BIIF PROFILE For
JPEG 2000, VERSION 01.10
In NSIF/BIIF/NITF

JPEG 2000 TEST PLAN DOCUMENT
VERSION 01.00

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Foreword

The Joint Photographic Experts Group (JPEG) 2000 Test Plan provides and describes the means of testing to determine whether the implementation(s) under test can generate, repackage and/or interpret the JPEG 2000 file format and associated compressed data stream in a manner compliant with the Basic Image Interchange Format (BIIF) Profile for JPEG 2000 Version 01.10 (BPJ2K01.10) the Standardization Agreements (STANAGs) 4545, 4609 and 7023. In order to support this effort, the Compliant Image Validation Analyzer, trusted JPEG 2000 interpreters, sample test files, and other software programs are required for the evaluation of generated or repackaged files and interpret testing.

The International Organization for Standardization/International Electrotechnical Commission (IS)/IEC) 12087-5:1998, BIIF, provides guidance for creating profiles of BIIF. At present, three profiles of BIIF have been established: 1) the model profile of BIIF as specified in ISO/IEC 12087-5; 2) the North Atlantic Treaty Organization (NATO) Secondary Imagery Format Version 01.00 (NSIF01.00); and 3) the North Atlantic Treaty Organization (NATO) Secondary Imagery Format Version 01.01 (NSIF01.01). The NSIF01.00 and NSIF01.01 profiles of BIIF allow for the compression of image data using the provisions of ISO/IEC 15444, Joint Photographic Experts Group (JPEG) 2000 (J2K) Part 1: Image Coding System: Core Coding System. BPJ2K01.10 is the applicable implementation profile for the J2K compression of digital imagery, incorporating the compressed digital imagery into STANAG 4545 NSIF files, Large Volume Streaming Data, STANAG 4609 files, and air reconnaissance primary imagery data STANAG 7023 files and exchanging them within the Command, Control, Communications, and Intelligence (C3I) user community. BPJ2K01.10 is the applicable implementation profile for the J2K compression of digital imagery, incorporating the compressed digital imagery into NSIF files, and exchanging them within the C3I user community.

This document provides guidance for testing the various application systems implementing the BPJ2K01.10 Profile within the applicable STANAGs, BIIF Profiles, and National Imagery Transmission Format communities. The producer of the implementation(s) under test and the responsible testers provide supplemental test information before each test to identify the appropriate test cases, test schedule, and other details applicable for the conduct of the specific test.

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Introduction

International Organization for Standardization/International Electrotechnical Commission (ISO/IEC) 15444-1: Joint Photographic Experts Group (JPEG) 2000 Part 1: Image coding system: Core coding system, an international standard for compression of imagery data, has been adopted as an imagery compression option for use within the North Atlantic Treaty Organization Secondary Imagery Format (NSIF) profile of ISO/IEC 12087-5, Basic Image Interchange Format (BIIF). ISO/IEC 15444-1 is a standard that describes an image compression system that allows great flexibility, not only for the compression of images but also for access into the codestream. The codestream provides a number of mechanisms for locating and extracting portions of the compressed image data for the purpose of retransmission, storage, display, or editing. This access allows storage and retrieval of compressed image data appropriate for a given application without decoding the entire codestream.

The BIIF Profile for JPEG 2000, Version 01.10 (BPJ2K01.10) is the profile applicable to Standardization Agreement (STANAG) 4545 NSIF files, Large Volume Streaming Data, STANAG 4609 files, and air reconnaissance primary imagery data STANAG 7023 files for the JPEG 2000 compression of digital imagery. All compliant NSIF decoders are required to decode all compliant data within the implemented NSIF complexity level that is compressed within the limits of the BPJ2K01.10 profile (any JPEG 2000 Part 1 Profile 1 codestream) as well STANAG 4609 and 7023 decoders are required to decode compliant data that is compressed within the limits of the BPJ2K01.10 profile applicable to STANAG 4609 and 7023. All compliant STANAG 4545, 4609 and 7023 encoders capable of producing JPEG 2000 compressed data are required to do so strictly within the limits of the BPJ2K01.10 profile and for STANAG 4545, the implemented NSIF complexity level.

The BPJ2K01.10, as well as detailing JPEG 2000 Profile-1 compliance, defines three STANAG 4545 profiles: 1) NSIF Preferred JPEG 2000 Encoding (NPJE) for all original image providers in NSIF when performing the initial first-stage compression of collected imagery, 2) Exploitation Preferred JPEG 2000 Encoding (EPJE) facilitates rapid access to a variety of resolution levels, and 3) Tactical Preferred JPEG 2000 Encoding (TPJE) created to facilitate all areas of airborne imagery compression. It also defines Large Volume Streaming Data (LVSD) Preferred JPEG 2000 Encoding (LPJE), the preferred JPEG 2000 compression encoding for LVSD supporting STANAG 4609; and STANAG 7023 Preferred JPEG 2000 Encoding (SPJE) when encoding 7023. These profiles place further constraints on the generation of compressed codestreams by systems designated to implement STANAG 4545, 4609 and 7023. The restrictions are applicable to imagery generated/compressed within a large distribution system that includes several levels of collection systems (encoders), libraries/distributors (transcoders), and end users (decoders) to help ensure adequate scalability without resorting to recompression.

Several portions of the STANAG file formats contain information directly related to the JPEG 2000 codestream content. The BPJ2K01.10 shows how the JPEG 2000

codestream fits into the context of the overall file format and in the case of STANAG 4545 provides information about file header, image subheader and Tagged Record Extension metadata that are related to the JPEG 2000 codestream content for which NSIF implementations are required to comply.

