

# JITC

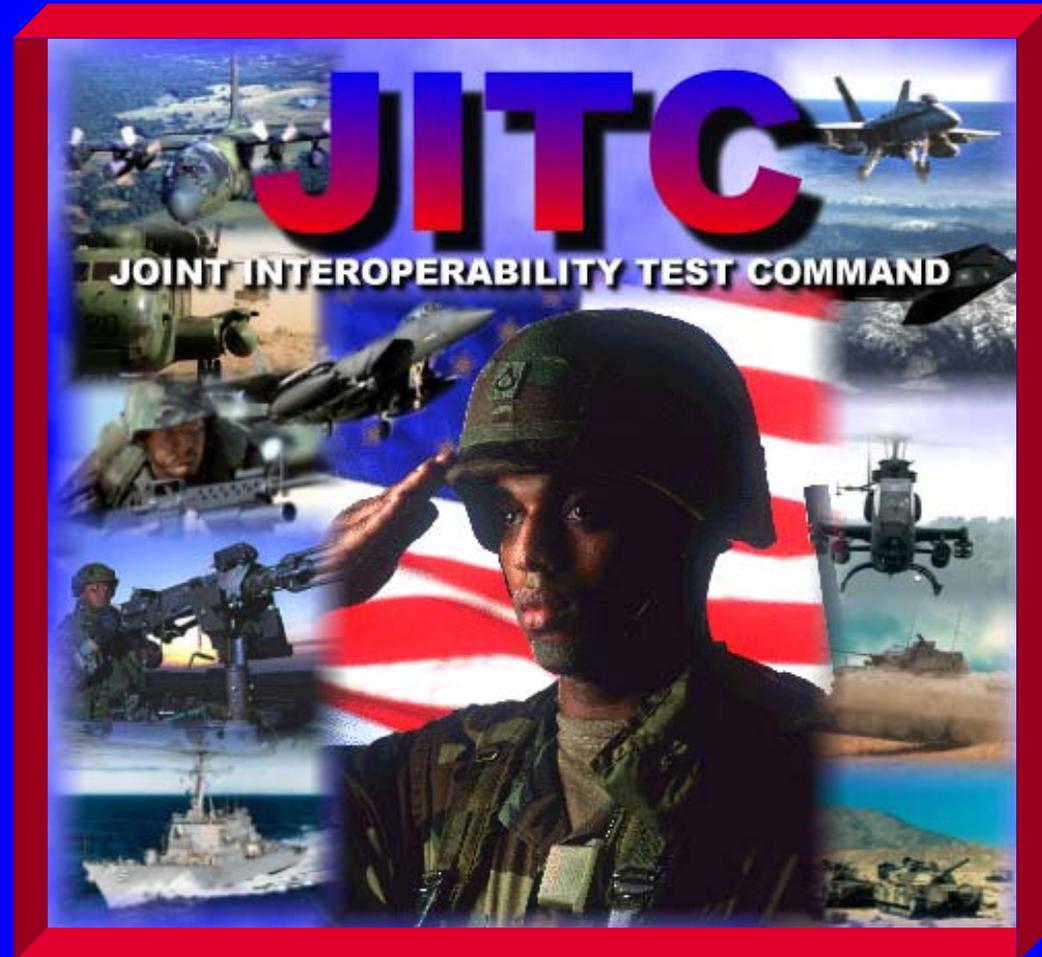


# JOINT INTEROPERABILITY TEST COMMAND



# Agenda

- ❑ JITC Background
  - Organization
  - Role
- ❑ NITFS Test Program
  - Program Plan
  - Test Support
  - Test Scheduling
  - Test Sponsors
- ❑ NITFS J2K Testing
  - J2K Test Development
  - J2K in NITFS
  - Test Schedule





