure for additional information that cannot be contained in the file or segment header. Data extension segments are used as necessary for storing Tagged Record Extension (TRE), or *tag*, data (see "Tagged Record Extensions" on page 15), and the reserved extension segment is reserved for future expansion of the NITF format.

Main Header

An NITF dataset may contain any or all types of segments available for that version, but every NITF dataset must contain a main header. The main NITF header describes the entire file, including origination information, file version and size, and the number and type of all data segments contained in the NITF dataset.

Displayable Segments

While NITF datasets without graphical data are supported, most datasets contain one or more *displayable segments*. Displayable segments are image, graphic, symbol, or label segments that contain graphical information and text for display. These segments contain instructions about how the graphical data they contain should be displayed relative to any other displayable segments, resulting in a composite display encompassing all graphical information in the dataset (see "NITF Display Composites" on page 16.)

Security Segments

The NITF format was designed to contain information deemed sensitive, so it includes header data describing the status of any information that is not available to the general public. The main file header contains security information describing the security level of the entire NITF dataset, and each segment also contains security information in its subheader, as the confidentiality of data within an image may vary. The security level of the entire file (T = Top Secret, S = Secret, C = Confidential, R = Restricted, U = Unclassified) is the same as or higher than that of the most restricted segment in the file. NITF 2.0 uses the same fields as NITF 1.1 to contain security information, while NITF 2.1 deprecated some security information fields and added new fields. These changes are described in Table 1-1. For a detailed description of these security fields, see Appendix A, "Security Attributes".

NITF 1.1/2.0 Security Fields	NITF 2.1 Security Fields
Classification	Classification
Codewords	Codewords
Control and Handling	Control and Handling
Releasing Instructions	Releasing Instructions
	Declassification Type
	Declassification Date
	Declassification Exemption
	Downgrade
	Downgrade Date
	Classification Text
	Classification Authority Type
Classification Authority	Classification Authority
	Classification Reason
	Security Source Date
Security Control Number	Security Control Number
Security Downgrading Instructions	

Table 1-1: NITF 2.0 and NITF 2.1 Security Fields

Image Segments

Image segments in an NITF file contain displayable image information. Each image segment contains a single image consisting of one or more bands of data (NITF 2.0 allows one, three, or four bands of data in an image, and NITF 2.1 allows up to 999 bands). All bands within an image segment must have the same data type, dimensions, storage order, and map information, although these characteristics can vary across different image segments. Each image segment may contain specific display instructions, including color lookup tables for single band images and default display bands for multi-band images. Images can be stored in integer data types in

NITF 2.0 and in integer, real, and complex data types in NITF 2.1. Images can also be compressed using a variety of algorithms including JPEG DCT, Vector Quantization, Bi-level, and JPEG 2000 (NITF 2.1 only). Images can be broken into *blocks*, providing an orderly set of subimages (or subarrays). Additional information describing the collection, intended use, wavelengths, and comments can also be stored with the image.

Images that are rotated or have gaps can also contain a *mask* indicating which portions of the image should not be used for display or analysis. Two types of image masks are used in NITF files: blocked image masks and transparent pixel masks. Blocked image masks can used to mask entire blocks of image data, and transparent pixel masks can be used for masking individual pixels or groups of pixels within an image block.

Graphic/Symbol Segments

Both the NITF 2.0 symbol segment and the NITF 2.1 graphic segment can contain Computer Graphics Metafile (CGM) graphics. CGM graphics can contain complex lines and polygons, as well as displayable text. The CGM format allows direct control of all display elements contained in the graphic including color, size, and orientation of objects. Multiple annotations can be combined in a single CGM, so symbol segments with CGM graphics may actually contain multiple sets of graphical primitives.

The NITF 2.1 graphic segment can only contain CGM graphics, but NITF 2.0 symbol segments can contain other graphical display elements as well. Symbol segments can contain bitmaps (color-mapped bitmaps to be displayed on the composite) or objects (graphics from a limited set of graphical primitives, including lines, arrows, circles, and rectangles).

For NITF 2.1, the bitmap and object symbol types as well as the label segment have been deprecated. Bitmaps are stored in image segments instead of symbols, and object symbols and labels been removed in favor of the more general and powerful CGM.

Label Segments

Label segments, available only in NITF 2.0, contain displayable text intended to be drawn with the NITF display. In addition to the text to be displayed, a label segment includes display instructions such as font, color, size, and a background color to be displayed behind the text.

Text Segments

Text segments contained in an NITF dataset consist of textual information that is not intended for graphical display. This information may be textual notes explaining target information, or the text segment may be used for passing US Message Text Format (USMTF) and text notes on to other users. NITF datasets consisting only of a header and text segments can be created to store messages or deliver information to users of NITF compliant systems. More often, however, text segments are provided to supplement the graphic content in the dataset.

Tagged Record Extensions

Tagged Record Extensions (TREs), or *tags*, may be present in NITF files to contain types of information that cannot be stored in the main NITF file header or segment subheaders. Tags can be associated with an entire NITF dataset or any segment type within an NITF dataset. Tags can be stored in the main header or a subheader, unless they exceed a certain size, in which case they can overflow to a data extension segment (DES). Each tag is identified by a unique six-character name.

Tags come in two forms: Registered Extensions (REs) and Controlled Extensions (CEs). The NITF Standard Technical Board (NTB) maintains a registry of known CEs and REs: the main difference between them is that both the tag name and tag layout of CEs are controlled by the NTB, whereas only the tag names of REs are registered with the NTB to prevent different users from using the same tag name. Therefore, CEs can be interpreted based on the published information contained in the NTB repository, whereas REs require specific knowledge of the tag contents available to the creator of the tag that may not be available to the data consumer.

An example of a tag is the RPC00B (Rapid Positioning Coordinate) tag that can be associated with an image segment in an NITF dataset and provides coefficients that can be used to orthorectify the associated image segment. Other Controlled tags specify processing history, information about specific targets in an image, collection information, and other types of meta data.

The JITC repository of Controlled Extension and Registered Extension tags can be viewed online at http://jitc.fhu.disa.mil/nitf/tag_reg/tagroup.htm.

NITF Display Composites

The NITF format supports construction of complex display composites that may contain multiple image, graphical, and displayable text elements. These composites are built from all displayable segments (image, graphic, symbol, and label) in the NITF dataset, making it possible for raw image information and additional exploitation material to co-exist nondestructively within the dataset. Each displayable segment contained in the NITF dataset contains information controlling the location of the display element in the composite. Each segment also contains a display level that determines which elements should be displayed on top of others, obscuring the lower-level displayable elements from view without corrupting the hidden portion of those lower-level displayable elements.

Figure 1-2 is an example of an NITF 2.1 composite.

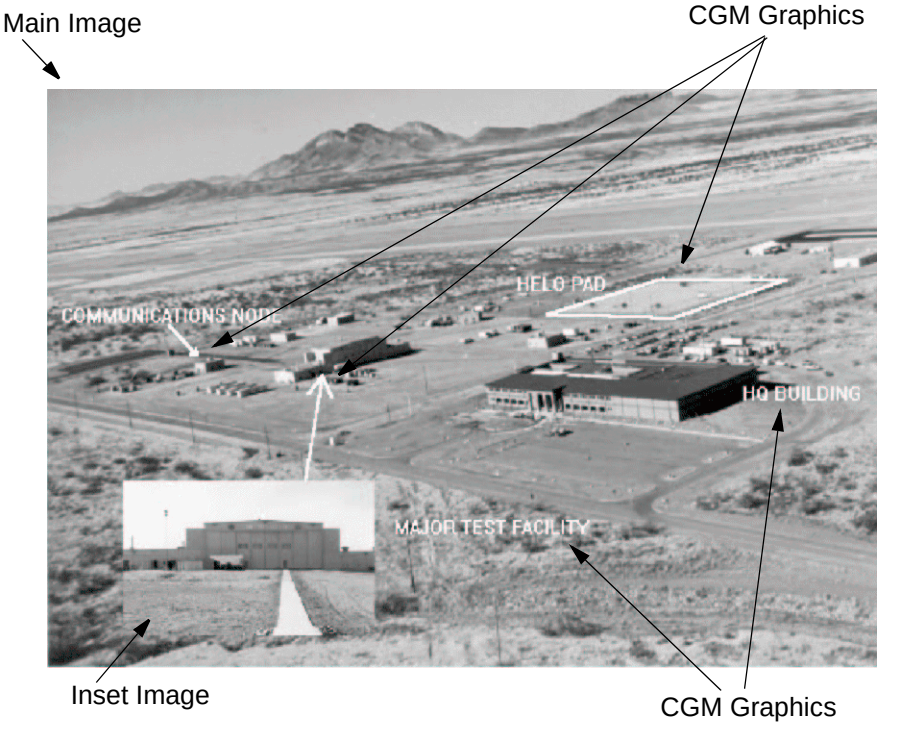

Figure 1-2: Sample Composite Image

In Figure 1-2, a close-up image is positioned on top of the main image, obscuring part of the image. However, because the inset image is contained in an image segment separate from the main image, it can be moved or deleted without destroying information contained in the main image underneath it. Likewise, the CGM graphics (text and graphical annotations) can be hidden or displayed without affecting the underlying image.

Image Masks

Mask information stored in image segments identifies pixels that are invalid or not intended to be displayed, and should therefore not be displayed (see “Image Segments” on page 13). When an image segment containing masked blocks or pixels is displayed, pixels from images or graphics underneath the image segment show through and are displayed even though they would ordinarily be obscured. If a transparent pixel occurs with nothing displayed under it, or if for any other reason there is no display information for a pixel, the background color specified in the main file header is displayed.

Display Levels

Each displayable segment in an NITF dataset is assigned a display level that determines the order of display. Segments with higher display levels are displayed over those with lower display levels.

Figure 1-3 shows these levels and their corresponding displayable segments.

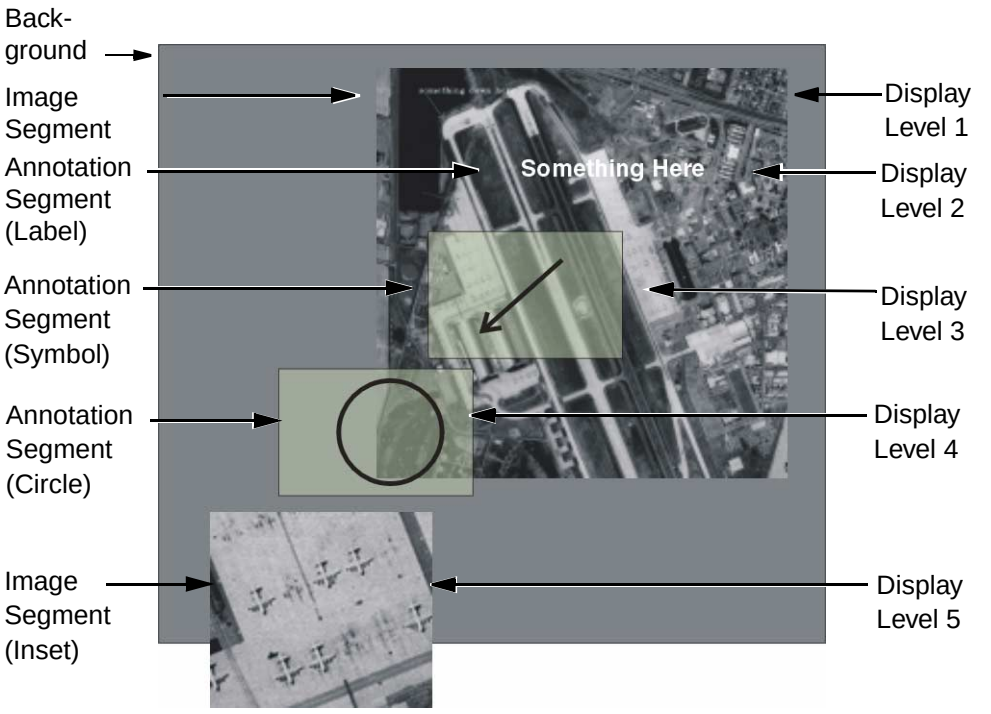

Figure 1-3: Layers of an NITF Composite

Figure 1-3 illustrates the composition of a composite NITF file. In this example, three annotation segments are displayed on top of a base image segment, another image segment is displayed as an inset, and the composite of these elements is displayed on a gray background.

Figure 1-4 shows the composite of the three annotation segments, the two image segments, and the gray background. While the annotations obscure portions of the

underlying image in the composite image, each annotation exists as a separate segment that can be displayed or hidden without affecting the underlying image.

Figure 1-4: NITF Composite

References

For more detailed information about the NITF/NSIF format and its components, see the appropriate technical specification listed in the following table. These documents are available from the NTB Web site http://164.214.2.51/ntb/baseline/docs. Click on the document title to open it in your Internet browser:

For information about...	Title
NITF 2.1	MIL-STD-2500B
NITF 2.0	MIL-STD-2500A
NSIF 1.0	STANAG 4545
CGM Graphics	MIL-STD-2301A
Controlled Extensions for NITF 2.1	STDI-0002
Test program plan	N-0105-98

Table 1-2: References for NITF/NSIF Format

Other documents, including compression schemes, may be found on the NTB Web site: http://164.214.2.51/ntb/baseline/1999.html

Chapter 2:
Installing the Module

This chapter describes how to install the Certified NITF/NSIF Module. It covers the following topics:

Before You Begin

Before installing the NITF Module, make sure you have checked the following:

- ENVI 3.6 has been previously installed.

Supported Platforms

Version 1.0 of the NITF Module supports the following platforms and operating systems:

Platform	Vendor	Hardware	Operating System	Supported Versions
Windows	Microsoft	Intel x86	Windows	NT 4.0, 2000, XP
UNIX†	SUN	SPARC	Solaris	8, 9
	SUN	SPARC (64-bit Ultra)	Solaris	8, 9

Table 2-1: NITF Module 1.0 Supported Platforms

† IDL, ENVI, and the NITF Module were either built on the lowest version of UNIX listed or tested on that version. It may be possible to install and run IDL, ENVI, and the NITF Module on versions other than those listed if your version is binary-compatible.

For Windows installation instructions, see "Windows Installation" on page 24.

For UNIX installation instructions, see "UNIX Installation" on page 26.

For licensing instructions, see "Licensing the NITF/NSIF Module" on page 28.

About Adobe® Acrobat® Reader

NITF Module online manuals require Adobe Acrobat Reader 3.0 or greater. Acrobat Reader has been included on your ENVI 3.6 CD-ROM in the `adobe` directory. Windows users need to run the `rp505enu.exe` installation application. UNIX users need to extract the *.tar file in the Solaris subdirectory, and installation instructions are included in the `README` file included in that *.tar file.

Visit the Adobe Systems Web site at `www.adobe.com` for the latest Acrobat Reader information and downloads.

Contacting RSI

If you have problems with installing or licensing this software product, contact RSI technical support for assistance:

- E-mail: support@RSInc.com
- Phone: (303) 413-3920
- Fax: (303) 786-9909
- Web page: http://www.RSInc.com — Visit the Tech Tips section in the Support section of our Web page for Frequently Asked Questions.

International customers should contact their local RSI office or distributor for technical support.

Windows Installation

This section describes how to install Version 1.0 of the NITF Module for Windows.

System Requirements

The following are the system requirements for the NITF Module for Windows:

Requirement	Description
Disk space	25 MB.
Operating System	Windows NT 4.0, Windows 2000, or Windows XP.
ENVI 3.6	ENVI 3.6 must be installed before installing the NITF Module. If the installer does not detect ENVI 3.6 Service Pack 1 in your ENVI 3.6 installation, it will be automatically installed for you.
Network Interface Card	A network interface card (NIC or Ethernet) is required for node-locked and floating licensing.