This document based on the referenced documents in the preceding clauses provides a means for testing the various applications implementing the BPJ2K01.10 Profile within the NSIF, BIIF, and National Imagery Transmission Format community, as well as STANAG 4609 and 7023.

1 Scope

The Joint Photographic Experts Group (JPEG) 2000 (J2K) Test Plan provides and describes the means of testing to determine to what extent an Implementation Under Test (IUT) can generate, repackage and/or interpret a North Atlantic Treaty Organization (NATO) Secondary Imagery Format Standardization Agreement (STANAG) 4545 (NSIF), Basic Image Interchange Format (BIIF) and/or National Imagery Transmission Format (NITF) J2K file formatted products, STANAG 4609 and STANAG 7023 and associated compressed data stream in a manner compliant with test requirements and criteria established in the BIIF Profile for J2K version 01.10 (BPJ2K01.10). This provides the framework for applying the abstract test suites in International Organization for Standardization (ISO)/ International Electrotechnical Commission (IEC) JPEG 2000 Image Coding System – Part 4, 15444-4, Profile-0, and Profile-1 ISO test codestreams requirements, as well established requirements in BPJ2K01.10. The JPEG 2000 Test Plan organizes all requirements and established criteria by specifying scenarios, subtests, executable test cases, and procedures to be followed during a test of an IUT to establish conformance to ISO/IEC JPEG 2000 Image Coding System – Part 1, 15444-1, JPEG 2000 Image Coding System – Part 2, 15444-2 and the BPJ2K01.10.

This JPEG 2000 Test Plan provides test requirements to establish conformance for:

- Encoding within the J2K, Part 1, Profile 1 constraints
- Encoding within the NSIF Preferred J2K Encoding (NPJE) constraints
- Encoding within the Exploitation Preferred J2K Encoding (EPJE) constraints
- Encoding within the Tactical Preferred J2K Encoding (TPJE) constraints
- Encoding within the Large Volume Streaming Data (LVSD) Preferred J2K Encoding (LPJE) constraints
- Encoding within the STANAG 7023 Preferred J2K Encoding (SPJE) constraints
- NSIF/BIIF/NITF (NBN) file structure and field population when using J2K
- NBN complexity level constraints when using J2K
- Decoding codestreams compliant with J2K Part 1, Profile 1 constraints
- Decoding codestreams compliant with NPJE constraints

- Decoding codestreams compliant with EPJE constraints
- Decoding codestreams compliant with TPJE constraints
- Decoding codestreams compliant with LPJE constraints
- Decoding codestreams compliant with SPJE constraints
- Repackaging J2K codestreams
- Decoding J2K minimal interchange format (JP2) file format
- Application and use of the J2KLRA (JPEG 2000 Layers, version A) Tagged Record Extension (TRE) within NBN

2 References

The following references document the technical details, codestream syntax, and testing methodologies that serve as a basis for the test requirements and criteria for establishing J2K compliance testing. At the time of publication, the editions indicated were valid. All Recommendations and Standards are subject to revision, and parties to agreements based on these Recommendations and Standards are encouraged to investigate the possibility of applying the most recent editions. Members of IEC and ISO maintain registers of current International Standards. The Telecommunication Standardization Bureau of the International Telecommunication Union (ITU) maintains a list of current ITU-Telecommunication (ITU-T) Recommendations.

2.1 Normative References

ISO/IEC 15444-1:2004 JPEG 2000 Image Coding System -- Part 1: Image Coding System: Core Coding System with Technical Corrigendum 1:2007/2:2008 and Amendment 1:2006/2:2009.

ISO/IEC 15444-2:2004 JPEG 2000 Image Coding System -- Part 2: Extensions with Technical Corrigendum 4:2007 and Amendment 2:2009.

ISO/IEC 15444-4:2002 JPEG 2000 Image Coding System -- Part 4: Conformance testing with Technical Corrigendum 1:2009

ISO/IEC 15444-5:2003 JPEG 2000 Image Coding System – Part 5: Reference software

BPJ2K01.10 BIIF Profile: for JPEG 2000 Version 01.10

NSIF01.00 BIIF Profile: NATO Secondary Imagery Format (NSIF) Version 01.00

ISO/IEC BIIF Profile NSIF01.01: NATO Secondary Imagery Format (NSIF) Version 01.01

BPCGM01.00 BIIF Profile: for Computer Graphics Metafile Version 01.00.

Allied Engineering Documentation Publication (AEDP) - 4 for NATO Secondary Imagery Format (NSIF) STANAG 4545 (Edition 2) Implementation Guide

AEDP - 8 NATO Motion Imagery (MI) STANAG 4609 (Edition 3) Implementation Guide

AEDP - 9 NATO Primary Imagery Format (NPIF) STANAG 7023 (Edition 1) Implementation Guide

2.2 Non-Normative References

MIL-STD-2500C. National Imagery Transmission Format (Version 2.1) for the National Imagery Transmission Format Standard, 1 May 2006.

MIL-STD-188-198A. Joint Photographic Experts Group (JPEG) Image Compression for the National Imagery Transmission Format Standard, 15 December 1993. Notice 1, 12 October 1994; Notice 2, 14 March 1997.

Copies of U.S. military standards are available from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094, or The Department of Defense Single Stock Point for Military Specifications, Standards and Related Publications website (http://dodssp.daps.mil/).