# DISA Organization Pyramid



**JOINT STAFF**



**DOT&E**

**DISA  
DIRECTOR**

**DISA  
PRINCIPAL STAFF**

**DISA FIELD OFFICES**

- ★ JOINT STAFF SPT CNTR
- ★ DISA COMMAND FIELD OFFICES
- ★ DEFENSE TECH INFO CENTER (DTIC)
- ★ WHITE HOUSE COMM AGENCY (WHCA)
- ★ DEFENSE INFO TECH CONTRACTING OFFICE (DITCO)
- ★ **JOINT INTEROPERABILITY TEST COMMAND (JITC)**



# JITC's Specific and Unique Roles

- ❑ DOD's sole joint interoperability certifier
- ❑ Operational Test Agency for many DOD elements
- ❑ Major Range & Test Facility Base (MRTFB)
- ❑ Executive Agent for testing (NIMA, EKMS, and CDL)





# JITC's Global Reach

## DOD

AIR FORCE  
ARMY  
MARINES  
NAVY



CINCs  
DDR&E  
RESERVE  
NAT'L GRD

SERVICE OTAs & PMs  
BMDO, DeCA, DFAS, DIA, DLA,  
NIMA, NSA

## INDUSTRY



3COM, AT&T, ESI, FORE SYSTEMS, GE,  
GENERAL SIGNAL TECHNOLOGIES,  
GTE, KODAK, LOCKHEED,  
LUCENT TECHNOLOGIES, NET,  
NORTHERN TELECOM, NORTHROP,  
PHOTOTELEESIS, RAYTHEON,  
SIEMENS CORP, TIMEPLEX,  
TITAN CORP, OTHER VENDORS

## FEDERAL



DEPARTMENT OF ENERGY  
DEPARTMENT OF JUSTICE  
DEPARTMENT OF STATE  
DEPARTMENT OF AGRICULTURE  
FEDERAL BUREAU OF INVESTIGATION