Table 2-2: NITF Module 1.0 Windows System Requirements

NITF Module Installation Procedure

To install the NITF Module, complete the following steps:

Note

To avoid losing unsaved information, save all open files and close any open applications before installing the NITF Module.

1. **Insert the NITF Module CD-ROM in your CD-ROM drive.** After a short delay, the NITF autorun program starts. If the autorun program does not start automatically, select **Start** → **Run**. In the Run dialog, type *x*`:\DEMO`, where *x* is the name of your CD-ROM drive, and click **OK**.
2. **Start the installation process.** Click **Install** to begin.Then click **Next** at the Introduction and Welcome dialogs to continue.
3. **Read the License Agreement.** After viewing the license agreement, click **Yes** to continue.

4. **View the NITF Module Release Notes.** Click **Next** after viewing the release notes.
5. **Review the installation settings.** At the Start Copying Files dialog, click the **Next** button to begin the installation, or click **Back** to change any settings.
6. **Run the license program.** At the License NITF screen, click **Yes** to run the licensing wizard now, or click **No** to run the licensing wizard at a later time.
7. **Click Finish**. Your installation is now complete.

Removing Your NITF Module Installation

To remove the NITF Module and restore ENVI with uncertified NITF support:

1. Select **Add/Remove Programs** from the Control Panel.
2. Select **Research Systems Certified NITF/NSIF Module 1.0** from the currently installed programs list, click **Change/Remove**, and follow the instructions to remove the installation.

UNIX Installation

This section describes how to install Version 1.0 of the NITF Module for UNIX.

System Requirements

The following are the system requirements for installing the NITF Module for UNIX.

Requirement	Description
Disk space	25 MB.
Operating System	Solaris SPARC 8 or 9, or SPARC 64-bit Ultra 8 or 9
ENVI 3.6	ENVI 3.6 must be installed before installing the NITF Module. If the installer does not detect ENVI 3.6 Service Pack 1 in your ENVI 3.6 installation, it will be automatically installed for you.

Table 2-3: NITF Module 1.0 UNIX System Requirements

Mounting the NITF Module CD-ROM

Some platforms automatically mount the CD-ROM when you insert it into your CD-ROM drive. On Solaris systems, the CD-ROM will be mounted as:

```
/cdrom/nitf10
```

NITF Module Installation Procedure

To install the NITF Module, complete the following steps:

Note

If you are installing the NITF Module to a public directory, make sure you have root or similar permissions before running the installation script.

1. **Execute the installation script.** Enter the following command at your UNIX prompt:

   ```
   /bin/sh /CDROM-PATH/unix/install.sh
   ```

   where *CDROM-PATH* is the path to your CD-ROM drive.

   The Product Installation dialog appears.

2. **Read and accept the license agreement.** To continue the installation, you must accept the terms of the Research Systems license agreement. Enter **Y** to accept the license agreement.
3. **Enter the installation directory where ENVI 3.6 is installed.** The default installation directory is `/usr/local/rsi`.
4. If ENVI cannot be found in the default `/usr/local/rsi` directory, you will be prompted to enter the path to the RSI folder.
   - To install in the `/usr/local/rsi` directory, enter **Y**.
   - To change it, enter **N**, then enter the path to where the RSI directory is located.
5. **Installation finished.** The installation is complete when the phrase "The installation has successfully been completed" appears.

Unmounting the CD-ROM

You can now unmount the CD-ROM using one of the following commands:

```
umount /cdrom/nitf10
```

or

```
eject /cdrom/nitf10
```

Removing Your NITF Module Installation

To remove the NITF Module and restore ENVI with uncertified support for NITF, you must run the installation script for ENVI 3.6 SP1:

1. Mount the NITF/NSIF CD-ROM (see above).
2. Execute the Service Pack 1 installer by entering the following command at the UNIX prompt:

   ```
   /CDROM-PATH/unix/sp1_install.sh
   ```

   where *CDROM-PATH* is the path to your CD_ROM drive.
3. Enter the installation directory. The default is `/usr/local/rsi`.
4. The installation is complete when the phrase "The installation has successfully been completed" appears.

Licensing the NITF/NSIF Module

The NITF Module requires a new ENVI license. If you have not already obtained a new license, contact RSI or your ENVI distributor to purchase a new ENVI license key. For information about entering your new ENVI license, refer to your *Installing & Licensing ENVI 3.6* manual.

Chapter 3: Introduction to the NITF Module

This chapter provides an introduction to the Certified NITF/NSIF Module. (For information on the NITF format, see Chapter 1, “Introduction to NITF”.) The following topics are discussed in this chapter:

The Certified NITF/NSIF Module

Providing support for the NITF format in IDL and ENVI is a joint development project between RSI and Eastman-Kodak. ENVI provides partial support for reading and writing some NITF files, but for NITF support that is fully compliant with the NITF standard, an ENVI module is required. Certified NITF support is provided via the Certified NITF/NSIF Module, available at additional cost from RSI or your ENVI distributor.

The Joint Interoperability Test Command (JITC) certifies systems implementing the NITF format for compliance with the NITF standard. JITC has examined the NITF Module for compliance with this standard and has provided certification for the product. The NITF Module has been certified to complexity level 7 (the highest) for compliance with the NITF Standard.

For detailed information about the NITF certification program, including functional read/write breakdown and testing anomalies, contact JITC (http://jitc.fhu.disa.mil/).

The NITF Module provides JITC-certified support for the NITF file format. With the NITF Module, ENVI can read and display all compressed or uncompressed NITF version 2.0 and 2.1 and NSIF 1.0 files, as well as legacy NITF 1.1 files, and can write NITF version 2.0 and 2.1 and NSIF 1.0 files.

This chapter provides an overview of how the NITF Module enables ENVI to read and write NITF files, and it describes some of the important features of the NITF Module. For detailed information about the NITF format, see Chapter 1, “Introduction to NITF”.

The NITF/NSIF Format

NITF is a complex imagery and image exploitation information format capable of containing a wide variety of image and non-image information. For information on the NITF format, see Chapter 1, “Introduction to NITF”. The NITF Module enables ENVI users to read NITF 2.0, NITF 2.1, NSIF 1.0 and legacy NITF 1.1 files, and to write NITF 2.0, NITF 2.1, and NSIF 1.0 datasets.

NSIF and NITF

The NITF format is used extensively in the United States. The multinational members of the North Atlantic Treaty Organization (NATO) use the NATO Secondary Image Format (NSIF). The NSIF 1.0 format is identical to the NITF 2.1 format, with the exception of the version name in the file header. In place of NITF02.10, this field contains NSIF01.00.

Note

In this document, general information about NITF files, and any specific information about NITF 2.1 files, also applies to NSIF files.

Annotation Segments

In the NITF Module, NITF 2.0 symbol and label segments, as well as NITF 2.1/NSIF 1.0 graphics segments, are collectively referred to as *annotation segments*, as illustrated in Figure 3-1.

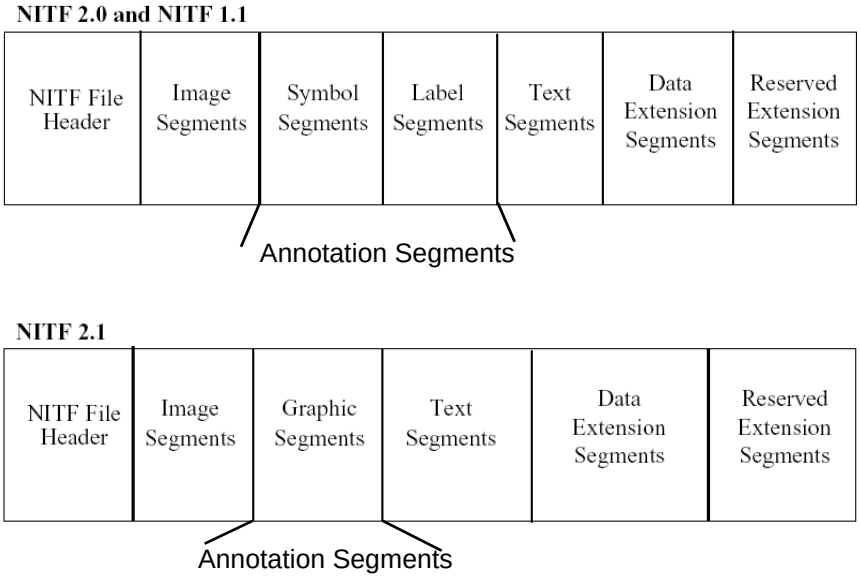

Figure 3-1: NITF 2.0 /2.1 File Segments and Annotations

Because of the similarity between the symbol segments and label segments in NITF 2.0 files, and the graphic segments in NITF 2.1 files, the NITF Module combines these segments into a single conceptual type (annotation segments). Annotation segments can contain symbol, label, or graphic segments, and they might include text, ellipses, polylines, bitmaps, and other objects. Annotation segments do not exist in any NITF file, and they are not mentioned in the NITF specification documents. They are a simplification used to reduce the overall number of segment types.

Annotation segments and image segments both carry information intended to be displayed graphically, and both are referred to as *displayable segments* in this document.

Annotation Objects

Because CGM graphics are capable of displaying multiple graphical elements, each annotation segment must be capable of storing multiple displayable features. In the NITF Module, these displayable features are referred to as *annotation objects*. Each annotation segment contains one or more annotation objects. Multiple CGM annotation objects can be contained in NITF 2.0 and 2.1 annotation segments; only one non-CGM label, bitmap or object symbol annotation object can be contained in each NITF 2.0 annotation segment. The type of object determines which fields will be filled in the annotation object. See “Annotation Object Attributes” in Appendix A for a description of the attributes of annotation objects.

Images and Composites

Each image segment in an NITF file represents a raster dataset that may have its own unique value for analysis or visualization. For that reason, the raw data from each segment must be accessible. At the same time, the display composite (see "NITF Display Composites" on page 16) must also be viewable as intended by the data provider. Each of these goals requires distinctly different treatment, but both are required.

Most images displayed in ENVI consist of a file containing a single raster dataset that, when opened in ENVI, adds one entry to the Available Bands List. NITF files, however, can contain multiple images with or without annotations, and these images can appear as multiple entries in the Available Bands List. If a raw image contains a mask, an additional mask image will be included. On the other hand, an NITF file containing only a text segment and no displayable segments will not be added to the Available Bands List: the contents of the file will be displayed only in the NITF Dataset Attributes viewer.

In ENVI, most images are not automatically displayed when an image is opened. Instead, the Available Bands List is displayed, and the user must select the appropriate bands and display mode before the image can be displayed. In ENVI with the NITF Module, however, many NITF datasets are displayed automatically by default. Table 3-1 lists the factors that determine whether images in an NITF dataset will be displayed automatically. (For a summary of the factors that determine how NITF files are displayed, see "Opening an NITF File" on page 54.)

Factors:			Comments
# of Image Segments	# of Annotation Segments	# of Entries in the Available Bands List	
0	0	0	NITF Dataset Attributes Viewer is displayed automatically.
1	0	1 (image segment)	Whether image is displayed automatically depends on contents of `IREP` and `IREPBAND` (see "Automatic Display of Datasets" on page 37).
0	1	1 (composite)	Annotation is contained in the composite and displayed over the background color.
1	1	1 image segment + 1 composite	Annotation is contained in the composite.
2 or more	0	2 or more image segments + 1 composite	
2 or more	1 or more	2 or more image segments + 1 composite	Annotations are contained within the composite.

Note - If one or more text segments are present in the dataset, you will be prompted to display the NITF Dataset Attributes viewer.

Table 3-1: Factors That Determine Automatic Display of NITF Datasets

Information Gathered from the Image Subheader

Wavelength information is imported from the BANDSA tag, if present, or from the band subcategory settings if the image category is multispectral or hyperspectral and the wavelength information is specified.

For images containing projection information in the image coordinate representation and image geolocation header fields, the georeferencing information is imported into ENVI automatically.

Bands Within Each Image Segment

The name of each image band begins with the number of the image segment in the file, e.g., `Image Segment #1`, followed by the band index, e.g., `Band 1.` If the file contains three bands, the band indices are replaced with `R`, `G`, and `B`. If the security level of the image segment is anything other than Unclassified, the classification level is prepended to each band name.

Datasets with a Single Image Segment and No Annotations

In ENVI with the NITF Module, an NITF dataset with a single image segment and no annotation segments is opened as a single entry in the Available Bands List. Access to the data in this image segment is the same as access to other data in ENVI.

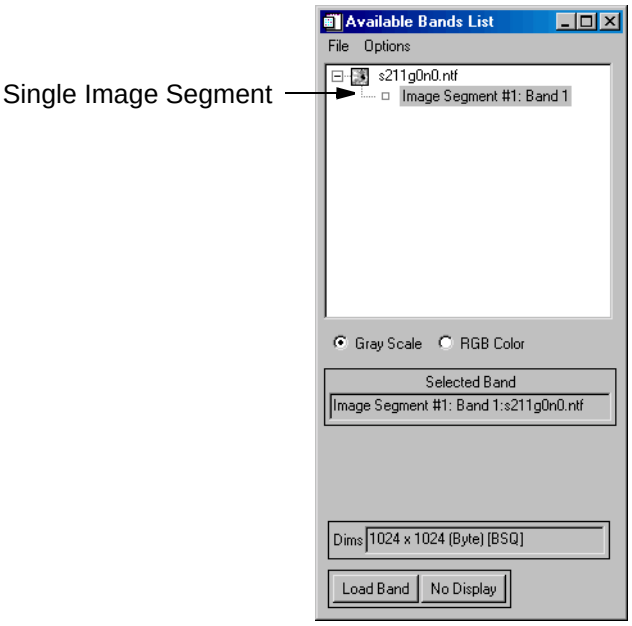

Figure 3-2: Simple NITF Dataset Added to the Available Bands List

Automatic Display of Datasets

In certain cases, when a dataset is opened, it will be displayed automatically. These cases are determined by the contents of the image representation (`IREP`) and band representation (`IREPBAND`) fields in the image subheader. The `IREP` values that occur most frequently are `MONO` (monochrome), `RGB` (three-band true color), `RGB\LUT` (single band image with color palette), `MULTI` (multi-band imagery), and `NODISPLY` (image not intended for display). The `IREPBAND` values used in this process are `R` (Red), `G` (Green), `B` (Blue), `M` (Mono), and `LU` (Look-Up Table). The image contains one `IREP` value for the image segment, and one `IREPBAND` value for each band in the dataset.

In addition, the following factors determine how a dataset will be automatically displayed:

- Images with the `IREP` value `RGB\LUT` will be displayed in true color by default, and the image will be decomposed into red, green, and blue bands.
- Multiple-band images with three bands identified as `R`, `G`, and `B` will be displayed as RGB composites, and the three bands will be represented as red, green, and blue bands.
- If no RGB values are found in the image, and there is a band marked `LU`, this band will be displayed with the lookup table applied.
- If the image contains a band with the value `M`, it will be displayed as a grayscale image.
- If none of these conditions are encountered, the image will not be automatically displayed.

For more information, see "Image Segment Attributes" on page 86 and "Band Attributes" on page 104.

Datasets with Multiple Image Segments or with Annotations

If an NITF dataset contains multiple image segments, or if it contains one or more annotations, a display composite will be created (see Table 3-1).

The NITF Module always adds display composites to the Available Bands List as three-band (RGB) composites, and the ENVI Virtual Mosaic™ feature is used to create the composite. Any annotations, or images that appear over annotations, are displayed using ENVI's annotation overlay capability. These annotations appear on the composite, not on the individual image segments.