3 Definitions

For the purposes of the JPEG 2000 Test Plan, the definitions shown in ISO/IEC 15444-1, ISO/IEC 12087-5 BIIF, BPJ2K01.10 Profile, NSIF01.00 and NSIF01.01 Profile apply.

4 Abbreviations

AEDP	Allied Engineering Documentation Publication
AMD	Amendment
BIIF	Basic Image Interchange Format
BPJ2K01.10	BIIF Profile for JPEG 2000, version 01.10
C3I	Command, Control, Communications, and Intelligence
Cclass	Compliance Classes
CLEVEL(s)	Complexity Level(s)
EPJE	Exploitation Preferred J2K Encoding
ETS	Executable Test Suite
IEC	International Electrotechnical Commission
ISO	International Standards Organization
ITU	International Telecommunication Union
ITU-T	ITU technical Standardization Sector
IUT	Implementation Under Test

J2K	JPEG 2000
JITC	Joint Interoperability Test Command
JP2	JPEG 2000 minimal interchange format
JPC	JPEG Codestream
JPEG	Joint Photographic Experts Group
JRF	J2K Registration Form
LPJE	LVSD Preferred J2K Encoding
LVSD	Large Volume Streaming Data
MIL-STD	Military Standard
NATO	North Atlantic Treaty Organization
NBN	NSIF/BIIF/NITF
NITF	National Imagery Transmission Format
NPJE	NSIF Preferred JPEG 2000 Encoding
NSIF	NATO Secondary Imagery Format
SPJE	STANAG 7023 Preferred J2K Encoding
STANAG	Standardization Agreement
TPJE	Tactical Preferred J2K Encoding
TIR	Test Incident Report
TRE	Tagged Record Extension

5 Purpose

The following section describes the features and functions that an IUT, when applicable, will be tested against and must successfully perform in order to achieve NBN J2K conformance. The test requirements and criteria are divided into three major categories: encode, decode and transcode/repack; which are further discussed from twelve areas; Profile-1 Encode, NPJE Encode, EPJE Encode, TPJE Encode, LPJE Encode, SPJE Encode, Profile-1 Decode, Repackaging, JP2 File Format Decoding, NBN Image Sub-header Encoding, J2KLRA Support and Complexity Level (CLEVEL) constraints.

For J2K image segments within an NBN product, ISO/IEC 15444-4 describes conformance for J2K decoders in terms of a system of guarantees. These guarantees serve to discourage encoders from producing codestreams that will be exceedingly difficult or impossible for a decoder to process, to encourage decoders to provide quality images from any reasonable codestream, and to encourage use of the flexibility and scalability of JPEG 2000 codestreams.

Profiles define a subset of technology, from ITU-T T.800 | ISO/IEC 15444-1: JPEG 2000, to meet the needs of a given application with limits on parameters within

the selected technology. Profiles limit bit streams. Encoders achieve quality guarantees for particular decoders by encoding bitstreams that meet a particular profile definition. Decoders provide guarantees, Compliance classes (Cclass), regarding their ability to interpret codestreams in part or in whole. Codestream profiles are designed with Cclass guarantees in mind to enhance decoder performance.

Cclass define guarantees of a given level of image quality for a decoder and guidance for encoders to produce codestreams that are easily decodable by compliant decoders. Essentially, if a JPEG 2000 encoder produces a codestream with certain properties, then a decoder of a certain Cclass will be capable of producing an image with some defined level of quality. The compliance class of a decoder is based solely on passing certain tests. The tests in ISO/IEC 15444-4 are designed to require a compliant decoder to be capable of decoding all codestreams with a set of defined properties.

5.1 Profiles and Compliance Classes

Two profiles are defined in ITU-T T.800 | ISO/IEC 15444-1 Amendment 1, labeled Profile 0 and Profile 1. The two profiles describe bit stream constraints for an ITU-T T.800 | ISO/IEC 15444-1 encoder, Profile 0 is a subset of Profile 1. Hence, any implementation capable of decoding Profile 1 test streams shall be capable of passing the compliance tests for Profile 0 of the same Cclass. The BPJ2K01.10 requires compliance with Profile 1 as identified in the JPEG 2000 Test Plan. The Cclasses define levels of image quality guarantees for decoders and guidance for encoders to produce codestreams that are easily decodable by compliant decoders. Cclass guarantees increase with the increasing Cclass numbers.

5.2 Decoders

The NBN compliant decoders are required to fully decode any JPEG 2000 Part-1, Profile-1 file produced within the constraints of the NBN complexity level implemented by the NBN decoder. In order to determine the accuracy of NBN JPEG 2000 decoders, the implementation must have the means to save decoded images into an uncompressed NBN file or in the case of LPJE or SPJE either as an NBN file or a raw data file. This will allow for comparison between the decoded image and a reference test image.

5.3 Encoders and Codestreams

The ITU-T T.800 | ISO/IEC 15444-1 Amendment 1 describes two restricted profiles (Profile 0 and Profile 1) that provide limits or constraints concerning the parameter ranges and information placement in a codestream. Since codestream limitations may also adversely affect scalability and interoperability, the smallest possible numbers of limitations are imposed by these profiles. Encoders may also be required to conform to certain guarantees in particular application areas of interest that are outside the scope of IEC/ISO 15444-4. Accordingly, the BPJ2K01.10 imposes

constraints on encoders required to comply with NPJE, EPJE, TPJE, LPJE and SPJE rules as identified in the JPEG 2000 Test Plan.