## ALLIES

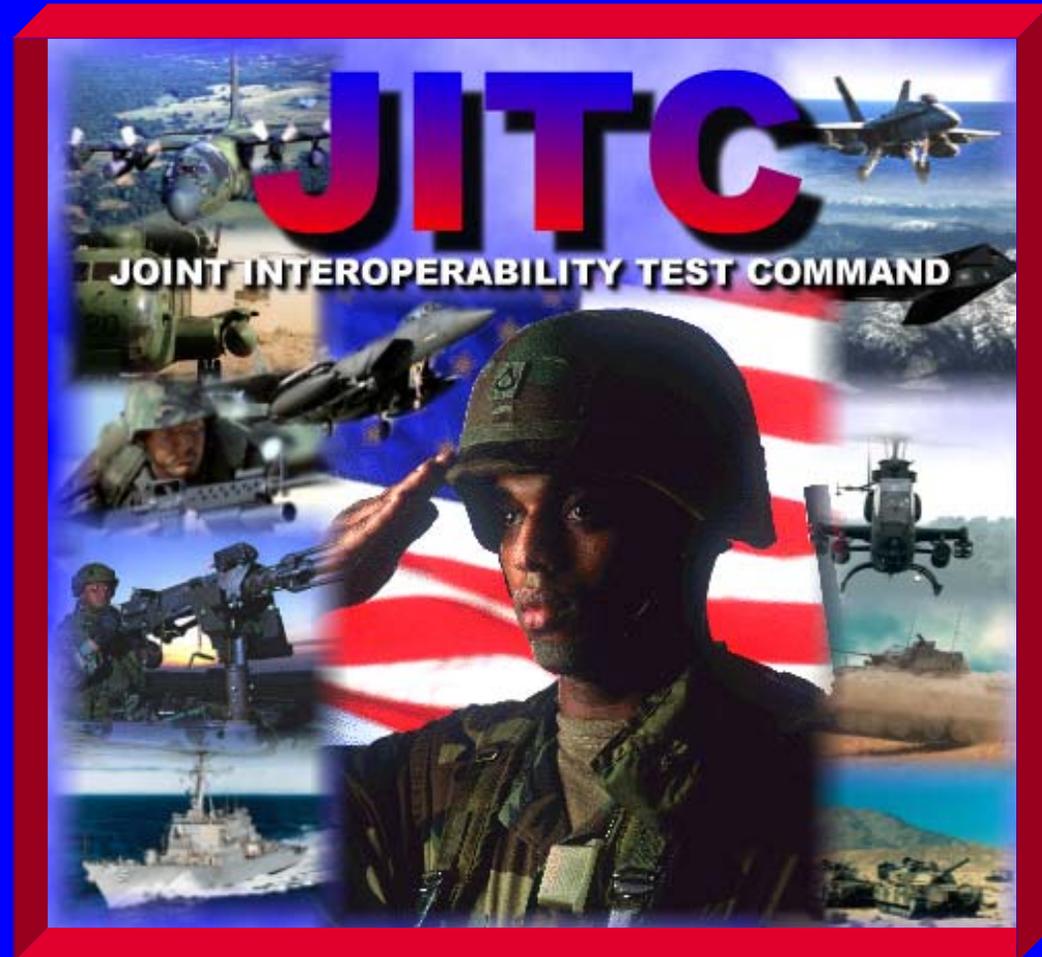


AUSTRALIA, SINGAPORE,  
THAILAND, KOREA, JAPAN,  
NATO, UNITED KINGDOM,  
ICELAND, NORWAY,  
PFP COUNTRIES



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# NITFS Test Program

## Test Director

Mr. Stephen Kerr

## Sponsor

National Imagery & Mapping Agency (NIMA)

## Objectives

Executive Agent for NIMA for the Test Program

Standards Validation Testing

Standards Compliance Testing

Standards-Based Interoperability Testing

## Clients

DOD & Federal Agencies

Commercial Vendors

NATO



# **NITFS Test Program Plan**

**NIMA Document N-0105/98**

**NITFS**

**Standards Compliance and Interoperability  
Test and Evaluation Program Plan**

**25 August 1998**



# Open International Standards

<b>ISO/IEC 12087-5</b>	<b>Basic Image Interchange Format (BIIF)</b>
<b>ISO/IEC 8632</b>	<b>Computer Graphics Metafile (CGM)</b>
<b>ISO/IEC 10918</b>	<b>Joint Photographic Experts Group (JPEG)</b>
<b>ISO/IEC 15444</b>	<b>JPEG 2000 (Part 1 and Part 4)</b>
<b>ITU-TT.4</b>	<b>Standardization of Group III Fax</b>

## **NSIF/NITF Profile of BIIF**

<b>MIL-STD-2500B</b>	<b>NITF 2.1</b>
<b>STANAG 4545</b>	<b>NSIF 1.0</b>

## **"Open Skies" Treaty Profile of BIIF**

## **Digital Geographic Information Exchange Standard (DIGEST)**



# Test Support

- ❑ **Standard Test Plan/Procedures**
- ❑ **Sample Test Files**
- ❑ **Sample Software**
- ❑ **Services During Development**
  - Consultation/Training**
  - Assistance Interpreting Standards**
  - Analysis of Trial Files**
  - Dry-Run Testing**
- ❑ **Compliance Testing**
- ❑ **Compliance Maintenance Testing**



# Scheduling Test Services

- ❑ **NITFS Compliance tests are customer funded.**
- ❑ **Tests can usually be scheduled within six weeks of receipt of test submission forms.**
- ❑ **Vendors can self-sponsor and pay for test services.**
- ❑ **JITC can take the test service to alternate facilities (at additional cost).**
- ❑ **The test sponsor only pays for time and materials to conduct the compliance test; Does not bear the cost of test development.**