When an NITF composite is created, the component image segments in the file are added to the Available Bands List (unless the "Show image segments" preference in the NITF configuration file is disabled). These component image segments are displayed in much the same way as single-image segments (see "Datasets with a Single Image Segment and No Annotations" on page 37), with the exception that they are not displayed automatically.

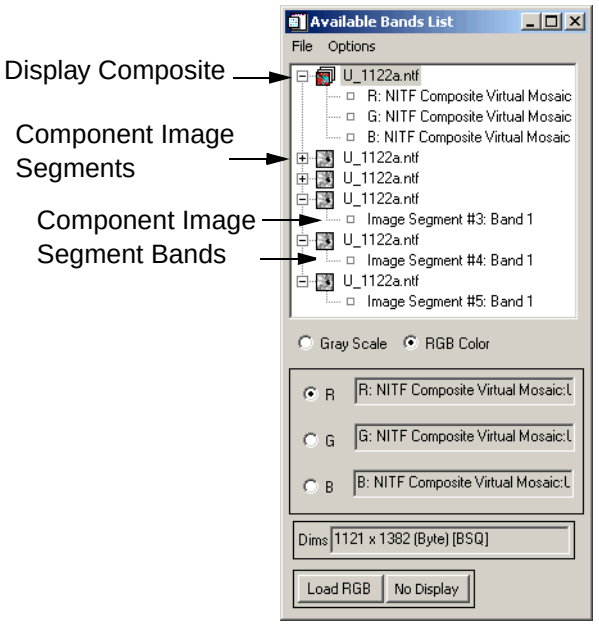

Figure 3-3: NITF Dataset with Multiple Image Segments Added to the Available Bands List

Note

The NITF image segment containing the appropriate data should be used instead of the composite image for any processing in ENVI. For example, to run a classification on a hyperspectral image in an NITF file, make sure to select the image segment containing the hyperspectral image as input. Using the composite will produce invalid results.

Composite Extents

NITF files can contain multiple displayable segments, and these segments are positioned relative to a two-dimensional Cartesian Common Coordinate System (CCS). In the NITF Module, the displayable area is limited to the *x* and *y* extents of the displayable elements within the dataset. These extents are calculated as a rectangle extending from the origin of the CCS to the intersection of two lines drawn 2 pixels from the edge of any displayable segments in the dataset, as illustrated in Figure 3-4. The extents are expressed as the number of rows and columns present in the RGB composite created in ENVI.

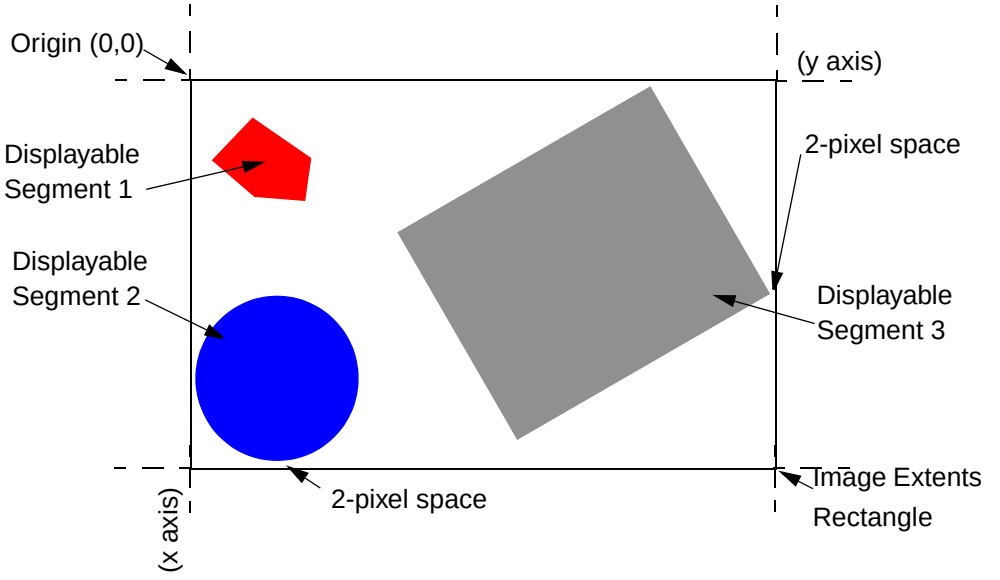

Figure 3-4: Image Extents Rectangle

NITF Tag support

Tagged Record Extensions (TRE), or *tags*, can be associated with an NITF dataset or any data segment in the file. Tag data can be viewed in ENVI through the NITF Dataset Attributes viewer and, in limited cases, tags are applied to the data in a file or segment to enhance the utility of the data. One or more tags that apply to the entire NITF dataset can be present in the file header, and each segment (image, annotation, or text) can also have one or more tags associated with it. Unless there is a large amount of data in a tag, the tag data is stored in the main header or segment subheader to which the tag applies. For tags too large to fit in the segment TRE area, a data extension segment (DES) is created at the end of the file, and a pointer to this DES is stored within the header. For more information about tags in NITF datasets, see "Tagged Record Extensions" on page 15.

There are two levels of tag support in ENVI:

- **Unsupported tags** are those for which no tag definition is available, or the tag definition does not match the physical layout of the tag. Only the raw data of tags of this type can be viewed. In the NITF Dataset Attributes viewer, unknown tags are identified by the text "Definition Unknown" beside the name of the tag. To view the raw data associated with this type of tag, open the tag container and click **Raw Tag Data: Click to View**. The ASCII data contained in the tag appears in a separate window.
- **Supported tags** match a valid tag definition, and the data in these tags can be viewed with the appropriate header information in the attribute viewer. These tags can be parsed into their specific components, and the value associated with each field in the tag is displayed in the Dataset Attributes viewer. To view the information contained in this type of tag, open the tag container. Each field in the tag will be displayed as a single entry.

Each tag supported by the NITF Module references an XML tag definition file. Definition files for a partial list of the NTB-registered CEs are installed with the NITF Module. For a list of the tags installed with the NITF Module, see Appendix B, "Supported Tags".

These files allow ENVI to interpret the raw data contained in the tag and extract specific information written into the file. However, none of the NTB-registered REs and only some of the NTB-registered CEs are supported by the NITF Module, and definition files for these tags are not installed. Support for tags can be added by creating tag definitions for the desired tags. For details contact RSI Technical Support (see "Contacting RSI" on page 23).

Creating New NITF Files

The NITF Module can create new NITF datasets from existing raster data. New datasets can be created in NITF 2.0, NITF 2.1 and NSIF 1.0 format. In Version 1.0 of the NITF Module, datasets containing a single image can be created from existing data in NITF and other formats. The NITF Module cannot export Annotation segments, text segments, or tags to new NITF datasets.

NITF image segments can be created in ENVI from any supported data type except 64-bit integer and complex. Supported data types and other criteria for export are described in the following table.

Compression Type	NITF 2.0	NITF 2.1
None	**# of Bands**: 1, 3, or 4 **Data Types**: 8- or 16-bit unsigned integers	**# of Bands**: 1-999 **Data Types**: 8-, 16-, or 32-bit unsigned integers; 16- or 32-bit signed integers; floating-point; double.
JPEG DCT	**# of Bands**: 1 or 3 **Data Types**: Byte	**# of Bands**: 1 or 3 **Data Types**: Byte
JPEG 2000	Not available	**# of Bands**: 1-999 **Data Types**: 8-, 16-, or 32-bit unsigned integers; 16- or 32-bit signed integers.

Table 3-2: NITF File Export Criteria

These image segments cannot contain masks or lookup tables used to alter image values for display.

All security and origination information contained in the file is editable by the user. In addition, some of the image settings controlling how the image is written, including image blocking settings, can be edited. Many of these settings have no required values, some have only a short list of acceptable values, and others are dependent on the values present in other fields.

Validation and Configuration

Before an NITF dataset can be written, the set of parameters to be added to the NITF header fields must be checked to ensure internal consistency with the requirements set forth in the NITF specification. This validation is performed automatically before any new NITF dataset is created. If the validation fails, an error message indicating the source of the failure, including the name of the field causing the error and a short description of the error, is generated. In most cases, you will have the opportunity to correct any errors before continuing.

The NITF Module attempts to determine a reasonable set of default values for all of the file parameters before a file is exported. You will, however, always have the ability to edit these values before creating an output file. Many of the default values, such as the image size and data type, are determined by the data being exported. Other values, such as the file and image title, are left blank by default. The information that can be edited is displayed in the NITF Dataset Attribute viewer (see "Editing Dataset Attribute Values" on page 63).

Some of the information written into the file, such as origination information and security settings, will be the same for all files you create. For these settings, you can set preferences in the NITF Configuration File to populate these fields by default. It is highly recommended that you customize these settings prior to creating any new NITF datasets. See "The NITF Configuration File" on page 46.

Saving an NITF File as NITF

When the source data for a new NITF file is an NITF dataset, the default settings from the source dataset will be used for the new file, with the following exceptions:

- The file date and time will be set to the current date and time.
- The number of file copies will be incremented (unless it is currently set to 0) and this copy number will be set to the number of copies.
- Any annotation segments, tags, or text segments will be removed.
- Any image segment with a compression setting not supported for output will default to uncompressed.

Note

The NITF Configuration file has a setting, `overwrite inherited header` (see "The NITF Configuration File" on page 46), for disabling the automatic use of source NITF dataset attributes for output. This causes the new NITF dataset to use

the same default settings that would be used by a dataset from a non-NITF format being converted into NITF (see "Exporting an ENVI File to NITF" following).

Exporting an ENVI File to NITF

Since default settings must be created for a dataset being exported, ENVI uses all available information about the data in ENVI, along with information from the NITF Configuration file, to create useful settings.

Main Header

The version, origination, security information, and background color in the main header are set from the NITF Configuration file. The file date and time are set to the current time. All other fields in the main header are left blank.

Image Segments

Image segments are populated in this way:

- **Security information** for the image segment is read from the NITF Configuration file, and the image **date and time** are set. For NITF 2.1 files, the date and time is set to UNKNOWN; for NITF 2.0 files, the date and time is set to Jan 1, 1970 (because NITF 2.0 does not recognize UNKNOWN).
- The number of **rows**, **columns**, **bands**, and the **data type** of the output dataset is determined from the input dataset. If the number of rows and columns is less than 4096, the block size is set to the full image size. For larger images, the image is set to a block size of 1024x1024.
- By default, the image will be **uncompressed**.
- If the image has **map information** in UTM, this information will be written to the file using the MGRS representation supported in both NITF 2.0 and 2.1. Other map information will be converted into geographic coordinates for export.
- For single-band images, the image representation field is set to **MONO** and the band representation is set to **M**, while three-band byte images have **RGB** as the image representation, with the band representations set to **R**,**G**, and **B** (see Table 3-3). For any other band count, the image representation will be set to **MULTI** and, if a set of default bands is specified in ENVI for this file, these

bands will have their representations set to **R**, **G**, and **B** to indicate that these bands should be displayed by default.

Type of Image	Image Representation	Band Representation
Single-band image	**MONO**	**M**
Three-band byte image	**RGB**	**R**, **G**, **B**
Other image	**MULTI**	**R**, **G**, **B** (if specified)

Table 3-3: Image and Band Representation

- If **wavelength information** is not available for the file, or if only one band is being exported, the image category is set to **VIS**, and the band subcategory is left blank. If wavelength information is available, ENVI will attempt to convert the wavelength into nanometers, then write that information into the band subcategory. In this case, the image category is set based upon the number of input bands: **HS** is used for files with more than 200 bands, and **MS** is used for files with 2-200 bands. All other fields are left blank.

The NITF Configuration File

The NITF configuration file contains configuration information for the NITF Module as well as the default origination, security, and compression attributes to be used for files saved in NITF format. You can edit the NITF configuration file with any text editor to include your own origination information and to change the default security attributes of the files you save.

In Windows, the NITF configuration is located at:

RSI-DIR`/IDL56/products/envi36/menu/nitf.cfg`

In UNIX, the NITF configuration is located at:

RSI-DIR`/IDL_5.6/products/envi_3.6/menu/nitf.cfg`

where *RSI-DIR* is the default installation directory for ENVI.

The following is a sample of the contents of an `nitf.cfg` file:

```
NITF Configuration File
show image segments = 1
show tag description = 1
cache size = 128
overwrite inherited header = 0
file write version = NITF02.10
file write ostaid = RSI
file write bgcolor = {0,0,0}
file write oname = Research Systems ENVI
file write ophone = 303-786-9900
security write sclas = U
security write 2.1 sclsy =
security write scode =
security write sctlh =
security write srel =
security write 2.1 sdctp =
security write 2.1 sdcdt =
security write 2.1 sdcxm =
security write 2.1 sdg =
security write 2.1 sdgdt =
security write 2.1 scltx =
security write 2.1 scatp =
security write scaut =
security write 2.1 scrsn =
security write 2.1 ssrdt =
security write sctln =
security write 2.0 sdwng =
security write 2.0 sdevt =
```

Attribute Display

To change the way file attributes are displayed in the Available Bands List and the NITF Dataset Attributes window, change the following:

Setting	Description	Values
`show image segments`	If set, adds each image segment in the file, in addition to the NITF composite, to the Available Bands List.	1 = Display all image segments (default). 0 = Display only the composite image.
`show tag description`	If set, displays descriptive names of tag fields in the NITF Dataset Attributes window.	1 = Display descriptive names (default). 0 = Display field names.

Table 3-4: Display Settings for NITF File Attributes

Cache Size

To improve performance with large NITF images, change the following:

Setting	Description	Values
`cache size`	Size in MB of memory allocated for use in reading NITF images. If not enough physical memory is available, virtual memory will be used.	Set this value to at least the amount of memory required to load one row of blocks across the entire width of the image. Default: 128

Table 3-5: Cache Size Setting for Displaying NITF Files

To determine optimal cache size, display the attributes of a representative image in the Dataset Attributes viewer, and locate the following information:

- Number of blocks per row (NBPR)
- Number of pixels per block (horizontal) (NPPBH)
- Number of pixels per block (vertical) (NPPBV)

- Number of bits per pixel (NBPP)
- Number of bands in the image

Then use the following formula to calculate the optimal cache size value:

value = NBPR*NPPBH*NPPBV*(NBPP/8)*Number of Bands / 1 MB

Overwrite Header

To determine whether to overwrite the file headers of existing NITF files when they are saved as new files, change the following:

Setting	Description	Values
`overwrite inherited header`	If set, uses default information for the output NITF Dataset Attributes.	1 = Overwrite 0 = Retain values in source NITF header (default)

Table 3-6: Overwrite Setting for NITF File Headers

Note

If the file header is retained, unsupported compression types will be set to none. The file date and time will be set to the current time. If FSCPYS is set, it will be incremented and this copy will be set to that number. For more details on the default settings, see "Creating New NITF Files" on page 42.