5.4 Implementation Compliance Statement

Evaluation of compliance for the IUT requires the developer to complete tables C-1 through C-12 that identify the options that have been implemented in the IUT. See Annex C. This will allow the implementation to be tested for compliance against only the relevant requirements of BPJ2K01.10 and shall contain only options within the framework of requirements specified in the ISO/IEC 15444-1 Standard, the BPJ2K01.10 and NBN specifications.

5.5 Abstract Test Suites

For decoding, the J2K Test Plan uses both the Abstract Test Suites defining general tests for sub-systems of ISO/IEC 15444-1 as well as specific executable test cases developed based on the BPJ2K01.10 and NBN specifications for providing the basic test requirements specified herein.

5.6 Reference Decoder

Both a reference decoder and the Compliant Image Validation Analyzer (CIVA) will be used for the evaluation of compliance of an encoder and/or repackage capability based on the J2K and NBN capabilities of the IUT. The reference decoder is defined in ITU-T T.800 | IS 15444-5. The reference decoder has been developed by the ISO Working Group 1 committee to provide guidance for IUTs and data providers. The reference decoder will be able to decode all encoder and/or repacker developed codestreams that fall within reasonable limits of the IUT.

5.7 Encoder Compliance

It is not a requirement to implement and/or support all possible encoding modes or capabilities of either J2K or NBN. However, many modes and capabilities are desirable for many applications. It is not a requirement for an encoder or repacker to produce any specific codestream. However, any codestream that is produced must be a lcompliant J2K codestream and NBN file with acceptation of LPJE and SPJE that can be either an NBN file or simply the J2K codestream. This can be verified by decoding the codestream and/or NBN file with the reference decoder and/or CIVA.

5.8 Decoder Compliance Classes

Compliant implementations of the decoder are not required to decode each codestream in its entirety, but are required to guarantee performance up to one of a collection of Profiles, Cclasses and NBN CLEVELs. These guarantees are directly connected with the resources required by a decoder. They may be interpreted as a contract by the IUT to recover, decode and transform a well-defined minimal subset of

the information contained in any codestream and to the supported NBN CLEVEL for which NBN compliance is requested. This contract is described in a manner that scales with the Cclass. The contract may be exploited by content providers to optimize recovered image quality over a family of decoders according to their known Cclasses. For a given Profile, decoder guarantees are expressed in terms of several parameters including decoded image dimensions, H (height) and W (width), and the number of components, for the Cclass and NBN CLEVEL. The parameters are not dependent on the codestream that is actually being decoded. ISO/IEC 15444-4, Annex C defines the parameters and the classes for which compliance claims may be made and tested. When decoding NPJE, EPJE, TPJE, LPJE and/or SPJE constrained codestreams, decoders are required to fully decode such codestreams within their NBN complexity level capabilities, if applicable. For all other J2K Part 1 Profile 1 codestreams contained in NBN files, the decoder must also correctly decode the file up to the limits of the CLEVEL capabilities; in the case of LPJE or SPJE, it may simply be the J2K codestream.

6 The Compliance Testing Process

6.1 Overview

This test plan is intended for repeated use in testing compliance to the BPJ2K01.10 Profile. It is comprehensive in its applicability to the NBN test program as well as NATO Large Volume Streaming Data Sensor and STANAG 7023 community producers; consequently, portions of it may not apply to a given IUT. Therefore, supplemental test information for each implementation will be provided to the developing community before testing to identify specific test requirements applicable to the particular IUT, see Annex C. Generally, an IUT is a J2K generator, repacker and/or interpreter. All J2K test software provided by the testing agency used for testing generators, repackers and/or interpreters offer a full range of system operations to provide the ability to test the majority of required and optional capabilities performed by an IUT.

Testing usually occurs at or near the end of the software development process. However, early involvement in developing a system content specification and coordinating for test services with a testing agency is highly recommended. Developers are strongly encouraged to plan and conduct internal testing during the development phase before formal NBN, LVSD, or 7023 J2K compliance testing.

6.2 Limitations

Testing provides a high level of confidence for a successful IUT to meet compliance for NBN, LVSD, or 7023 JPEG 2000-compressed data. However, as a result of the numerous possible combinations of associated JPC parameter variations, required and optional Markers and Marker Segments that are allowed in the implementation of J2K products and if applicable for NBN within the segments and size

combinations; it is not feasible or cost effective to test all possible combinations or conditions permissible in the standards.

In recognition of these limitations, the test exercises minimum and maximum boundary conditions of the applicable standards as well as a limited set of random intermediate conditions. The test will also include any related functionality required by the IUT's requirements documents and any known community requirements.

The limitations will not affect compliance determination. The testing agency encourages sponsors of tested systems to provide feedback regarding any NBN, LVSD, or 7023 related problems arising during fielded operations. The testing agency will analyze all identified problems and take action to increase the rigor of compliance testing as needed.

6.3 Methodology

A set of test scenarios and associated test cases assist testers in effectively testing the ability of the IUT to generate, repackage and/or interpret a JPEG Codestream (JPC), and in the case of NBN-capable IUTs that NBN compliant data files are processed. Testers use test scenarios and cases to measure JPC or JPC and NBN compliance against criteria derived from the BPJ2K01.10 and in the case of NBN IUTs applicable NBN format specifications. By reviewing the IUT capability column in tables C-1 through C-12, testers can determine what subtests are applicable for the testing process. Each individual subtest contains specific criteria that determine to what extent the generator, repackage process, and/or interpreter functions conform to JPC and/or NBN specifications.