# Testing Statistics

## **NITF Version 2.0 (1994-Present)**

**225 System Configuration Tests  
50 Separately Named Products  
29 Developers**

## **NITF Version 2.1 (1998-Present)**

**72 System Configuration Tests  
21 Separately Named Products  
12 Developers**



# Agencies/PM's Sponsoring Tests

**DISA**

**SAF/AQ**

**NIMA**

**DIA**

**SOCOM**

**FORSCOM**

**JFCOM**

**ONI**

**USASPO**

**NAWC**

**OASD**

**OSO**

**SPAWARS**

**AFRL**

**AFWA**

**JMCIS PMO**

**AFMIS PMO**

**CIP PMO**

**DAGS PMO**

**MATRIX PMO**

**IPA/IPL PMO**

**IDEX PMO**

**JDISS PMO**

**JSIPS PMO**

**Joint STARS PMO**

**PPPS PMO**

**IEC PMO**

**Radiant Mercury PMO**

**COSMEC PMO**

**Dissemination Element**



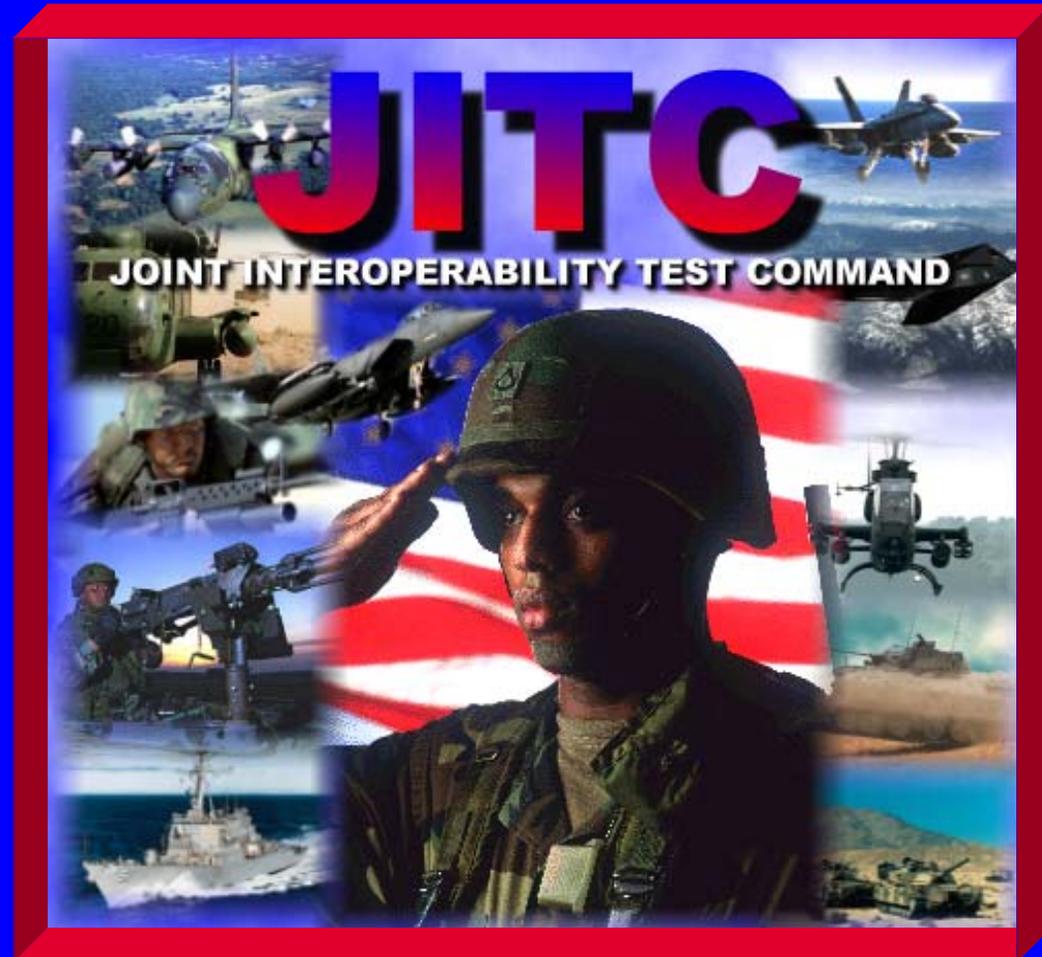
# Vendor Participation

<b>BTG</b>	<b>GE Aerospace</b>	<b>Orbital Imaging Corp</b>
<b>TRW</b>	<b>Harris Corp.</b>	<b>Lockheed Martin Corp.</b>
<b>BAE</b>	<b>GTE (DIEPS)</b>	<b>Technology Services Corp.</b>
<b>ITAC</b>	<b>E-Systems</b>	<b>Paragon Imaging, Inc.</b>
<b>SAIC</b>	<b>Space Imaging</b>	<b>Northrop Grumman</b>
<b>TASC</b>	<b>VITec Imaging</b>	<b>Eastman Kodak Corp.</b>
<b>ITEK</b>	<b>ERDAS, Inc.</b>	<b>Loral Federal Systems</b>
<b>Hughes</b>	<b>Phototelesis</b>	<b>Texas Instruments, Inc.</b>
<b>SEMCOR</b>	<b>Geodynamics</b>	<b>Rome Laboratory</b>
<b>Raytheon</b>	<b>GDE Systems Inc.</b>	<b>Sterling Software, Inc.</b>
<b>EarthWatch</b>	<b>General Dynamics (GTE Government Sys)</b>	
<b>Motorola Sys</b>	<b>Solutions Group</b>	<b>Marconi Integrated Sys Inc.</b>
<b>DigitalGlobe</b>	<b>Research Systems</b>	<b>Sensor Systems</b>



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# NITFS J2K Test Services

- **JITC is in the process of developing the capability to test JPEG 2000 within the context of NITFS.**
  - NITF image subheader field options/constraints related to J2K compression processing.