Origination

To determine the origination information in the headers of files saved in NITF format, change the following:

Setting	Description	Values

`file write version`	NITF version in which file originated	`NITF02.00`
		`NITF02.10` (default)
		`NSIF01.00`

`file write ostaid`	Station ID of organization in which file originated	Size: 10 characters Default: `RSI`

Table 3-7: Origination Information for NITF File Headers

Setting	Description	Values
`file write bgcolor`	Background color for file	(RGB triplet) Default: `{0,0,0}`
`file write oname`	Name of file's originator	Size: 24 characters Default: `Research Systems ENVI`
`file write ophone`	Telephone number of file's originator	Size: 18 characters Default: `303-786-9900`

Table 3-7: Origination Information for NITF File Headers (Continued)

Security

To set the default security information in the main header and each data segment for all files you save in NITF format, change the following:

NITF All Versions

Setting	Description	Values
`security write sclas`	Security classification	T = Top Secret S = Secret C = Confidential R = Restricted U = Unclassified (default)
`security write scode`	Security codewords. See "Codewords" on page 78.	Default: blank
`security write sctlh`	Security control/handling. See "Control/ Handling" on page 78.	Default: blank
`security write srel`	Security release instructions. See "Release Instructions" on page 78.	Default: blank

Table 3-8: Security Settings for NITF Files, All Types

Setting	Description	Values
`security write scaut`	Security classification authority. See “Classification Authority” on page 81.	Default: blank
`security write sctln`	Security control number. See “Control Number” on page 82.	Default: blank

Table 3-8: Security Settings for NITF Files, All Types (Continued)

NITF Version 2.0 Only

Setting	Description	Values
`security write 2.0 sdwng`	Security downgrade. See “(NITF 2.0) Downgrade” on page 80.	Default: blank
`security write 2.0 sdevt`	Security downgrade event. See “(NITF 2.0) Downgrade Event” on page 80.	Default: blank

Table 3-9: Security Settings for NITF Version 2.0 Files

NITF Version 2.1 Only

Setting	Description	Values
`security write 2.1 sclsy`	Security classification authority type. See “(NITF 2.1) Classification Authority Type” on page 81.	Default: blank

Table 3-10: Security Settings for NITF 2.1 Files

Setting	Description	Values
`security write 2.1 sdctp`	Security declassification type. See “(NITF 2.1) Declassification Type” on page 79.	Default: blank
`security write 2.1 sdcdt`	Security declassification data and time. See “(NITF 2.1) Declassification Date” on page 79.	Default: blank
`security write 2.1 sdcxm`	Security declassification exemption. See “(NITF 2.1) Declassification Exemption” on page 79.	Default: blank
`security write 2.1 sdg`	Security downgrade level. See “(NITF 2.1) Downgrade Level” on page 80.	Default: blank
`security write 2.1 sdgdt`	Security downgrade date. See “(NITF 2.1) Downgrade Date” on page 80.	Default: blank
`security write 2.1 scltx`	Security classification text. See “(NITF 2.1) Classification Text” on page 80.	Default: blank
`security write 2.1 scatp`	Security classification authority type. See “(NITF 2.1) Classification Authority Type” on page 81.	Default: blank
`security write 2.1 scrsn`	Security classification reason. See “(NITF 2.1) Classification Reason” on page 82.	Default: blank

Table 3-10: Security Settings for NITF 2.1 Files (Continued)

Setting	Description	Values
`security write 2.1 ssrdt`	Security source date. See “(NITF 2.1) Security Source Date” on page 82.	Default: blank

Table 3-10: Security Settings for NITF 2.1 Files (Continued)

Chapter 4:

Using the Certified NITF/NSIF Module

This chapter describes how to use the Certified NITF/NSIF Module. The following topics are covered:

Opening an NITF File

The following methods can be used to select and open NITF files from the ENVI graphical user interface:

- Select **File → Open Image File**, and select an NITF file to open.
- Select **File → Open External File → Military → NITF → NITF**, and select an NITF file to open.
- If the file you want to open is an IKONOS file in NITF format, select **File → Open External File → IKONOS → NITF**, and select the NITF file to open.
- If the file you want to open is a QuickBird file in NITF format, select **File → Open External File → QuickBird → NITF**, and select the NITF file to open.
- Select **File → Open External File → Military → NITF → View NITF Dataset Attributes**, display attributes for NITF files until you find the one you want to open, and click **Open**. For details on this approach, see "Viewing NITF Dataset Attributes" on page 55.

Any of the above methods will open the selected NITF file. The following factors determine how the file will be displayed:

- If no displayable segments are present in the file, the NITF Dataset Attributes Viewer will display the contents of the file.
- Files containing displayable segments will have one or more entries added to the Available Bands List and may or may not be automatically displayed (see "Images and Composites" on page 34).
- If any images in the file are marked non-displayable (`IREP` = `NODISPLY`), you will have the option of displaying the file contents in the NITF Dataset Attributes Viewer instead of displaying the file in the image viewer.
- If the file contains any text segments, you will be prompted to display the file contents in the NITF Dataset Attributes viewer.

For more information on opening files in ENVI, see "Opening External Files" in the *ENVI User's Guide*.

Viewing NITF Dataset Attributes

The NITF Dataset Attribute viewer allows you to view the meta data in the header and subheaders of an NITF file. You can also view the contents of tags and text segments in the file.

To view the dataset attributes of an NITF file:

1. Select **File → Open External File → Military → NITF → View NITF Dataset Attributes**.
2. Locate the desired NITF file in the Select NITF File dialog, and click **Open**.

   The attributes of the selected file are displayed in the NITF Dataset Attributes window.

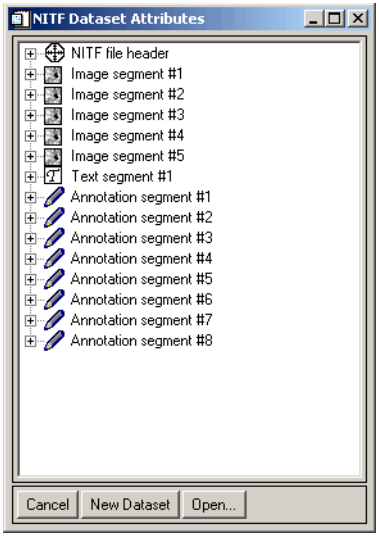

Figure 4-1: NITF Dataset Attributes Window

Note

The number and type of containers displayed vary according to the dataset being displayed, and the attributes displayed in each container vary among different versions of NITF.

3. Click a + button to expand the File Header, Image Segment, Text Segment, or Annotation Segment node in the tree view control. Attributes are grouped in the tree view control as follows (click on a container name in the following list to view attribute details):

   NITF File Header Attributes

   - Security Attributes
   - Tag Attributes (if present)

   Image Segment Attributes (if present)

   - Security Attributes
   - Band Attributes (one for each band)
   - Image Comments (if present)
   - Tag Attributes (if present)

   Text Segment Attributes (if present)

   - Security Attributes
   - Tag Attributes (if present)

   Annotation Segment Attributes (if present)

   - Security Attributes
   - Annotation Object Attributes (if present)
   - Tag Attributes (if present)

4. From the NITF Dataset Attributes Viewer, you can do any of the following:

   - Click **Open** to open the selected file and add this image to the Available Bands List. This button will not be present if the file is already open.
   - Click **New Dataset** to clear the currently selected file and view the attributes of another NITF file.
   - Click **Cancel** to dismiss the View NITF Dataset Attributes window.

NITF Dataset Attribute Icons

The following icons appear in the NITF Dataset Attributes window to identify the types of attributes that may appear in a particular container. For more information about the attributes in each container, refer to Appendix A, “Dataset Attributes”.

Container	Icon	Description
File Header		Contains attributes common to the entire NITF file. In addition to file attributes, this container can contain tags or security attributes pertaining to the entire file.
Security		Contains security attributes for the file, image segment, annotation segment, or text segment.
Tag		Contains attributes for a tag.
Single-band Image Segment		Contains image attributes for a single-band image segment. In addition to information about the image band, this container may contain security attributes, image comments, and tag attribute containers.
Multi-band Image Segment		Contains image attributes for a multiple-band image segment. In addition to information about the image bands, this container may contain security attributes, image comments, and tag attribute containers.
Image Comments		Contains image comments for an image segment.
Annotation Segment		Contains attributes for an annotation segment. In addition to one or more annotation object containers, this container may contain security and tag attribute containers.
Text Annotation Object		Contains attributes for a text annotation object.
Ellipse Annotation Object		Contains attributes for a circular or elliptical annotation object.

Container	Icon	Description
Polyline Annotation Object		Contains attributes for a polyline annotation object.
Polygon Object		Contains attributes for a polygon annotation object.
Text Segment		Contains attributes for a text segment.

Viewing NITF Text Segments

Text segments in an NITF file must be viewed through the NITF Dataset Attributes viewer. To view the text contained in a text segment, first open the NITF file. If the file contains only a text segment, opening the file with **File → Open Image File** will automatically open the Dataset Attributes viewer. Alternatively, select **File → Open External File → Military → NITF → View NITF Dataset Attributes**.

To open a file with displayable content and a text segment:

1. Select **File → Open Image File.** After the file is added to the Available Bands List, you will be prompted to open the Dataset Attributes viewer.

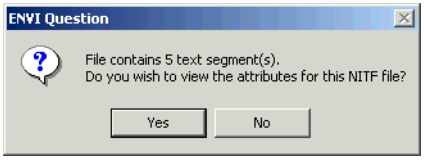

Figure 4-2: Prompt to Open Dataset Attributes Viewer

2. Select **Yes** to open the Dataset Attributes viewer.
3. Select the text segment in the Dataset Attributes viewer to view the data contained in that segment.
4. Click the + button to expand the Text Segment container.

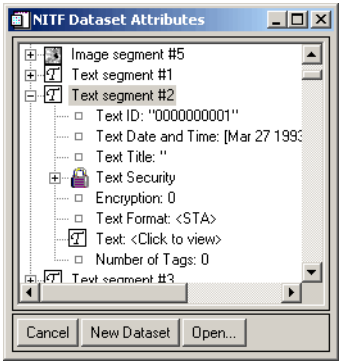

Figure 4-3: Text Segment Expanded in Dataset Attributes Viewer

This displays the information in the text segment subheader.

5. Click **<Click to view>** to display the text contained within this segment. This opens a new ASCII text display window that allows you to view and scroll through the text in this text segment.

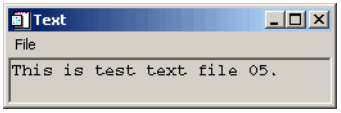

Figure 4-4: Text Segment Text Window

6. To save this text to an ASCII file, click **File → Save text to ASCII**.

Note

To view Unicode (U8S) text, you will need to save the text in the Text Segment Window as an HTML file and view it in your Web browser. Use the following procedure:

Viewing Unicode Text Segments

1. Follow steps 1-5 above to display the text in the Text Segment Window.
2. Select **File → Save Text to ASCII**, and specify a filename with a `.htm` extension.
3. Open the `.htm` file in your Web browser.
4. Set text encoding to Unicode (UTF-8):
   - Internet Explorer: Select **View → Encoding → Unicode (UTF-8)**.
   - Netscape: Select **View → Character Coding → Unicode (UTF-8)**.

Saving NITF Files

There are two ways to create new NITF files with the NITF Module:

- Create a dataset that is an exact copy of the data in an existing image. This option makes it possible to create datasets of any supported data type, size, or number of bands, but it does not allow you to overlay any non-image information with this file.
- Create a dataset with the data that is currently displayed in an ENVI display group. This option will create an NITF image of byte type, with one or three output bands, and any annotation or vector overlay displayed on the image can also be merged into the image data. Any display enhancements applied in the display will also be applied to the output data.

Save File As NITF

Use Save File As → NITF to create a dataset that is an exact copy of an existing image without any annotation overlays.

To create an NITF file that is an exact copy of a spatial and spectral subset of the data in an existing dataset:

1. Select **File → Save File As → NITF**.

2. At the NITF Output File dialog, select the output file and perform any subsetting.

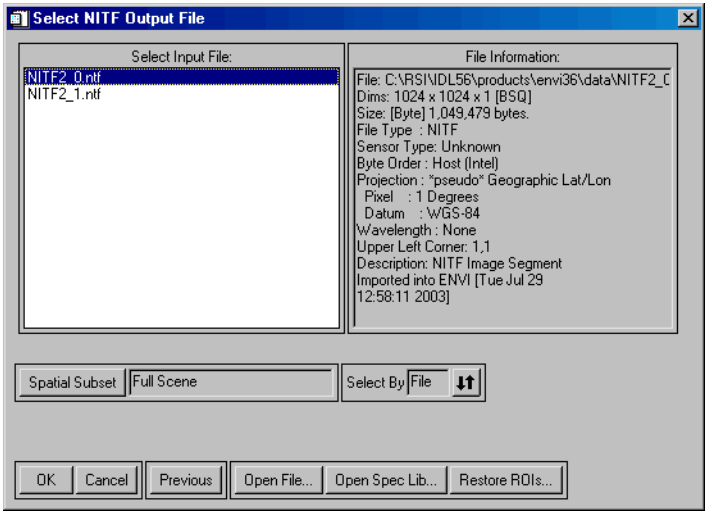

Figure 4-5: NITF Output File Dialog

3. At the NITF Output Parameters dialog, select the desired NITF output version from the button menu.

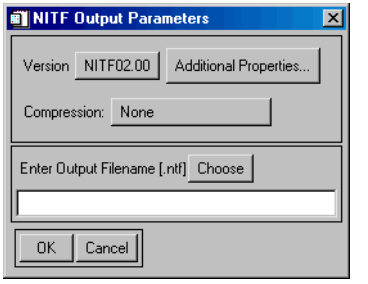

Figure 4-6: NITF Output Parameters Dialog

- If the Compression menu is displayed, you may choose a compression algorithm to apply to your output image. See "Compression Types" on page 63 for details.

- To enter additional parameters such as originator information or header details, click the **Additional Settings** button and make any necessary changes to the editable attributes in the NITF Attributes Viewer. See "Editing Dataset Attribute Values" on page 63 for details.

4. In the Enter Output Filename field, do either of the following:
   - Enter an output filename and click **OK**.
   - To overwrite an existing NITF file, click **Choose**, select an existing filename, click **Open**, and click **OK**.
5. Click **OK** to export the dataset.

Compression Types

The types of compression available (if any) are determined by the data type and the NITF output version selected, as indicated in Table 4-1. Higher compression rates result in smaller files with lower quality.

NITF Output Version	Data Type	Compression Types
All versions	1- or 3-Band Byte	JPEG DCT (High) (High compression)
	"	JPEG DCT (Medium compression)
	"	JPEG DCT (Low compression)
NITF 2.1/NSIF 1.0 only	Any Integer data type	JPEG 2000 (High) (Lossy)
	"	JPEG 2000 (No Visible Loss)
	"	JPEG 2000 (Lossless)
	Floating-point, double	None

Table 4-1: Compression Types Available

Editing Dataset Attribute Values

Clicking the **Additional Settings** button in the NITF Output Parameters dialog allows you to edit certain file parameters in the NITF Dataset Attributes viewer.

To edit a file parameter:

1. Click the parameter name in the NITF Dataset Attributes viewer. If the parameter is editable, an Edit Value text box is displayed.

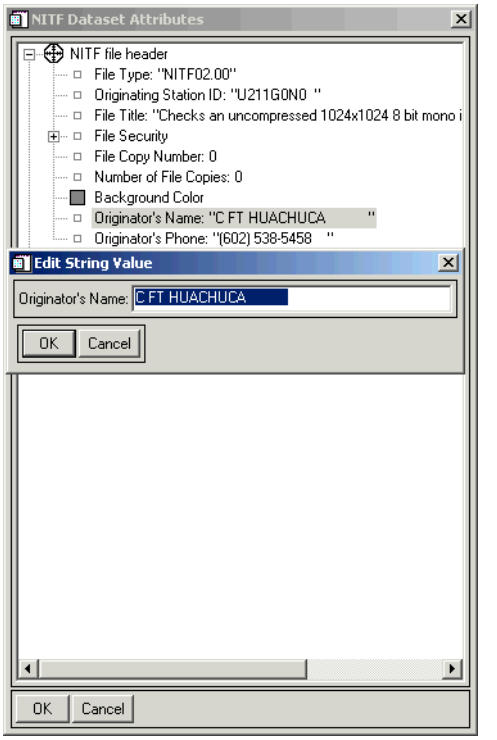

Figure 4-7: Editing Values in the NITF Dataset Attributes Viewer

2. To edit the displayed value, enter a new value in the Edit Value text box and do either of the following:
   - Click **OK** to save your changes and advance to the next editable attribute.
   - Click **Cancel** to close the text box without saving changes.
3. When you have finished editing values, do either of the following:
   - Click **OK** to close the NITF Dataset Attributes viewer and save changes.
   - Click **Cancel** to close the viewer and discard changes.