6.3.1 Encode/Generate

Before the generate portion of testing, the sponsor designates the specific capabilities and features the IUT is required to support. To determine a NBN, LVSD, or 7023 compliance requirement level, the IUT developer should complete the "IUT Capability" column in tables C-1, C-2, C-3, C-4, C-5, C-6, C-10, C-11, and C-12 located in Annex C prior to testing. The completion of these tables defines the capabilities of the generator being tested and provides the tester information on what subtests to omit (if any) during testing. The IUT developers and testers will determine the scenario used during generation based upon the information collected from the appropriate Annex C tables. The IUT generates test case files under the guidance of the test scenario to the bounds of the associated parameter variations, optional support for Markers and Marker Segments, as well in the case of NBN generators non-JPC data type optional support. Following the directions from each applicable subtest, the testers evaluate the resulting test case files for compliance with the applicable portions of the JPC and applicable specifications using automated test tools and visual inspection.

Following are the steps the IUT developer and tester take to determine the subtests to use or omit for testing a generator.

- *Step 1:* The IUT developer completes the Generate/Encode Capabilities Tables C-1, C-2, C-3, C-4, C-5, C-6, C-10, C-11, and C-12. Developers mark "S" in the "IUT Capability" column for the functions supported by the generator under test.
- *Step 2:* Based upon the results in Step 1, the tester determines what test scenarios are applicable (see Annex E).
- *Step 3:* Based upon the results in Step 2, the tester determines what subtests are applicable from Annex A.
- *Step 4:* The tester gathers all subtests applicable to the IUT and runs each test for the appropriate JPC supported Markers and Marker Segments listed in the Data Requirements section, following the instructions in the Test Procedures section of each subtest.
- *Step 5:* The tester determines whether the criteria listed in each subtest are met, and documents the results in the Generate/Encode Capabilities Tables (from *Step 1*).

Following are the subtests for generation, the full descriptions and test criteria are provided for each Subtest in Clause 8.

- Subtest 1, Minimum Required Markers and Marker Segments
- Subtest 2, Ordering of Required Markers and Marker Segments
- Subtest 3, Start of Tile-Part (SOT, 0xFF90) Marker Segment
- Subtest 4, Image and Tile Size (SIZ, 0xFF51) Marker Segment
- Subtest 5, Code Style Default (COD, 0xFF52) Marker Segment
- Subtest 6, Coding Style Component (COC, 0xFF53) Marker Segment
- Subtest 7, Region of Interest (RGN, 0xFF5E) Marker Segment
- Subtest 8, Quantization Default (QCD, 0xFF5C) Marker Segment
- Subtest 9, Quantization Component (QCC, 0xFF5D) Marker Segment
- Subtest 10, Progression Order Change (POC, 0xFF5F) Marker Segment
- Subtest 11, Tile-Part Length (TLM, 0xFF55) Marker Segment
- Subtest 12, Packet Length Main Header (PLM, 0xFF57) Marker Segment
- Subtest 13, Packet Length Tile Header (PLT, 0xFF58) Marker Segment
- Subtest 14, Packed Packet Main Header (PPM, 0xFF60) Marker Segment
- Subtest 15, Packed Packet Tile Header (PPT, 0xFF61) Marker Segment
- Subtest 16, Start of Packet (SOP, 0xFF91) Marker Segment
- Subtest 17, End of Packet Header (EPH, 0xFF92) Marker
- Subtest 18, Component Registration (CRG, 0xFF63) Marker Segment
- Subtest 19, Comment (COM, 0xFF64) Marker Segment
- Subtest 20, Empty Tiles
- Subtest 21, Multiple Codestreams
- Subtest 22, Numerically Lossless Encoding
- Subtest 23, NBN File Structure Values for Associated JPC Values
- Subtest 24, NBN File Structure Function for Associated JPC Function

- Subtest 25, Minimum Required NPJE, EPJE, TPJE, LPJE and SPJE Markers and Marker Segments
- Subtest 26, Ordering of Required NPJE, EPJE, TPJE, LPJE and SPJE Markers and Marker Segments
- Subtest 27, Start of Tile-Part (SOT, 0xFF90) Marker Segment NPJE Restrictions
- Subtest 28, Start of Tile-Part (SOT, 0xFF90) Marker Segment EPJE Restrictions
- Subtest 29, Start of Tile-Part (SOT, 0xFF90) Marker Segment TPJE Restrictions
- Subtest 30, Start of Tile-Part (SOT, 0xFF90) Marker Segment LPJE or SPJE Restrictions
- Subtest 31, Image and Tile Size (SIZ, 0xFF51) Marker Segment with NPJE and EPJE Restrictions
- Subtest 32, Image and Tile Size (SIZ, 0xFF51) Marker Segment with TPJE Restrictions
- Subtest 33, Image and Tile Size (SIZ, 0xFF51) Marker Segment with LPJE and SPJE Restrictions
- Subtest 34, Code Style Default (COD, 0xFF52) Marker Segment with NPJE Restrictions
- Subtest 35, Code Style Default (COD, 0xFF52) Marker Segment with EPJE Restrictions
- Subtest 36, Code Style Default (COD, 0xFF52) Marker Segment with TPJE Restrictions
- Subtest 37, Code Style Default (COD, 0xFF52) Marker Segment with LPJE and SPJE Restrictions
- Subtest 38, Quantization Default (QCD, 0xFF5C) Marker Segment with NPJE and EPJE Restrictions
- Subtest 39, Quantization Default (QCD, 0xFF5C) Marker Segment with TPJE Restrictions
- Subtest 40, Quantization Default (QCD, 0xFF5C) Marker Segment with LPJE and SPJE Restrictions
- Subtest 41, Quantization Component (QCC, 0xFF5D) Marker Segment with NPJE and EPJE Restrictions
- Subtest 42, Quantization Component (QCC, 0xFF5D) Marker Segment with TEPJE Restrictions
- Subtest 43, Quantization Component (QCC, 0xFF5D) Marker Segment with LPJE and SPJE Restrictions
- Subtest 44, Tile-Part Length (TLM, 0xFF55) Marker Segment with NPJE Restrictions
- Subtest 45, Tile-Part Length (TLM, 0xFF55) Marker Segment with EPJE Restrictions
- Subtest 46, Tile-Part Length (TLM, 0xFF55) Marker Segment with TPJE Restrictions
- Subtest 47, Tile-Part Length (TLM, 0xFF55) Marker Segment with LPJE and SPJE Restrictions
- Subtest 48, Packet Length Tile Header (PLT, 0xFF58) Marker Segment with NPJE Restrictions