  - Ability to unpack/interpret any compressed data stream compliant with ISO/IEC 15444, Part 1, Profile 1, Compliance Class 1.
  - Where applicable, ability to constrain compression processing to 'preferred encoding options.'



# J2K Test Development

## □ NITFS JPEG 2000 Test Plan

- Test Criteria and Measures
- Test Procedures
- Test Files for Evaluation of Decoders
- Test Scenarios for Evaluation of Encoders
- Test Scenarios for Evaluation of Transcoding, Chipping, Partial Extraction, etc.
- Test Tools for Evaluating Code Streams

## □ Sample Files and Sample Test Scenarios to Aid Implementation Development Efforts



# Functionality Added to Legacy JPEG by the NITFS Format

- ❑ **Color designation for components (bands)**
- ❑ **Use of Color Transform Functions**
- ❑ **Sample Value Remapping and LUTs**
- ❑ **Image Blocking / Tiling**
- ❑ **Component Interleaving Modes**
- ❑ **Indexed access into large image files**
- ❑ **Vacant Block / Tile Masking**
- ❑ **Error Management**
- ❑ **Reduced Resolutions**



# Role of NITFS Format With JPEG 2000

- ❑ Image Rendering (Image/Pixel Structure)
- ❑ Basic/common image/pixel attributes
- ❑ Multi-image/graphic/etc. composition
- ❑ Parameters and Attribution, for example:
  - Discovery and Retrieval
  - Security
  - Geospatial Attributes
  - Exploitation Support Data



# Test Development Schedule

## □ Test Requirements Document

- First Draft Jun 2003
- Second Draft Aug 2003
- Final Profile + 90 days

## □ Sample NITF2.1 Files

- 15444-5 Test Streams Dec 2002
- Preferred Encodings, Suite 1 Feb 2003
- Preferred Encodings, Suite 2 Apr 2003
- Preferred Encodings, Final Profile + 90 days



# Test Services Schedule

## ❑ Preliminary NITFS/J2K Compliance Test Services

- Basic services available now
- Shared risk testing during early development period pending Profile completion/registration
- Opportunity to have positive impact on the Profile
- Posture implementations for formal test