For more information about saving files in ENVI, see “Saving Files” in the *ENVI User’s Guide*.

Save Image As Image File

Use **Save Image As → Image File** to save the one or three bands currently displayed in the ENVI Main Image window with the current stretch applied. Any graphic overlays added in the image window, including text, ROIS, annotations and symbols, will be merged with the image data when the file is saved.

To create an NITF file from the image displayed in an ENVI display group:

1. Select **File → Save Image As → Image File** from the Main Image window.
2. At the Output Display to Image File dialog, select **NITF** from the Output File Type drop-down list.

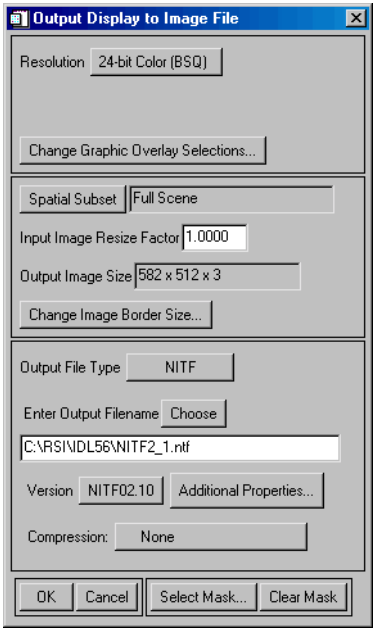

Figure 4-8: Output Display to Image File Dialog

3. Select the NITF output version from the button menu. You will have the following options:

- Choose a compression algorithm to apply to your output image. Compression types are determined by the NITF output version selected, as indicated in Table 4-1.
- To enter additional parameters such as originator information or header details, click the **Additional Settings** button and make any necessary changes to the editable attributes in the NITF Attributes Viewer (see Figure 4-7).

Note

Regardless of the settings inherited from an NITF source file, the default file creation settings (see "Exporting an ENVI File to NITF" on page 44) will be used.

4. Enter a filename, or click **Choose** to overwrite an existing file.
5. Click **OK**.

Note

Annotations cannot be saved as non-destructive annotation segments in NITF files saved with ENVI. The annotations will be saved as part of the image and *not* as an annotation segment separate from the image. This process alters the image segment permanently, and the process cannot be reversed.

For more information on saving images, see "Display Output Options" in Chapter 4 of the *ENVI User's Guide*.

Personalizing the NITF Configuration File

The NITF configuration file (`nitf.cfg`) contains configuration information for the NITF Module as well as the default origination, security, and compression attributes to be used for files saved in NITF format. If your ENVI installation is located on your own computer or in your home directory, you can simply edit the `nitf.cfg` file to customize the NITF Module for your use. However, if you share your installation of ENVI with other users, before you can customize ENVI and the NITF Module for your use, you will need to follow these steps:

Note

UNIX users: See Tech Tip #1790 on the RSI Tech Support Web site for complete instructions on setting up personal configuration information on a shared ENVI installation.

1. Copy the `nitf.cfg` file to your home directory from the installation directory.
2. Copy the `e_locate.pro` file, which can be found in the ENVI menu directory, into your home directory. The presence of a `.pro` file in your home directory will cause IDL to add your home directory to the search path when it starts up, allowing ENVI to find your copy of the `nitf.cfg` file.
3. Add your home directory to the ENVI search path by doing either of the following:
   - **Windows users:** Start ENVI and select **Preferences** from the IDL File menu. Click the **Path** tab, and add your home directory to the search path.
   - **UNIX users:** Add a line to your `.cshrc` file that will source the ENVI setup file from your home directory when you log into the system. This setup will ensure that ENVI will find the files in your home directory before it finds the copies of them which are in the default installation location, where you don't have write permission. The line in your `.cshrc` file which sources the ENVI setup file should look something like this:

     ```
     source
     /usr/local/rsi/idl_5.6/products/envi_3.6/bin/envi_setup;
     setenv IDL_PATH '+/home/myusername:'$IDL_PATH
     ```

     You will need to change the home directory path, shown here as `+/home/myusername`, to your own home directory path. You may also need to change the path to the `envi_setup` file if your ENVI installation is in a location other than `/usr/local/rsi`.

See ENVI Online Help or the *ENVI User's Guide* for information on personalizing your ENVI installation.

4. You may now edit the file.

Chapter 5: Programming Reference

This chapter provides reference information for programming with the Certified NITF/NSIF Module. It covers the following topics:

ENVI_OPEN_DATA_FILE

Use this routine to open a data file. For NITF files, use the NITF keyword. For other formats, see “ENVI_OPEN_DATA_FILE” in the *ENVI Reference Guide*.

Syntax

ENVI_OPEN_DATA_FILE, *Name*

Arguments

NAME

The filename to open. The type of the file is indicated by setting the proper keyword.

Keywords

NITF (optional)

Set this keyword to specify that the file being opened is a NITF file.

R_FID (optional)

Use this keyword to specify a named variable that will contain the file ID for the opened data. This file ID can be used to access the processed data.

ENVI_OUTPUT_TO_EXTERNAL_FORMAT

Use this routine to output image data to external formats. This routine allows output of NITF and other formats. For other formats, see "ENVI_OUTPUT_TO_EXTERNAL_FORMAT" in the *ENVI Reference Guide*.

Note

NITF datasets have many properties, all of which are set for you automatically when you export an NITF file. See "Creating New NITF Files" on page 42 for a description of these default settings.

Syntax

ENVI_OUTPUT_TO_EXTERNAL_FORMAT

Keywords

DIMS

Use this keyword to specify the spatial dimensions on which to perform the operation. DIMS is a five-element array of long integers with the following definitions:

- DIMS(0): Unused for this function, set to -1.
- DIMS(1): The starting X pixel. (The first pixel is number zero.)
- DIMS(2): The ending X pixel.
- DIMS(3): The starting Y pixel. (The first pixel is number zero.)
- DIMS(4): The ending Y pixel.

FID

Use this keyword to specify the file ID for the open file. This is the value returned from the keyword R_FID in the ENVI_OPEN_FILE procedure. FID is a long integer with a value greater than zero. An invalid file ID is specified as -1.

OUT_NAME

Use this keyword to specify an output file name for the resulting data. The output file will be in the format specified by one of the following keywords, ARCVIEW, ASCII, ENVI, ERMAPPER, ERDAS, PCI or TIFF.

POS

Use this keyword to specify an array of band positions, indicating the band numbers on which to perform the operation. POS is an array of long integers, ranging from zero to the number of bands-1.

NITF (optional)

Set this keyword to specify output to an NITF formatted file.

Example Program

This sample code demonstrates the use of the ENVI_OPEN_DATA_FILE and ENVI_OUTPUT_TO_EXTERNAL_FORMAT routines. This code requires an NITF file that can be written with the ENVI NITF module (see “Creating New NITF Files” on page 42 for criteria) as input.

```
pro envi_copy_file_nitf
compile_opt idl2

  ;Allow the user to select an NITF file to open
  fname=envi_pickfile(filter='*.ntf')

  ; Open the NITF file in ENVI
  envi_open_data_file, fname, /nitf, r_fid=fid

  ; Gracefully exit if the user picked a bogus file
  if (fid eq -1) then return

  ;Query the number of samples, lines, and bands in the file
  envi_file_query, fid, ns=ns, nl=nl, nb=nb

  ; Select all bands in the file for output
  pos = lindgen(nb)

  ; Export the entire spatial extent of the dataset
  dims = [-1,0,ns-1,0,nl-1]

  ; Select the name for the new NITF dataset
  out_name = fname + '_copy.ntf'

  ; Export the NITF file, referenced by file id
  envi_output_to_external_format, /nitf,$
    fid=fid, pos=pos, dims=dims, out_name=out_name
end
```

Appendix A:
Dataset Attributes

This appendix describes the following Certified NITF/NSIF Module dataset attributes:

Dataset Attribute Tables

This chapter contains descriptions of the attributes of NITF segments derived from the NITF 2.0 and NITF 2.1 specification documents (MIL-STD-2500A and MIL-STD-2500B). Please refer to these documents (and their update NOTICEs) for complete information.

As explained in "The NITF/NSIF Format" on page 10, different versions of NITF include different dataset attributes. Where possible, we have identified those attributes associated only with a particular version of NITF.

The NITF Module's NITF Dataset Attributes viewer lists some attributes slightly differently from the way they are presented in the specification documents mentioned above. The data attribute tables presented in this appendix follow the listing of attributes in the NITF Module Dataset Attributes viewer. They differ from the specification documents in the following ways:

- NITF 2.0 symbol segments and label segments, as well as NITF 2.1 graphic segments, are classified together in the Dataset Attributes viewer as *annotation segments*.
- Tagged Record Extensions (TREs) are classified in the Data Attribute Viewer as *Tags*.

In the Dataset Attribute Tables, all of the possible attributes in each Dataset Attributes viewer container are described. Each attribute is identified by a name that appears in the Dataset Attributes viewer.

Security Attributes

Each NITF file segment (header, image segment, text segment, annotation segment) contains a security segment. The following attributes can be found in any of the Security Segment containers (File Security, Image Security, Text Security, and Annotation Security) in the NITF Dataset Attributes viewer (see "Viewing NITF Dataset Attributes" on page 55).

Attribute	Field ID	Description
Classification	SCLAS	The classification level of the entire file, image, text, or annotation. Valid values are: • T = Top Secret • S = Secret • C = Confidential • R = Restricted • U = Unclassified
(NITF 2.1) Classification System	SCLSY	The national or multinational security system used to classify the file, image, text, or annotation. National security systems: • Country Codes per FIPS 10-4 Multinational security systems: • Codes per DIAM 65-19 If this field is all spaces, it shall imply that no security classification system applies to the file, image, text, or annotation.

Table A-1: Security Attributes

Attribute	Field ID	Description
Codewords	SCODE	An indicator of the security compartments associated with the file, image, text, or annotation. Values include one or more of the tri/digraphs found in DIAM 65-19 and/or Table A-9 or Table A-10. Multiple entries shall be separated by single spaces: The selection of a relevant set of codewords is application specific. If this field is all spaces, it shall imply that no codewords apply to the file, image, text, or annotation.
Control/ Handling	SCTLH	Additional security control and/or handling instructions (caveats) associated with the file, image, text, or annotation. Values include digraphs found in DIAM 65-19 and/or Table A-9 or Table A-10. The digraph may indicate single or multiple caveats. The selection of a relevant caveat(s) is application specific. If this field is all spaces, it shall imply that no additional control and handling instructions apply to the file, image, text, or annotation.
Release Instructions	SREL	A list of country and/or multilateral entity codes that indicate to which countries and/or multilateral entities the file, image, text, or annotation is authorized for release. Country entity codes: • One or more country codes as found in FIPS 10-4 Multilateral entity codes: • Codes identifying multilateral entities as found in DIAM 65-19. If this field is all spaces, it shall imply that no release instructions apply.

Table A-1: Security Attributes (Continued)

Attribute	Field ID	Description
(NITF 2.1) Declassification Type	SDCTP	The type of security declassification or downgrading instructions which apply to the file, image, text, or annotation. Valid values are: • DD = declassify on a specific date • DE = declassify upon occurrence of an event • GD = downgrade to a specified level on a specific date • GE = downgrade to a specified level upon occurrence of an event • O = OADR • X = exempt from automatic declassification If this field is all spaces, it shall imply that no security declassification or downgrading instructions apply.
(NITF 2.1) Declassification Date	SDCDT	The date on which the file, image, text, or annotation is to be declassified if the value in the Declassification Type attribute is DD. If this field is all spaces, it shall imply that no declassification date applies.
(NITF 2.1) Declassification Exemption	SDCXM	The reason the file, image, text, or annotation is exempt from automatic declassification, if the value in the Declassification Type attribute is X. Valid values are X1 through X8 and X251 through X259. X1 through X8 correspond to the declassification exemptions found in DOD 5200.1-R, paragraphs 4-202b(1) through (8) for material exempt from the 10-year rule. X251 through X259 correspond to the declassification exemptions found in DOD 5200.1-R, paragraphs 4-301a(1) through (9) for permanently valuable material exempt from the 25-year declassification system. If this field is all spaces, it shall imply that a declassification exemption does not apply.

Table A-1: Security Attributes (Continued)

Attribute	Field ID	Description
(NITF 2.1) Downgrade Level	SDWNG	The classification level to which a file, image, text, or annotation is to be downgraded, if the values in the Declassification Type attribute are GD or GE. Valid values are S (=Secret), C (=Confidential), R (= Restricted). If this field is all spaces, it shall imply that security downgrading does not apply.
(NITF 2.0) Downgrade	SDG	An indicator that designates the time at which a declassification or downgrading action is to take place. The valid values are (1) the calendar date in the format YYMMDD, (2) the code "999999" when the originating agency's determination is required (OADR), and (3) the code "999998" when a specific event determines at what point in time declassification or downgrading is to take place. If this field is all spaces, it shall imply that no image security downgrade condition applies.
(NITF 2.1) Downgrade Date	SDGDT	The date on which a file, image, text, or annotation is to be downgraded, if the value in the Declassification Type attribute is GD. If this field is all spaces, it shall imply that a security downgrading date does not apply.
(NITF 2.0) Downgrade Event	SDEVT	If the Downgrade attribute equals "999998," this attribute contains a valid specification of the downgrade event. If this attribute contains all spaces, it implies that an error exists. Valid values for the event specification are determined by the application.
(NITF 2.1) Classification Text	SCLTX	Additional information about file, image, text, or annotation classification to include identification of a declassification or downgrading event if the values in Declassification Type are DE or GE. This field may also be used to identify multiple classification sources and/or any other special handling rules. Values are user-defined free text. If this field is all spaces, it shall imply that additional information about classification does not apply.

Table A-1: Security Attributes (Continued)

Attribute	Field ID	Description
(NITF 2.1) Classification Authority Type	SCATP	The type of authority used to classify the file, image, text, or annotation. Valid values are: • O = original classification authority • D = derivative from a single source • M = derivative from multiple sources If this field is all spaces, it shall imply that classification authority type does not apply.
Classification Authority	SCAUT	The classification authority for the file, image, text, or annotation dependent upon the value in Classification Authority Type. Values are user-defined free text, and should contain the following information: • Original classification authority name and position or personal identifier if the value in the Classification Authority Type attribute is O. • Title of the document or security classification guide used to classify the file, image, text, or annotation if the value in the Classification Authority Type attribute is D. • Derive-Multiple if the file, image, text, or annotation classification was derived from multiple sources. In this case, the originator will maintain a record of the sources used in accordance with existing security directives. One of the multiple sources may also be identified in the Classification Text attribute, if desired. If this field is all spaces, it shall imply that no classification authority applies.

Table A-1: Security Attributes (Continued)

Attribute	Field ID	Description
(NITF 2.1) Classification Reason	SCRSN	The reason for classifying the file, image, text, or annotation. Valid values are A through G. These correspond to the reasons for original classification per E.O. 12958, Section 1.5.(a) through (g). If this field is all spaces, it shall imply that no classification reason applies.
(NITF 2.1) Security Source Date	SSRDT	The date of the source used to derive the classification of the file, image, text, or annotation. In the case of multiple sources, the date of the most recent source shall be used. If this field is all spaces, it shall imply that a security source date does not apply.
Control Number	SCTLN	The security control number associated with the file, image, text, or annotation. The format of the security control number shall be in accordance with the regulations governing the appropriate security channel(s). If this field is all spaces, it shall imply that no security control number applies.