- Subtest 49, Packet Length Tile Header (PLT, 0xFF58) Marker Segment with EPJE Restrictions
- Subtest 50, Packet Length Tile Header (PLT, 0xFF58) Marker Segment with TPJE Restrictions
- Subtest 51, Packet Length Tile Header (PLT, 0xFF58) Marker Segment with LPJE and SPJE Restrictions
- Subtest 52, Marker and Marker Segments Not Recommended and Not Allowed for NPJE, EPJE, TPJE, LPJE and SPJE
- Subtest 53, Generation of J2KLRA
- Subtest 54, Generation of Non-J2K NBN Segments
- Subtest 55, Generation of NBN file header and CLEVEL population

6.3.2 Decode/Interpret

For interpret testing, the tester supplies the IUT with reference test case files designed to exercise the required capabilities for all interpret applications. Testers also present the IUT with test case files designed to exercise the JPC and/or NBN features, and those optional features the IUT may support as designated by the test sponsor. The IUT processes, displays, prints, or otherwise renders the test case file content. Testers, guided by a test scenario checklist, inspect and evaluate the IUT capabilities to read/interpret the test cases according to the established test criteria.

Following are the steps the IUT developer and tester take to determine the subtests to use or omit for testing an interpreter.

- *Step 1:* The IUT developer completes the JPC and/or NBN Functional Support Interpret Feature Summary Tables C-7, C-9, C-11, and C-12. Developers mark “S” in the “IUT Capability column for the functions supported by the interpreter under test.
- *Step 2:* Based upon the results in Step 1, the tester determines what test scenarios are applicable (see Annex E).
- *Step 3:* Based upon the registration level requested, the tester determines what subtests are applicable from Annex A.
- *Step 4:* Based upon identified scenarios and subtests identified in Steps 2 and 3, the tester views the Test Cases for Interpretation (Table F-6) and documents the test cases to use for testing the IUT.
- *Step 5:* The tester gathers and organizes all test case sample files as well as the corresponding files providing the specific input values.
- *Step 6:* The tester gathers all subtests applicable to the IUT and runs each test case called for in the Data Requirements section, following the test scenario called for in the Test Procedures section of each subtest.
- *Step 7:* The tester determines whether the criteria listed in each subtest are met, and documents the results in the Functional Support Interpret Feature Summary spreadsheet (from *Step 1*).

Following are the subtests for interpretation, the full descriptions and test criteria are provided for each Subtest in Clause 9.

- Subtest 56, Decoding of Minimally Required Markers and Marker Segments
- Subtest 57, Start of Tile-Part (SOT, 0xFF90) Marker Segment
- Subtest 58, Image and Tile Size (SIZ, 0xFF51) Marker Segment
- Subtest 59, Code Style Default (COD, 0xFF52) Marker Segment
- Subtest 60, Coding Style Component (COC, 0xFF53) Marker Segment
- Subtest 61, Region of Interest (RGN, 0xFF5E) Marker Segment
- Subtest 62, Quantization Default (QCD, 0xFF5C) Marker Segment
- Subtest 63, Quantization Component (QCC, 0xFF5D) Marker Segment
- Subtest 64, Progression Order Change (POC, 0xFF5F) Marker Segment
- Subtest 65, Tile-Part Length (TLM, 0xFF55) Marker Segment
- Subtest 66, Packet Length Main Header (PLM, 0xFF57) Marker Segment
- Subtest 67, Packet Length Tile Header (PLT, 0xFF58) Marker Segment
- Subtest 68, Packed Packet Main Header (PPM, 0xFF60) Marker Segment
- Subtest 69, Packed Packet Tile Header (PPT, 0xFF61) Marker Segment
- Subtest 70, Start of Packet (SOP, 0xFF91) Marker Segment
- Subtest 71, End of Packet Header (EPH, 0xFF92) Marker
- Subtest 72, Component Registration (CRG, 0xFF63) Marker Segment
- Subtest 73, Comment (COM, 0xFF64) Marker Segment
- Subtest 74, Marker Segment Precedence Main Header over Main Header
- Subtest 75, Marker Segment Precedence Tile Header over Tile Header
- Subtest 76, Marker Segment Precedence Tile Header over Main Header
- Subtest 77, Terminating Processing of NBN JPC Files
- Subtest 78, Presentation of JPC with Reduced Processing
- Subtest 79, JPC Precedence over NBN Image Sub-header for Associated Values
- Subtest 80, Processing a Truncated JPC
- Subtest 81, Interpretation of Non-J2K NBN Segments
- Subtest 82, Interpretation of J2KLRA
- Subtest 83, Interpret JP2 File Format