## ❑ Formal NITFS/J2K Compliance Test Services

- Profile + 90 (Late 2003)



# Contact Information

## NITFS Test Facility

**1-800-LET-JITC  
x8-5458**

**TEL (520) 538-5458  
FAX (520) 538-5257**

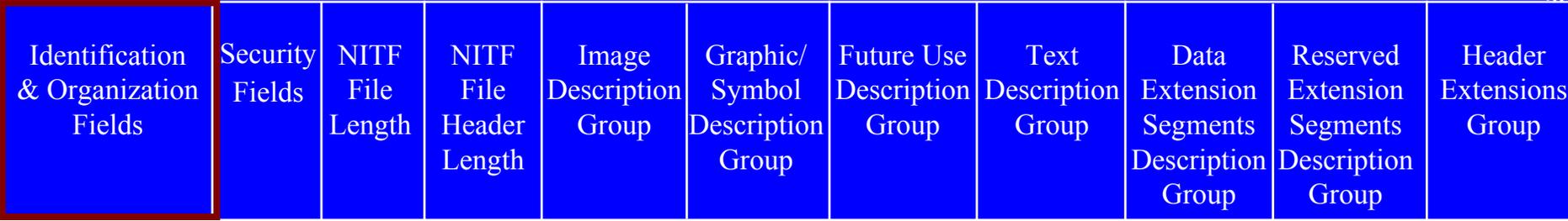
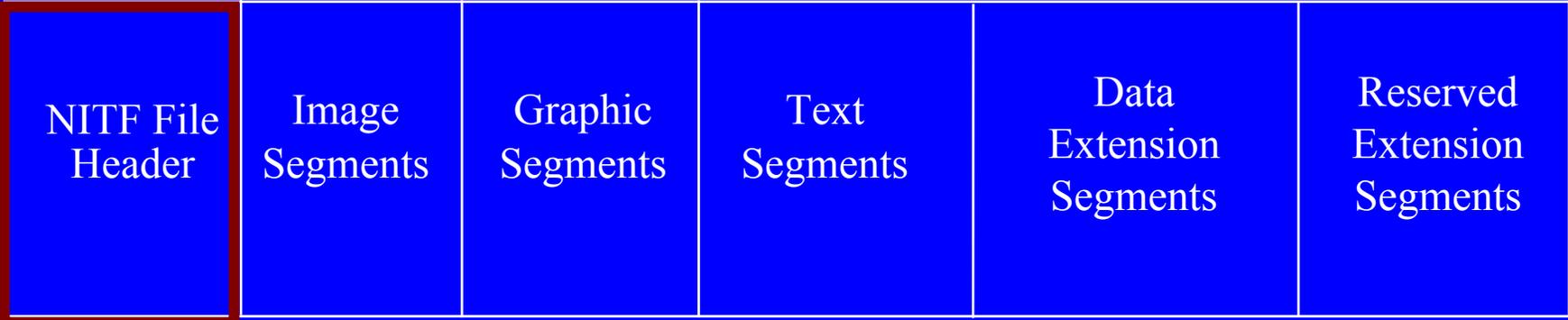
**[jitcn@fhu.disa.mil](mailto:jitcn@fhu.disa.mil)**

**<http://jitc.fhu.disa.mil/nitf/nitf.htm>**



# NITF File Structure

## NITF 2.1 & NSIF 1.0





# NITF File Header

## □ Identification and Organization Fields

- FHDR NITF
- FVER 02.10
- CLEVEL 03, 05, 06, 07, 09
- STYPE BF01
- OSTAID Originating Station Identifier
- FDT File Data and Time
- FTITLE File Title
- FBKGC File Background Color
- ONAME Originator's Name
- OPHONE Originator's Phone Number