Table A-1: Security Attributes (Continued)

NITF File Header Attributes

Each NITF file begins with a file header, whose fields contain identification and origination information, file-level security information, and the number and size of segments of each type, such as image segment(s), annotation segments(s), and text segment(s), contained in the file. The following attributes can be found in the NITF File Header container in the NITF Dataset Attributes viewer (see “Viewing NITF Dataset Attributes” on page 55). .

Attribute	Field ID	Description
File name	FILE_NAME	The name of the NITF file.
File Type	VERSION	The NITF version of the file: NITF 1.1, 2.0, or 2.1.
Complexity Level	CLEVEL	A code used in the file header which indicates the degree of complexity an interpret implementation needs to support to adequately interpret the files. NITF 2.0 values: 01, 02, 03, 04, 05, 06. NITF 2.1 values: 03, 05, 06, 07. Items that differentiate complexity include: number of image segments, number of symbol segments, number of text segments, size of the common coordinate system, and size of image data. See MIL-STD-2500B NOTICE 2 and MIL-STD-2500A for value details.
Standard Type	STYPE	NITF 2.0: System type or capability. This field is reserved for future use and shall be filled with spaces. NITF 2.1:Standard type or capability. A character string that indicates that this file is formatted using ISO/IEC 12087-5.
Originating Station ID	OSTAID	The identification code or name of the organization, system, station, or product that originated this file. This field should not be left blank.

Table A-2: File Header Attributes

Attribute	Field ID	Description
File Date and Time	FDT	The date and time of the file's origination. UTC (Zulu) is assumed to be the time zone designator to express the time of day. NITF 2.0: DDHHMMSSZMONYY, NITF 2.1: CCYYMMDDhhmmss.
File Title	FTITLE	File Title. This field contains the title of the file or is filled with spaces.
File Security	FILE_SECURITY	See Table A-1.
Encryption	ENCRYP	The value of this attribute is always zero.
File Copy Number	FSCOP	The copy number of the file. NITF 2.1: If this field is all zeros, it shall imply that there is no tracking of number file copies.
Number of File Copies	FSCPYS	The total number of copies of the file. NITF 2.1: If this field is all zeros, it shall imply that there is no tracking of numbered file copies.
File Background Color	FBKGC	The three color components of the file background in the order Red, Green, Blue, where (0x00, 0x00, 0x00) is black and (0xFF, 0xFF, 0xFF) is white.
Originator's Name	ONAME	The name of the operator who originated the file. If the field is all spaces, it indicates that no operator is assigned responsibility for origination.
Originator's Phone	OPHONE	The phone number for the operator who originated the file. If the field is all spaces, it indicates that no phone number is available for the operator assigned responsibility for origination.
File Length	FL	The length in bytes of the entire file, including all headers, subheaders, and data.
Header Length	HL	The length in bytes of the NITF file header.

Table A-2: File Header Attributes (Continued)

Attribute	Field ID	Description
Number of Images	NUMIMG	The number of separate image items included in the file. This field shall be zeros if and only if no images are included in the file.
Number of Text Segments	NUMTEXT	The number of separate text items included in the file. This field shall be zeros if and only if no text items are included in the file.
Number of Annotation Segments	NUMANNO	The number of label and symbol segments in the file.
Number of Tags	NUMTAGS	The number of tags in the file.

Table A-2: File Header Attributes (Continued)

Image Segment Attributes

Image Segments contain information regarding an image contained within the NITF file. An NITF file can contain multiple image segments. The following attributes can be found in the Image Segment container in the NITF Dataset Attributes viewer (see "Viewing NITF Dataset Attributes" on page 55).

Attribute	Field ID	Description
Image ID1	IID1	The alphanumeric identification code associated with the image.
Image Date and Time	IDATIM	The time of the image acquisition. UTC (Zulu) is assumed to be the time zone designator to express the time of day. NITF 2.0: DDHHMMSSZMONYY, NITF 2.1: CCYYMMDDhhmmss
Target ID	TGTID	The identification of the primary target in the format, BBBBBBBBBBFFFFFCC, consisting of ten characters of BE (Basic Encyclopedia) identifier, followed by five characters of functional category code, followed by the two character country code as specified in FIPS PUB 10-4.
Image ID2	IID2	The identification of additional information about the image.
Image Title	ITITLE	Image title.
Image Security		See Table A-1.
Encryption	ENCRYP	The value of this attribute is always zero.
Image Source	ISORCE	A description of the source of the image. If the source of the data is classified, then the description shall be preceded by the classification, including codeword(s) contained in Table A-9 or Table A-10. If this field is all spaces, it shall imply that no image source data applies.

Table A-3: Image Segment Attributes

Attribute	Field ID	Description
Number of Rows	NROWS	The total number of rows of significant pixels in the image. When NPPBV*NBPC > NROWS, the remaining last rows (NPPBV*NBPC - NROWS) shall contain fill data (that is, only the rows indexed 0 through NROWS -1 of the image contain “significant” data).
Number of Columns	NCOLS	The total number of columns of significant pixels in the image. When NPPBH*NBPR > NCOLS, the remaining last pixels of each column (NPPBH*NBPR - NCOLS) shall contain fill data (that is, only the columns indexed 0 through NCOLS -1 of the image contain “significant” data).
Pixel Value Type	PVTYPE	The type of computer representation used for the value for each pixel for each band in the image. Valid entries are: • B = bi-level • SI = 2’s complement signed integer • R = real • C = complex The data bits of INT and SI values appear in the file in order of significance, beginning with the MSB and ending with the LSB. INT and SI data types are limited to 16 bits. R values are represented as 32-bit floating point. C values are represented as Real and Imaginary parts, each represented as 32-bit floating point and appearing in adjacent four-byte blocks, first Real, then Imaginary. B (bi-level) pixel values are represented as single bits with value 1 or 0.

Table A-3: Image Segment Attributes (Continued)

Attribute	Field ID	Description
Image Representation	IREP	An indicator for the general kind of image represented by the data. (NITF 2.0) Valid representation indicators are: • MONO = monochrome • RGB = red, green, or blue true color • RGB/LUT = mapped color • MULTI = multiband imagery • YCbCr601 = compressed in the CCIR 601 color space using JPEG (if IC field = C3) (NITF 2.1) Valid representation indicators are: • MONO = monochrome • RGB = red, green, or blue true color • RGB/LUT = mapped color • 1D = monoband data • 2D = two dimensional data • ND = multidimensional data • MULTI = multiband imagery • NODISPLY = an image not intended for display • NVECTOR and POLAR = vectors with Cartesian and polar coordinates respectively • VPH = Synthetic Aperture Radar (SAR) Video Phase History. • YCbCr601 = compressed in the ITU-R Recommendation BT.601-5 color space using JPEG (if IC field = C3, C5, or I1) This field should be used in conjunction with the ICAT, ISUBCATnn, and IREPBANDnn fields to interpret the significance of each band in the image.

Table A-3: Image Segment Attributes (Continued)

Attribute	Field ID	Description
Image Category	ICAT	An indicator of the specific category of image, raster or grid data. Used in conjunction with the IREP, ISUBCATnn, and IREPBANDnn fields to interpret the significance of each band in the image. (NITF 2.0) Valid categories are: • VIS: visible imagery (default) • MAP: maps • SAR: synthetic aperture radar • IR: infrared • MS: multispectral • FP: fingerprints • MRI: magnetic resonance imagery • XRAY: x-rays • CAT: cat scans.

Table A-3: Image Segment Attributes (Continued)

Attribute	Field ID	Description
Image Category (cont'd)	`ICAT (cont'd)`	(NITF 2.1) Valid categories include: • VIS: visible imagery • SL: side-looking radar • TI: thermal infrared • FL: forward looking infrared • RD: radar • EO: electro-optical • OP: optical • HR: high resolution radar • HS: hyperspectral • CP: color frame photography • BP: black/white frame photography • SAR: synthetic aperture radar • SARIQ: SAR radio hologram • IR: infrared • MS: multispectral • FP: fingerprints • MRI: magnetic resonance imagery • XRAY: x-rays • CAT: CAT scans • VD: video.

Table A-3: Image Segment Attributes (Continued)

Attribute	Field ID	Description
Image Category (cont'd)	ICAT (cont'd)	Valid categories for geographic products or geo-reference support data: • MAP for raster maps • PAT for color patch • LEG for legends • DTEM for elevation models • MATR for other types of matrix data • LOCG for location grids. This field should be used in conjunction with the IREP, ISUBCATnn, and IREPBANDnn fields to interpret the significance of each band in the image.
Actual Bits per Pixel	ABPP	The number of "significant bits" for the value in each band of each pixel without compression. Even when the image is compressed, ABPP contains the number of significant bits per pixel that were present in the image before compression. This field is less than or equal to Number of Bits Per Pixel (field NBPP). The number of adjacent bits within each NBPP is used to represent the value. These "representation bits" are left justified or right justified within the NBPP field, according to the value in the PJUST field. For example, if 11-bit pixels are stored in 16 bits, their field contains 11 and NBPP contains 16. The default number of "significant bits" (if this field is all zeros) is the value contained in NBPP.
Pixel Justification	PJUST	When ABPP is not equal to NBPP, this field indicates whether the significant bits are left justified (L) or right justified (R). Nonsignificant bits in each pixel shall contain the value 0. Right justification is recommended.

Table A-3: Image Segment Attributes (Continued)

Attribute	Field ID	Description
Image Coordinate System	ICORDS	(NITF 2.0) Code indicating the geo-referenced coordinate system for the image. The valid values for this field are: • U = UTM expressed in Military Grid Reference System (MGRS) form • G = Geodetic (Geographic) • C = Geocentric • N = None. (NITF 2.1) Code indicating the type of coordinate system used for providing an approximate location of the image in the Image Geographic Location field (IGEOLO). The valid values for this field are: • U = UTM expressed in Military Grid Reference System (MGRS) form • N = UTM (Northern hemisphere) • S = UTM (Southern hemisphere) • G = GEOGRAPHIC • D = Decimal degrees

Table A-3: Image Segment Attributes (Continued)

Attribute	Field ID	Description
Image Geographic Location	IGEOLO	(NITF 2.0) If the Image Coordinate System field ICORDS value is not N, this field shall contain a valid geographic location, in terms of corner locations, of the image in the coordinate system specified in the ICORDS field. The locations of the four corners of the (significant) image data shall be given in image coordinate order: (0,0), (0, MaxCol), (MaxRow, MaxCol), (MaxRow, 0). MaxCol and MaxRow shall be determined from the values contained, respectively, in NCOLS and NROWS as MaxCol = NCOLS - 1 and MaxRow = NROWS - 1. Valid corner locations in geodetic and geocentric coordinates shall be expressed as latitude and longitude. The format ddmmssX represents degrees, minutes, and seconds of latitude with X = N or S for north or south, and dddmmssY represents degrees, minutes, and seconds of longitude with Y = E or W for east or west, respectively. For the UTM coordinate system, coordinates shall be expressed in UTM grid coordinates (also known as Military Grid Reference System (MGRS) coordinates) to the accuracy indicated by the Value Range specification. A description of UTM Grid Coordinates can be found in Technical Manual No. 5-241-1 of the Department of the Army, GRIDS and GRID REFERENCES, 1983. (NITF 2.1) Approximate geographic location, in terms of corner locations, of the image in the coordinate system specified in the Image Coordinate Representation attribute. Coordinates shall be populated to the precision of the corner coordinates. Non significant digits of the field shall be replaced with blanks (for example: “ddmm Xdddmm Yddmm Xdddmm Yddmm Xdddmm Yddmm XdddmmY”).

Table A-3: Image Segment Attributes (Continued)

Attribute	Field ID	Description
Image Geographic Location (cont'd)	IGEOLO (cont'd)	The locations of the four corners of the (significant) image data shall be given in image coordinate order: (0,0), (0, MaxCol), (MaxRow, MaxCol), (MaxRow, 0). MaxCol and MaxRow shall be determined from the values contained, respectively, in NCOLS and NROWS as MaxCol = NCOLS -1 and MaxRow = NROWS -1. Valid corner locations in geographic coordinates shall be expressed as latitude and longitude. The format ddmmssX represents degrees, minutes, and seconds of latitude with X = N or S for north or south, and dddmmssY represents degrees, minutes, and seconds of longitude with Y = E or W for east or west, respectively. For the UTM coordinate system, coordinates shall be expressed either in plain UTM coordinates or using MGRS. Plain UTM coordinates use the format zzeeeeeennnnnnn where "zz" represents the UTM zone number, and "eeeeee," "nnnnnnn" represent Easting and Northing. UTM expressed in MGRS use format zzBJKeeeeennnnn where "zzBJK" represents the zone, band and 100 km x 100 km area within the zone and "eeeee," "nnnnn" represent residuals of Easting and Northing. Decimal degrees are expressed as ±dd.ddd±ddd.ddd (four times) where ±dd.ddd equals latitude ("+"=northern hemisphere, "-" = southern hemisphere) and ±ddd.ddd = longitude ("+" = eastern hemisphere, "-" = western hemisphere). (Null if not calculable.)

Table A-3: Image Segment Attributes (Continued)

Attribute	Field ID	Description
Image Geographic Location (cont'd)	IGEOLO (cont'd)	Note - Values are provided only to the decimal places (precision) warranted by the sources and methods used to determine the location. The remaining places will be blank. There is no implied accuracy associated with the data in this field. Additional precision for geospatial or geo-referencing applications can be found in geospatial related extensions if present in the file.
	CORNERS	The four corners of the image, as determined by the Image Geographic Location.
	CELLSIZE	Pixel size of the image, as determined by the Image Geographical Location.
Number of Image Comments	NICOM	The number of 80 character blocks (ICOMn) that follow to be used as free text image comments.
Image Comments		Image Comment *#N*: "*(Comment)*" Image Comments contain free-form text. They are intended for use as a single comment block. If the image comment is classified, it is preceded by the classification, including codeword(s). This field is omitted if the value in the NICOM field is 0.

Table A-3: Image Segment Attributes (Continued)

Attribute	Field ID	Description
Image Compression	IC	Code indicating the form of compression used in representing the image data. Values for this field are: • C1: Bi-level. • C3: JPEG. • C4: Vector Quantization. • C5: Lossless JPEG. • I1: Down sampled JPEG. • NC: The image is not compressed. • M1, M3, M4, and M5: Compressed images. • NM: Uncompressed images indicating an image that contains a block mask and/or a transparent pixel mask. The format of a mask image is identical to the format of its corresponding non-masked image except for the presence of an Image Data Mask at the beginning of the image data area. The format and structure of the Image Data Mask are shown in MIL-STD-2500B NOTICE 2 and MIL-STD-2500A. The definitions of the compression schemes associated with codes C1/M1, C3/M3, C4/M4, and C5/M5 are given, respectively, in ITU-T T-4, AMD2 08/95, MIL-STD-188-198A, MIL-STD-188-199, and NIMA N0106-97. C1=ITU-T T-4 AMD2 08/95, C3=MIL-STD-188-198A, C4= MIL-STD-188-199, and C5= NIMA N0106-97. (NITF 2.1) C6 and M6 are reserved values that will represent a future correlated multi-component compression algorithm. C7 and M7 are reserved values that will represent a future complex SAR compression. C8 and M8 are reserved values that will represent the future ISO standard compression JPEG 2000.