6.3.3 Repackage

During the repackage portion of testing, the test sponsor designates the specific JPC NBN capabilities and features the IUT is required to support. To determine a compliance requirement level, the IUT developer should complete the “IUT Capability” column in Annex C Tables C-1, C-2, C-3, C-4, C-5, C-6, C-7, C-8, C-10, C-11, and C-12 prior to testing. Note: The high level repacking is primarily based on Table C-8; however, as repackaging is partial regeneration of the file, select portions of the Generation subtests will be reviewed. The completion of these tables defines the capabilities of the repackaging process being tested, thereby supplying the tester information on what subtests to omit (if any) during testing. The IUT developers and testers will determine the scenario used during repackaging based upon the information collected from the appropriate Annex C tables. The IUT repackages test case files

under the guidance of the test scenario to the bounds of the associated parameter variations, optional support for Markers and Marker Segments as well as optionally support NBN non-JPC data types. Following the directions from each applicable subtest, the testers evaluate the resulting test case files for compliance with the applicable portions of the JPC and applicable specifications using automated test tools and visual inspection.

Following are the steps the IUT developer and tester take to determine the subtests to use or omit for testing a repackaging process.

- *Step 1:* The IUT developer completes the applicable Generate/Encode Capabilities Tables C-1, C-2, C-3, C-4, C-5, C-6, C-7, C-8, C-10, C-11, and C-12 for repackaging. Developers mark “S” in the “IUT Capability” column for the functions supported by the repackage process under test.
- *Step 2:* Based upon the results in Step 1, the tester determines what test scenarios are applicable (see Annex E).
- *Step 3:* Based upon the results in Step 2, the tester determines what subtests are applicable from Annex A.
- *Step 4:* The tester gathers all subtests applicable to the IUT and runs each test for the appropriate JPC supported Markers and Marker Segments listed in the Data Requirements section, following the instructions in the Test Procedures section of each subtest.
- *Step 5:* The tester determines whether the criteria listed in each subtest are met, and documents the results in the applicable Configuration Tables (from *Step 1*).

Following are the subtests for repackaging, the full descriptions and test criteria are provided for each Subtest in Clause 10

- Subtest 84, Decomposition Levels (Resolution)
- Subtest 85, Quality Layers (Reduction)
- Subtest 86, Components (Fewer Bands)
- Subtest 87, Positional Subset (Chipping) On Tile Boundaries
- Subtest 88, Positional Subset (Chipping) Off Tile Boundaries
- Subtest 89, Positional Subset (Chipping) On Codeblock Boundaries
- Subtest 90, Progression Order

6.4 Resources

The IUT sponsor is responsible for providing all required hardware/software and a trained operator for NBN J2K compliance testing. Depending upon the particular IUT configuration, the sponsor is also responsible for providing peripherals and any special ancillary hardware. The Cclass and CLEVEL for which an implementation is being tested, personnel and equipment availability, and the amount of pre-test coordination will impact the overall test time.

6.5 Test Schedule

An NBN J2K file format compliance test will require approximately three working days for a low-end encode/generate or decode/interpret CLEVEL 03 system. A comparable test for a high-end, CLEVELs 06 and 07, fully encode/generate-, repackaging-, and decode/interpret-capable system may require up to ten working days. Testing LVSD or STANAG 7023 for J2K codestream compliance, based on the robustness of the encode/generate-, repackaging-, and decode/interpret-capable system, may require up to five working days The test agency may publish supplemental test information before testing that will include specific milestones and test schedules for each IUT. These projections assume minimal required rework and regression testing, as discussed in Clause 8.4.1.2 and 8.4.2.2.

6.6 Format Structure

For testing of NBN, LVSD or 7023 IUTs this test plan fully addresses JPC requirements; additionally, for NBN capable IUTs the NBN format structure will be addressed. The NBN file header and sub-headers include data elements, identifying originator information, security, date and time and other associated information about the file content. See Figure 1 for a diagram of the NBN file structure.