# J2K & CLEVELs

- ❑ **Same CLEVEL constraints as currently defined in Mil-Std-2500B, Table A-10 for:**
  - Common Coordinate System (CCS) Extents
  - Maximum File Sizes
  - Image Segment Row x Column Sizes
  - Image Blocking
  - Number of Bands in an Image Segment
  - Number of Image Segments Per File
  - Number of Graphic, Text, & Extension Segments per File



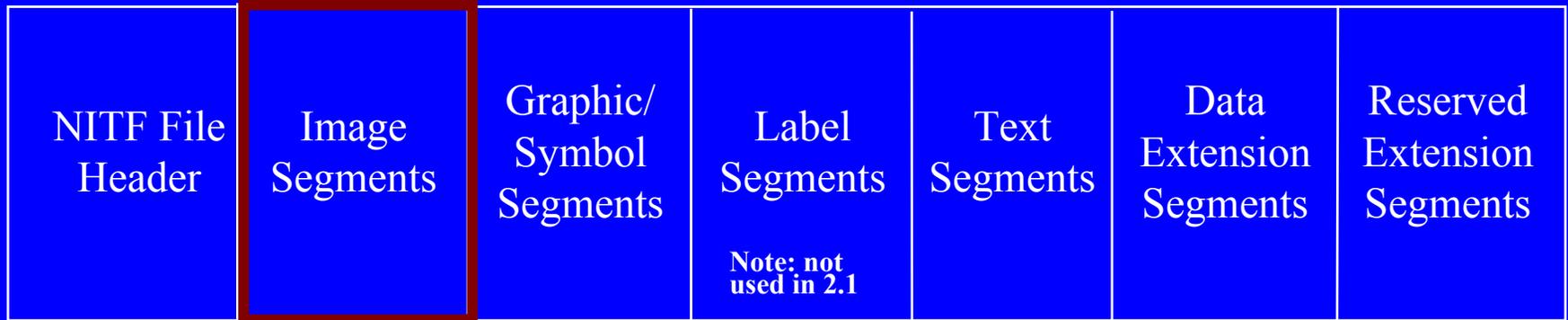
# J2K & CLEVELS (cont.)

## □ J2K attributes common across CLEVELS:

- Lossless compression (numerically reversible)
- Lossy compression (numerically irreversible)
- Binary, Integer, and Signed Integer (PVTYPES)
- 01 - 38 bits-per-pixel (per component/band)
- With and Without LUTs (LUTs with lossless case only)
- IREPs: MONO, RGB/LUT, RGB, YCbCr and MULTI
- IMODE = B (interleave by block/tile) default for all J2K code stream progression options.
- IC = C8, M8 (M8 with lossless transparent pixel mask)