Table A-3: Image Segment Attributes (Continued)

Attribute	Field ID	Description
Compression Rate Code	COMRAT	If the Image Compression attribute contains, C1, C4, M1, or M4, this field is present and contains a code indicating the compression rate for the image. If the value in IC is C1 or M1, the valid codes are 1D, 2DS, and 2DH, where: • 1D represents One-dimensional Coding • 2DS represents Two-dimensional Coding Standard Vertical Resolution (K=2) • 2DH represents Two-dimensional Coding High Vertical Resolution (K=4) (NITF 2.0) Zero is used for the Y value when custom Q-Tables are used. Explanation of these codes can be found in MIL-STD-188-196. Explanation of the compression rate for vector quantization can be found in MIL-STD-188-199. Valid codes in this case are 0.75, 1.40, 2.30, and 4.50. If the value in IC is C3 or M3, this field is used to identify the default quantization table(s) used by the JPEG compression algorithm. In this case, the format of this field is XX.Y where XX is the image data type (00 = general purpose, 01 through 99 are reserved), and Y represents the quality level 1 through 5. Explanation of these codes can be found in MIL-STD-188-198A. If the value in IC is C4 or M4, this field shall contain a value given in the form n.nn representing the number of bits-per-pixel for the compressed image. Explanation of the compression rate for vector quantization can be found in MIL-STD-188-199. This field is omitted if the value in IC is NC or NM. If the value in IC is C5, M5, this field is used to identify the lossless JPEG algorithm. If the value in IC is I1, this field is used to identify the down sampled JPEG algorithm. Explanation of the compression rates for lossless and down sampled JPEG can be found in NIMA N0106-97.

Table A-3: Image Segment Attributes (Continued)

Attribute	Field ID	Description
Compression Rate Code (cont'd)	COMRAT (cont'd)	(NITF 2.1) If the Image Compression attribute contains, C1, C4, M1, or M4, this field is present and contains a code indicating the compression rate for the image. If the value in IC is C1 or M1, the valid codes are 1D, 2DS, and 2DH, where: • 1D represents One-dimensional Coding • 2DS represents Two-dimensional Coding Standard Vertical Resolution (K=2) • 2DH represents Two-dimensional Coding High Vertical Resolution (K=4) Explanation of these codes can be found in ITU-T T.4, AMD2. If the value in IC is C3, M3, C5, M5, or I1, the value of the field shall identify the embedded quantization table(s) used by the JPEG compression algorithm. In this case, the format of this field is XX.Y where XX is the image data type, and Y represents the quality level 1 to 5. The image data types are represented by: • 00 represents General Purpose • 01 represents VIS • 02 represents IR • 03 represents SAR • 04 represents Downsample (DS) JPEG Explanation of the optimized tables can be found in MIL-STD-188-198A and NIMA N0106-97. The value of Y shall be 0 if customized tables are used. It is optional but highly recommended that the value of XX still be used for the image type with customized tables.

Table A-3: Image Segment Attributes (Continued)

Attribute	Field ID	Description
Compression Rate Code (cont'd)	COMRAT (cont'd)	If the value of IC is C5 or M5, then the value of Y shall be 0. It is optional but highly recommended that the value of XX still be used for the image type. If the value in IC is C4 or M4, this field shall contain a value given in the form nn.n representing the number of bits-per-pixel for the compressed image. Explanation of the compression rate for vector quantization can be found in MIL-STD-188-199. This field is omitted if the value in IC is NC or NM.
	J2K_R_LEVELS	Number of JPEG 2000 Reduced Resolution Layers.
Number of Bands	NBANDS	The number of data bands and multi-spectral bands within the specified image. This field and the Image Representation attribute are interrelated and independent of the Image Mode attribute. The corresponding values for (IREP, NBANDS) are (MONO, 1); (RGB, 3); (RGB/LUT, 1); (YCbCr601, 3); (MULTI, 2-9); and 0 for multi-spectral images with greater than 9 bands. For 1D, 2D, and ND, NBANDS reflects the number of components at each data point. When NBANDS contains the value 0, this field shall contain the number of bands comprising the multi-spectral image.
Band *N*		See Table A-4.
Image Sync Code	ISYNC	The value of this attribute is always zero.

Table A-3: Image Segment Attributes (Continued)

Attribute	Field ID	Description
Image Mode	IMODE	(NITF 2.0) This field shall contain an indicator of whether the image bands are stored in the file sequentially or interleaved (by block or pixel). Valid values are: B: Band Interleaved by Block P: Band Interleaved by Pixel S: Band Sequential The significance of the IMODE value must be interpreted with the knowledge of whether the image is JPEG compressed (IC=C3, C5, I1, M3, or M5), Vector Quantization (VQ) compressed (IC=C4 or M4), or uncompressed (IC=NC or NM). When IC=C1 , the use of IMODE is undefined. The interpretation of these values of IMODE for this case is specified in Paragraph 5.2.3.3 of the NITFS document, MIL-STD-188-198A. For details, see MIL-STD-2500A, Notice 3. (NITF 2.1) An indicator of whether the image bands are stored in the file sequentially, band interleaved by block, band interleaved by pixel format, or band interleaved by row. Valid values are: • B: Band Interleaved by Block. • P: Band Interleaved by Pixel. • R: Band Interleaved by Row. • S: Band Sequential. The significance of the IMODE value must be interpreted with the knowledge of whether the image is JPEG compressed (IC=C3, C5, M3, or M5), VQ compressed (IC=C4 or M4), or uncompressed (IC=NC or NM).

Table A-3: Image Segment Attributes (Continued)

Attribute	Field ID	Description
Image Mode (cont'd)	IMODE (cont'd)	Uncompressed: • S indicates band sequential, where all blocks for the first band are followed by all blocks for the second band, and so on. • B indicates band interleaved by block. This implies that within each block, the bands follow one another. • P indicates band interleaved by pixel within each block: such that, for each block, one after the other, the full pixel vector (all band values) appears for every pixel in the block, one pixel after another, the block column index varying faster than the block row index. • R indicates band interleaved by row. The ordering mechanism for this case stores the pixel values of each band in row sequential order. JPEG-compressed: • The presence of B, P, or S implies specific ordering of data within the JPEG image data representation. For this case the interpretation of the various values of the IMODE field is specified in MIL-STD-188-198A. When IC contains I1, IMODE contains B. Vector Quantization compressed: • VQ compressed images are normally either RGB with a color look-up table or monochromatic. In either case, the image is single band, and the IMODE field defaults to B. Bi-Level Compressed: • When the value of the IC field is C1 or M1, the value of the IMODE field is B.

Table A-3: Image Segment Attributes (Continued)

Attribute	Field ID	Description
Number of Blocks per Row	NBPR	The number of image blocks in a row of blocks in the horizontal direction. If the image consists of only a single block, this field shall contain the value one.
Number of Blocks per Column	NBPC	The number of image blocks in a column of blocks in the vertical direction. If the image consists of only a single block, this field shall contain the value one.
Pixels per Block Horizontal	NPPBH	The number of pixels horizontally in each block of the image. NBPR*NPPBH ≥ NCOLS.
Pixels per Block Vertical	NPPBV	The number of pixels vertically in each block of the image. NBPC*NPPBV ≥ NROWS.
Bits per Pixel	NBPP	If the Image Compression attribute contains NC, NM, C4, or M4, this field shall contain the number of storage bits used for the value from each component of a pixel vector. The value in this field is always greater than or equal to Actual Bits Per Pixel (ABPP).
Display Level	DLVL	A value that indicates the graphic display level of the image relative to other displayed file components in a composite display. The valid values are 001 to 999. The display level of each displayable file component (image or graphic) within a file shall be unique; that is, each number from 001 to 999 is the display level of, at most, one item. The meaning of display level is illustrated in “Display Levels” on page 17. The image or graphic component in the file having the minimum display level shall have attachment level 0.
Attachment Level	ALVL	A value that indicates the attachment level of the image. Valid values for this field are 0, and the display level value of any other image or graphic in the file. The image, graphic, or text component in the file having the minimum display level shall have attachment level 0.

Table A-3: Image Segment Attributes (Continued)

Attribute	Field ID	Description
Image Location	LOC	The location of the first pixel of the first line of the image. This field shall contain the image location represented as rrrrrccccc, where rrrrr and ccccc are the row and column offset from the ILOC or SLOC value of the item to which the image is attached. A row or column value of 00000 indicates no offset. Positive row and column values indicate offsets down and to the right and range from 00001 to 99999, while negative row and column values indicate offsets up and to the left and must be within the range -0001 to -9999. The location in the common coordinate system of all displayable graphic components can be computed from the offsets given in the ILOC and SLOC fields.
Image Magnification	IMAG	The magnification (or reduction) factor of the image relative to the original source image. Decimal values are used to indicate magnification, and decimal fraction values indicate reduction. For example, “2.30” indicates the original image has been magnified by a factor of “2.30,” while “0.5” indicates the original image has been reduced by a factor of 2. The default value is 1.0, indicating no magnification or reduction. In addition, the following values shall be used for reductions that are reciprocals of nonnegative powers of 2: /2 (for 1/2), /4 (for 1/4), /8 (for 1/8), /16 (for 1/16), /32 (for 1/32), /64 (for 1/64), /128 (for 1/128).
Image Mask Present	HAS_MASK	If an Image Mask is present, the value of this attribute is 1. Otherwise, it is 0.
	MASK_VALUE	Values of those pixels in the image that contain data that is not valid or meaningful and should therefore be transparent.
Number of Tags	NUMTAGS	The number of tags contained in this image segment.

Table A-3: Image Segment Attributes (Continued)

Band Attributes

Each image segment contains a single image of one or more bands of data (NITF 2.0 allows up to nine bands of data in an image, and NITF 2.1 allows up to 999 bands). Band attributes can be found in the Band container in the NITF Dataset Attributes viewer (see "Viewing NITF Dataset Attributes" on page 55). .

Attribute	Field ID	Description
Band Representation	IREPBAND	When NBANDS contains the value 1, this field shall contain all spaces. In all other cases, this field shall contain a valid indicator of the interpretation of the *nn*th band. The band number is a positive integer when IREP contains MULTI. In all other cases, the use of this field is user defined. If the IREP field contains the value 2D, this field may contain LX or LY. However, its purpose is to provide the significance of the *nn*th band of the image with regard to the general image type as recorded in IREP. The significance of each band in the image can be derived from the combination of the IREP, IREPBANDnn, ICAT, and ISUBCATnn fields. (NITF 2.0) • If IREP = Mono, IREPBAND1 = 2 spaces and NBANDS=1 • If IREP = RGB then IREPBAND1 = R or G or B and IREPBANDn = R or G or B and NBANDS = 3 • IF IREP = RGB/LUT then IREPBAND1 = LU and NBANDS = 1 • If IREP = YcbCr then IREPBAND1 = Y and IREPBANDn = CB then Cr and NBANDS = 3 • If IREP = MULTI the valid values are user defined.

Table A-4: Band Attributes

Attribute	Field ID	Description
Band Representation (cont'd)	IREPBAND (cont'd)	(NITF 2.1) The following standard values shall apply: • R, G, B respectively for a Red, Green, Blue representation of the band, • LU for a LUT representation of the band (e.g., a three table LUT for RGB and a single table LUT for shades of grey), • M for a monochrome representation of the band, spaces for a band not designated for display, but may be displayed if desired, • Y, Cb, Cr respectively for the Luminance, Chrominance (blue), and Chrominance (red) representation of a YCbCr601 (compressed case only) image, The only valid values when IREP contains MULTI are M, R, G, B, and LU: • It is strongly recommended that 3 of the multiple bands have the IREPBANDn fields populated with R, G, and B. • When bands marked as LU, R, G, B, and M are present, the RGB designated bands are the default bands for display. If R, G, B are not present, the default displayable band is the LU band. If R, G, B, or LU are not present, the default displayable band is the first M band. When no bands are marked with LU, R,G, B, or M the first three bands may be displayed as R, G, and B respectively. For consistency, multispectral images cannot have more than one band, each marked as R, G, and B.

Table A-4: Band Attributes (Continued)

Attribute	Field ID	Description
Band Representation (cont'd)	IREPBAND (cont'd)	• IREPBANDn shall be filled with the M value, if the band is to be represented as monochrome. • IREPBANDn shall be filled with the LU value, if the band is to be represented using a LUT. • When IREPBANDn is filled with spaces, no specific representation is defined for the band, but it may be displayed if desired. Additional values are reserved for specific interpretations and shall be coordinated with the Custodian to regulate their use. • The only valid values when IREP contains MONO images is M or spaces. • The only valid values when IREP contains RGB images are R, G and B. • The only valid value when IREP contains RGB/LUT images is LU. • The only valid values when IREP contains YCbCr601 images are Y, Cb and Cr.

Table A-4: Band Attributes (Continued)

Attribute	Field ID	Description
Band Subcategory	ISUBCAT	This attribute is repeated for each band. The use of this attribute is user-defined except for the location grids and matrix data. Its purpose is to provide the significance of the *nn*th band of the image with regard to the specific category (ICAT) of the overall image. An example would be the wave length of IR imagery. For location grids, the number of bands is strictly equal to 2; consequently, there are only 2 fields ISUBCAT1 and ISUBCAT2. Standard values of these fields for the Location grids are either ISUBCAT1 = CGX and ISUBCAT2 = CGY for the cartographic X (Easting) and Y (Northing) bands, or ISUBCAT1 = GGX, and ISUBCAT2 = GGY, for the geographic X (longitude), and Y (latitude) bands. Candidate values for the matrix data should be taken from STANAG 7074 (DIGEST) part 4 annex B.

Table A-4: Band Attributes (Continued)

Attribute	Field ID	Description
Image Type	ITYPE	(NITF 1.1) Type of image: • BW: Black and white. • TV • SAR • XRAY • MS: Multispectral. Can include additional designators such as TM7 (Themic Mapper Band 7). • FAX: Facsimile • IR. Can include wavelength, e.g., IR1.06. • RGB (including Pseudocolor) • CMY • YIQ • A: Alpha channel (transparency)
Image Filter Condition	IFC	This attribute contains the value N (to represent none). Other values are reserved for future use.
Image Filter Code	IMFLT	This attribute is always filled with spaces.
Number of LUTs	NLUTS	The number of look-up tables associated with the *nn*th band of the image. Use of the look-up tables is user defined in all cases after the first band.
Elements in each LUT	NELUT	The number of entries in each of the look-up tables for the *nn*th band of data. This field shall be omitted if the value in NLUTS*nn* is zero.

Table A-4: Band Attributes (Continued)

Annotation Segment Attributes

Annotation Segment containers in the NITF Dataset Attributes viewer comprise NITF 2.0 symbol segment and label segment attributes as well as NITF 2.1 graphic segment attributes. The following attributes can be found in the Annotation Segment container in the NITF Dataset Attributes viewer (see "Viewing NITF Dataset Attributes" on page 55).

Attribute	Field ID	Description
File Part Type	FILE_PART_TYPE	Part type of this annotation: • SY = Symbol • LA = Label
Annotation ID	ANNO_ID	Alphanumeric identification code associated with the symbol or label. The valid codes are determined by the application.
Annotation Name	ANNO_NAME	Alphanumeric name for the symbol or label.
Annotation Security	P_SEC	See Table A-1.
Encryption	ENCRYP	The value of this attribute is always zero.
Annotation Type	ANNO_TYPE	Type of this annotation segment: • B = Bitmap • C = CGM • O = Object • L = Label

Table A-5: Annotation Segment Attributes

Attribute	Field ID	Description
Annotation Display Level	DLVL	Display level of the symbol or label relative to other displayed file components in a composite display. The valid values are 001 to 999. The display level of each displayable file component (image or graphic) within a file is unique; that is, each number from 001 to 999 is the display level of, at most, one item. The graphic or image component in the file having the minimum display level has attachment level 0.
Annotation Attachment Level	ALVL	Attachment level of the symbol or label. Valid values for this field are 0 and the display level value of any other image or graphic in the file. The graphic or image component in the file having the minimum display level has attachment level 0.
Annotation Location	LOC	Location specified by providing the location of a point bearing a particular relationship to the symbol or label. For a CGM graphic, the point is the Virtual Device Coordinate (VDC) origin as defined in ISO/IEC 8632-1. This field contains the graphic location represented as rrrrrccccc, where rrrrr and ccccc are the row and column offset from the ILOC or SLOC value of the item to which the graphic is attached. A row and column value of 00000 indicates no offset. Positive row and column values indicate offsets down and to the right and range from 00001 to 99999, while negative row and column values indicate offsets up and to the left and must be within the range -0001 to -9999. The location in this common coordinate system of all displayable graphic components can be computed from the offsets given in the ILOC and SLOC fields.
Annotation Size	SIZE	Dimensions of the annotation. Unique measurement used by the NITF/NSIF Module.