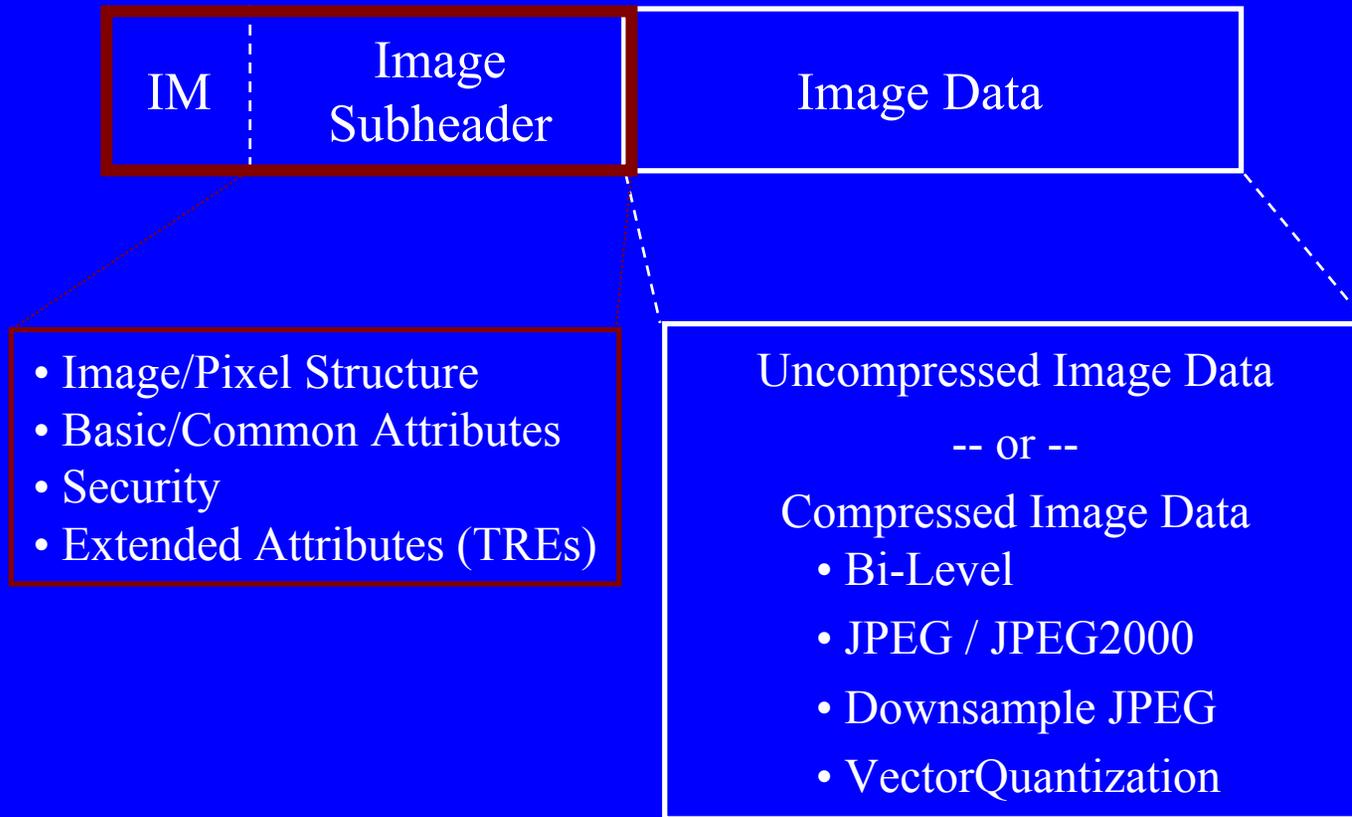


# NITF Image Segment File Structure





# NITF Image Segment File Structure (Cont'd)





# Image Subheader Fields

- ❑ IM
- ❑ IID1
- ❑ IDATIM
- ❑ TGTID
- ❑ IID2
- ❑ Security Fields
- ❑ ENCRYP
- ❑ ISORCE
- ❑ NROWS / NCOLS
- ❑ PVTTYPE
- ❑ IREP / IREP BANDnn
- ❑ ICAT / ISUBCATnn
- ❑ ABPP / NBPP
- ❑ PJUST
- ❑ ICORDS / IGEOLO
- ❑ NICOM / ICOMn
- ❑ IC / COMRAT
- ❑ NBANDS / XBANDS
- ❑ IFCn / IMFLTn
- ❑ NLUTSn / NELUT / LUTDnm
- ❑ ISYNC
- ❑ IMODE
- ❑ NBPR / NBPC
- ❑ NPPBH / NPPBV
- ❑ IDLVL / IALVL
- ❑ ILOC
- ❑ IMAG
- ❑ UDID / IXSHD



# NITFS/J2K Validation

- ❑ **Test Plan.** The NITFS/J2K test development will contribute toward ‘validating’ the NITFS/J2K implementation documentation.
- ❑ **Profile Review.** Community review and comment on the J2K Profile.
- ❑ **Implementer Feedback.** We solicit ‘feedback’ and ‘lessons learned’ from efforts to implement J2K within the context of NITFS.