Table A-5: Annotation Segment Attributes (Continued)

Attribute	Field ID	Description
Number of Annotation Objects	NUMOBJECTS	Number of annotation objects contained within this annotation segment.
Number of Tags	NUMTAGS	Number of tags contained within this annotation segment.
Annotation Object		See Table A-6.

Table A-5: Annotation Segment Attributes (Continued)

Annotation Object Attributes

Each annotation segment contains one or more annotation objects. NITF 2.1 annotation segments are limited to one CGM annotation object. NITF 2.0 annotation objects can be text, line, arrow, polygon, ellipse, or bitmap objects, and the type of object determines which fields will be included in the annotation object. The following attributes can be found in the annotation object container in the NITF Dataset Attributes viewer (see "Viewing NITF Dataset Attributes" on page 55).

Attribute	Field ID	Description
Type	TYPE	Representation type of the symbol or label: • TEXT • LINE • ARROW • POLYGON • POLYGON SET • ELLIPSE • BITMAP
Text	TEXT_STRING	For TEXT objects, the text data contained in this object.
Text Height	TEXT_HEIGHT	For TEXT objects, the cell height of this object.
Font	TEXT_FONT	For TEXT objects, name of the font used for this annotation object.
Text Color	TEXT_COLOR	For TEXT objects, the RGB value of the text color of this annotation object.
Text Background Color	TEXT_BG_COLOR	For TEXT objects, the RGB value of the text background color of this annotation object.
Line Color	LINE_COLOR	For LINE or ARROW objects, the RGB value of the line color of this annotation object.

Table A-6: Annotation Object Attributes

Attribute	Field ID	Description
Line Style (NITF 2.1)	LINE_STYLE	For LINE or ARROW objects, the CGM line type. The valid values are: • 1 = solid • 2 = dashed • 3 = dotted • 4 = dash-dot • 5 = dash-dot-dot
Line Width (NITF 2.1)	LINE_WIDTH	For LINE or ARROW objects, the CGM line width.
	ARROW_HEAD_ANGLE	For ARROW objects, the angle of the arrowhead.
	ARROW_HEAD_LENGTH	For ARROW objects, the length of the arrowhead.
Fill Color	FILL_COLOR	For POLYGON, POLYGON SET or ELLIPSE objects, the RGB value of the fill color of this annotation object.
Fill Style	FILL_STYLE	For POLYGON, POLYGON SET or ELLIPSE objects, the CGM interior fill style for this annotation object. The valid values are: 1 (solid), 2 (hatch), or 3 (empty).
	HATCH_INDEX	For POLYGON, POLYGON SET or ELLIPSE objects, if FILL_STYLE is 2 (hatch), the CGM hatch index for this annotation object. The valid values are: • 1 = horizontal • 2 = vertical • 3 = positive slope • 4 = negative slope • 5 = horizontal/vertical crosshatch • 6 = positive/negative slope cross

Table A-6: Annotation Object Attributes (Continued)

Attribute	Field ID	Description
	EDGE_VISIBILITY	For POLYGON, POLYGON SET or ELLIPSE objects, the CGM edge (border) visibility. The valid values are: • 0=off • 1=on
Center Point	ELLIPSE_CENTER	For ELLIPSE objects, the Center X and Center Y coordinates of a CGM ellipse object, or the Circle Ellipse Center coordinates for an NITF 2.0 symbol object. Valid value is an array of two coordinates.
Semi-Major Axis	ELLIPSE_RAD1	For ELLIPSE objects, endpoint coordinates of Radius 1 of the ellipse. For CGM, this is End1X and End1Y. For an NITF 2.0 symbol object, this is the semi-major axis. Valid value is an array of two coordinates.
Semi-Minor Axis	ELLIPSE_RAD2	For ELLIPSE objects, endpoint coordinates of Radius 2 of the ellipse. For CGM, this is End2X and End2Y. For an NITF 2.0 symbol object, this is the semi-minor axis. Valid value is an array of two coordinates.
Ellipse Start Point	ELLIPSE_START	For ELLIPSE objects, coordinates for the beginning of the ellipse.
Ellipse End Point	ELLIPSE_END	For ELLIPSE objects, coordinates for the end of the ellipse.
Type	ELLIPSE_CLOSE_TYPE	For ELLIPSE objects, the manner in which the ellipse is closed. Valid values are: • -1 = closed by an arc. • 0 = closed by two radii to form a pie shape. • 1 = closed by a chord. • 2 = closed as a complete ellipse.
Orientation	ORIEN	Orientation of the current annotation.

Table A-6: Annotation Object Attributes (Continued)

Attribute	Field ID	Description
Number of Points	NPOINTS	Number of points in the annotation.
Bits per Pixel (NITF 2.0)	BITS_PER_PIXEL	The number of bits per pixel in the annotation. This number is always greater than the Actual Bits Per Pixel (ABPP).
Elements in LUT (NITF 2.0)	NELUT	The number of color look-up table (LUT) entries in the annotation.
LUT (NITF 2.0)	LUT	Data defining the color look-up table (LUT) used for the annotation.

Table A-6: Annotation Object Attributes (Continued)

Text Segment Attributes

NITF text segments contain non-displayable text. Text segments allow inclusion in the NITF file of textual information related to the base image, such as a textual description of the activities portrayed in the image. The following attributes can be found in the Text Segment container in the NITF Dataset Attributes viewer (see "Viewing NITF Dataset Attributes" on page 55).

Attribute	Field ID	Description
Text ID	TEXTID	Alphanumeric identification code associated with the text item. The valid codes are determined by the application.
Text Date and Time	TXTDT	The time of origination of the text. UTC (Zulu) is assumed to be the time zone designator to express the time of day.
Text Title	TXTTL	Title of the text item.
Text Security	P_SEC	See Table A-1.
Encryption	ENCRYP	The value of this attribute is always zero.
Text Format	TXTFMT	Three-character code indicating the format or type of text data. Valid codes are: • MTF: USMTF (Refer to MIL-STD-6040 for examples of the USMTF format) • STA: BCS-A • UC2: 2-octet coded characters • UT1: 1-octet coded characters, Basic Latin and Latin Supplement 1.
Text	TEXT	Text contained within this text segment.
Number of Tags	NUMTAGS	Number of tags contained within this text segment.

Table A-7: Text Segment Attributes

Tag Attributes

The Tag attributes can be found in the Tag container in the NITF Dataset Attributes viewer (see “Viewing NITF Dataset Attributes” on page 55).

Note

For more information about tags, refer to the document Controlled Extensions for NITF 2.1, STDI-0002 available from the NTB Web site (http://164.214.2.51/ntb/baseline/1999.html).

Attribute	Field ID	Description
Unique Extension Identifier		An alphanumeric identifier registered with the ISMC.
Length of Entire Tagged Record		The length in bytes of the tag data.
Tag Data		These attributes contain data of either binary or character data types defined by and formatted according to user specification. Examples of tag data include Cloud Cover, Sensor Mode, Source, Project ID Code, etc.
	`TAG_NAME`	Name of the current tag.
	`P_NAME`	Pointer to an array of strings containing the names of each field in the tag.
	`P_DESC`	Pointer to an array of strings containing the description of each field in the tag.
	`P_VALUE`	Pointer to an array of strings containing the value of each field in the tag.

Table A-8: Tag Attributes

Security Codewords

NITF 2.0 Codewords

Codeword	Digraph
NOCONTRACT	NC
ORCON	OR
PROPIN	PI
WNINTEL	WI
LIMDIS	DS
ATOMAL	AL
COSMIC	CS
CNWDI	CN
CRYPTO	CR
FOUO	FO
FORM REST DATA	RD
SIOP	SH
SIOP/ESI	SE
COPYRIGHT	PX
EFTO	TX
LIM OFF USE (UNCLA)	LU
NONCOMPARTMENT	NT
NOFORN	NF
PERSONAL DATA	IN
SAO	SA
SAO-1	SL
SAO-2	HA

Table A-9: NITF 2.0 Codewords

Codeword	Digraph
SAO-3	HB
SAO-SI-2	SK
SAO-SI-3	HC
SAO-SI-4	HD
SPECIAL CONTROL	SC
SPECIAL INTEL	SI
SI-1	SN
WARNING NOTICE - SEC CLAS IS BASED ON THE FACT OF EXISTENCE AND AVAIL OF THIS GRAPHICS	WN

Table A-9: NITF 2.0 Codewords

NITF 2.1 Codewords

Codeword	Digraph
ATOMAL	AT
CNWDI	CN
CONFIDENTIAL	C
COPYRIGHT	PX
COSMIC	CS
CRYPTO	CR
EFTO	TX
FORMREST DATA	RF
FOUO	FO
GENERAL SERVICE (GENSER)	GS
LIM OFF USE (UNCLAS)	LU
LIMDIS	DS
NATO	NS
NO CONTRACT	NC
NONCOMPARTMENT	NT
ORCON	OR
OTHER CODEWORDS	USE APPROPRIATE DIGRAPH
PERSONAL DATA	IN
PROPIN	PI
RESTRICTED DATA	RD
SAO	SA
SAO-1	SL
SAO-2	HA

Table A-10: NITF 2.1 Codewords

Codeword	Digraph
SAO-3	HB
SAO-SI-2	SK
SAO-SI-3	HC
SAO-SI-4	HD
SECRET	S
SIOP	SH
SIOP/ESI	SE
SPECIAL CONTROL	SC
SPECIAL INTEL	SI
TOP SECRET	TS
UNCLASSIFIED	U
US ONLY	UO
WARNING NOTICE - SEC CLAS IS BASED ON THE FACT OF EXISTENCE AND AVAIL OF THIS GRAPHIC	WN
WNINTEL	WI

Table A-10: NITF 2.1 Codewords

Appendix B:
Supported Tags

This appendix contains information about the tags supported in the Certified NITF/NSIF Module. The following table lists the currently supported tags that ship with the NITF Module.

References are provided to the following NITF specification documents:

- STDI0002 = The Compendium of Controlled Extensions for NITF version 2.1

  http://164.214.2.51/ntb/baseline/stdi0002/final.pdf
- DIGEST = The Digital Geographic Information Exchange Standard (DIGEST) Part 2, Annex D: Image Interchange Format (IIF) Encapsulation Specification

  http://www.digest.org/html/gp2d1.htm#A1

Tag Name	Filename	Descriptive Name	Reference
AIMIDA	AIMIDA.xml	Additional Image Identification	STDI0002
AIMIDB	AIMIDB.xml	Additional Image Identification Version B	STDI0002
BANDSA	BANDSA.xml	Multispectral/ Hyperspectral Band Parameters	STDI0002
BCKGDA	BCKGDA.xml	Background Data	STDI0002
BLOCKA	BLOCKA.xml	Image Block Information	STDI0002
CMETAA	CMETAA.xml	Complex Metadata Tagged Record Extension Version A	STDI0002
EXOPTA	EXOPTA.xml	Exploitation Usability Optical Information	STDI0002
EXPLTA	EXPLTA.xml	Exploitation Related Information Version A	STDI0002
EXPLTB	EXPLTB.xml	Exploitation Related Information Version B	STDI0002

Table B-1: Supported Tags

Tag Name	Filename	Descriptive Name	Reference
GEOLOB	GEOLOB.xml	Local Geographic (lat/long) Coordinate System Extension	DIGEST
GEOPSB	GEOPSB.xml	Geographical Positioning for geo-referencing parameters including datums, ellipsoids	DIGEST
GRDPSB	GRDPSB.xml	Grid Positioning, Version B	DIGEST
HISTOA	HISTOA.xml	Softcopy History Tagged Record Extension	STDI0002
ICHIPA	ICHIPA.xml	Image Chip Support Data Extension Version A	DIGEST
ICHIPB	ICHIPB.xml	Image Chip Support Data Extension Version B	STDI0002
IOMAPA	IOMAPA.xml	Input/Output Mapping Tagged Record Extension	STDI0002
MAPLOB	MAPLOB.xml	Local Cartographic (x/y) Coordinate System Extension	STDI0002

Table B-1: Supported Tags

Tag Name	Filename	Descriptive Name	Reference
MENSRA	MENSRA.xml	Airborne SAR Mensuration Data	STDI0002
MENSRB	MENSRB.xml	Airborne SAR Mensuration Data Version B	STDI0002
MPDSRA	MPDSRA.xml	Mensuration Data	STDI0002
MSTGTA	MSTGTA.xml	Mission Target	STDI0002
MTIRPA	MTIRPA.xml	Moving Target Information Report	STDI0002
MTIRPB	MTIRPB.xml	Moving Target Information Report	STDI0002
NBLOCA	NBLOCA.xml	(Number of bytes) image Block or frame is offset.	STDI0002
OFFSET	OFFSET.xml	(NITF 2.1) Offset of the first pixel of an image from the first pixel of the full image.	STDI0002
PATCHA	PATCHA.xml	Patch information	STDI0002
PATCHB	PATCHB.xml	Patch information Version B	STDI0002
PIAEQA	PIAEQA.xml	Profile for Imagery Archives Equipment	STDI0002

Table B-1: Supported Tags

Tag Name	Filename	Descriptive Name	Reference
PIAEVA	PIAEVA.xml	Profile for Imagery Access Event	STDI0002
PIAIMB	PIAIMB.xml	Profile for Imagery Archives Image	STDI0002
PIAIMC	PIAIMC.xml	Profile for Imagery Access Image	STDI0002
PIAPEA	PIAPEA.xml	Profile for Imagery Archives Person	STDI0002
PIAPEB	PIAPEB.xml	Profile for Imagery Access Person	STDI0002
PIAPRC	PIAPRC.xml	Profile for Imagery Archives Product	STDI0002
PIAPRD	PIAPRD.xml	Profile for Imagery Access Product	STDI0002
PIATGA	PIATGA.xml	Profile for Imagery Archives Target	STDI0002
PIATGB	PIATGB.xml	Profile for Imagery Archives Target Version B	STDI0002
PRJPSB	PRJPSB.xml	Projection Parameters extension	DIGEST

Table B-1: Supported Tags

Tag Name	Filename	Descriptive Name	Reference
REGPTB	REGPTB.xml	Registration Points extension	DIGEST
RPCOOB	RPC00B.xml	Rapid Positioning Capability Support Data Extension	STDI0002
SECTGA	SECTGA.xml	Secondary Target Information	STDI0002
SENSRA	SENSRA.xml	EO-IR Sensor Parameters	STDI0002
STDIDC	STDIDC.xml	Standard ID extension	STDI0002
STREOB	STREOB.xml	Stereo Information	STDI0002
USE00A	USE00A.xml	Exploitation Usability extension	STDI0002

Table B-1: Supported Tags

NSDE Tags

For information on obtaining additional tag definition files for NSDE tags, contact RSI Technical Support:

- E-mail: support@RSInc.com
- Phone: (303) 413-3920
- Fax: (303) 786-9909

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