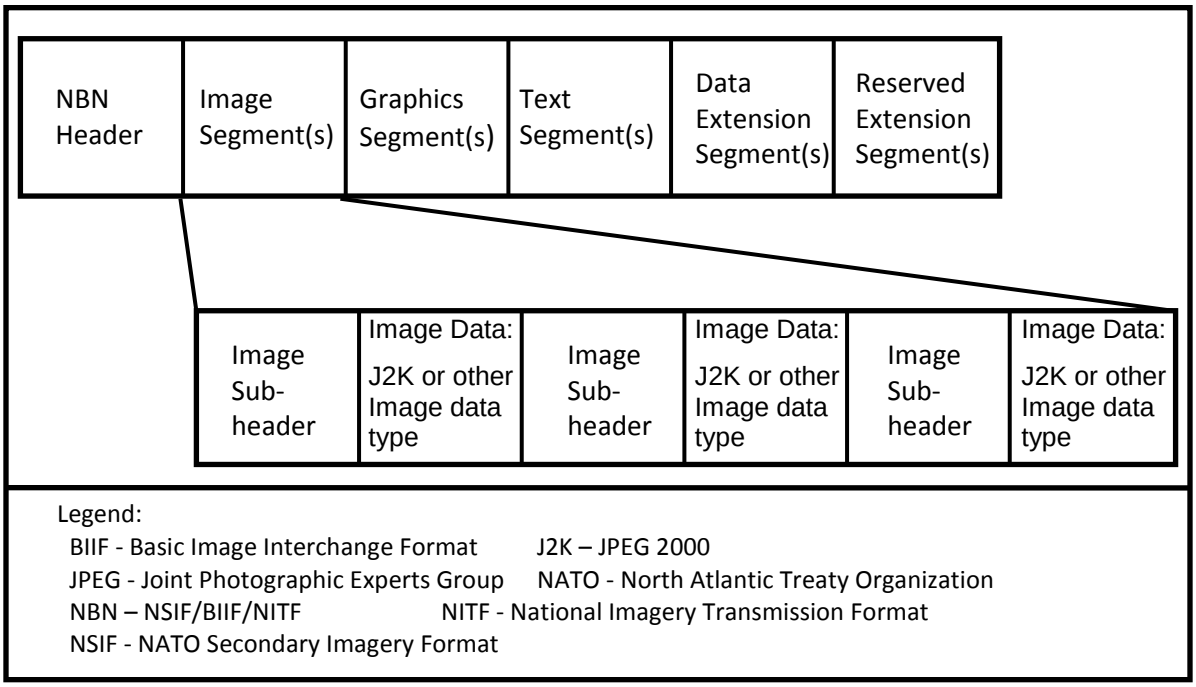

Figure 1. NBN File Structure

6.7 Registration Forms

The test sponsor will submit an inventory of hardware and software configuration items and desired test dates as listed in the J2K Registration Forms (JRF) to the appropriate testing agency when making a request for J2K compliance registration testing under BPJ2K01.10. (See Annex F).

7 Details of Test

This test plan addresses compliance test types for J2K: encode/generation, repackaging, and decode/interpretation plus compliance to NBN. The following sections describe each type of testing with high-level objectives and test procedures. As indicated in preceding clauses, testing for a specific IUT will include a combination of subtests from one or more of the three test types depending on the intended implementation's functionality, Cclass, and CLEVEL.

8 Generation (Encoding) of J2K Segments

Each J2K- or NBN J2K-compressed product is created to enable various functions and capabilities. Within each subtest, the test criteria cover all optional and required JPC features. Therefore, the criteria for optional features may apply differently for a particular IUT depending on the JPC features chosen for implementation. The overall test approach for J2K encoding is based upon 3 high level operational scenarios to assess the extent of the JPC and/or NBN capabilities. The associated scenarios are broken down into sub-scenarios and are repeated based on the IUT capabilities for

supported parameter variations, required and optional markers and marker segments as well as support for optional JPC and NBN data types based on operational requirements. Each requested scenario generates specific data from the source product, which creates the JPC image and if applicable with the associated NBN wrapper applicable to the scenario. Annex E provides details on each scenario, sub-scenario and individual test case files.

8.1 Objective

The test agency will test the IUT to determine the degree to which the IUT can generate J2K or NBN J2K-compressed products in a manner compliant with the BPJ2K01.10 using test cases and scenarios.

8.2 Criteria

All criteria pertaining to individual subtests are listed under each subtest section.

8.3 Data Requirements

The following data requirements are common for all subtests. The data requirement section for each subtest describes if an individual subtest may include additional or unique data requirements pertaining to that subtest.

8.3.1 Criteria Related

- Digital copies of each control file/image, to include original image parameters, presented to the IUT for generating a J2K or NBN J2K file
- For numerically lossless testing, an original uncompressed image source file
- Digital copies of J2K or NBN J2K files as generated by the IUT
- Manual or automated data collection forms with any file format related anomalies noted

8.3.2 Configuration Management Data

The JRF submitted during pre-test preparation will be updated based on final test configuration of IUT J2K or NBN J2K executables to include:

- Size in bytes
- Date/time stamp information
- Application, compiler(s)/linker(s) name(s)/version(s)
- Available IUT documentation
- If feasible based on the IUT, “installable” (i.e., licensed) useable copy of IUT executable software. (NOTE: Used for a baseline test configuration control, isolating, identifying and verifying reported problems from the field.)
- Personnel Data. Information on personnel follows:
  - Names of the test team members

  - The IUT sponsor
  - Organization
  - Point of Contact
  - Address
  - Phone Number
  - E-mail
- The developer team, to include system operator during the test:
  - Name
  - Point of Contact
  - Address
  - Phone Number
  - E-mail
- Intended field operator (for usability evaluation)
  - Projected training requirements to operate system

8.3.3 Supplemental Data

Descriptions of problems or anomalies encountered in the encoding/generation, repacking and decoding/interpretation of NBN J2K files.

8.4 Test Procedures for Generation

The following test procedures are common for all subtests. Individual subtests may indicate additional procedures pertaining to that subtest and are under the test procedures sections in each subtest.

8.4.1 Test Conduct

8.4.1.1 Test Process

The generation test process requires the IUT to generate test cases under the guidance of specified test scenarios (Annex E) as mutually designed by the IUT developer and tester. The test scenarios consist of a variety of J2K capabilities individually focused on specific test criteria from a cross section of the subtests. Collectively, the J2K test scenarios address all test criteria identified in the BPJ2K01.10 specification. The steps for generation testing are as follows:

(a) Test case files containing J2K image segment(s) are produced by the generator under test according to the scenarios and test case designs relevant to the capabilities of the generator.

(b) Test case files are evaluated by the tester per the objectives, criteria and any other test processes described in the subtests. The test case files are evaluated following the process shown in Figure 2.

8.4.1.2 Regression Testing

Any configuration changes made during any portion of the test requires regression testing for the appropriate tests previously conducted. If testing falls behind schedule, the test director determines whether testing can be continued or should be rescheduled.

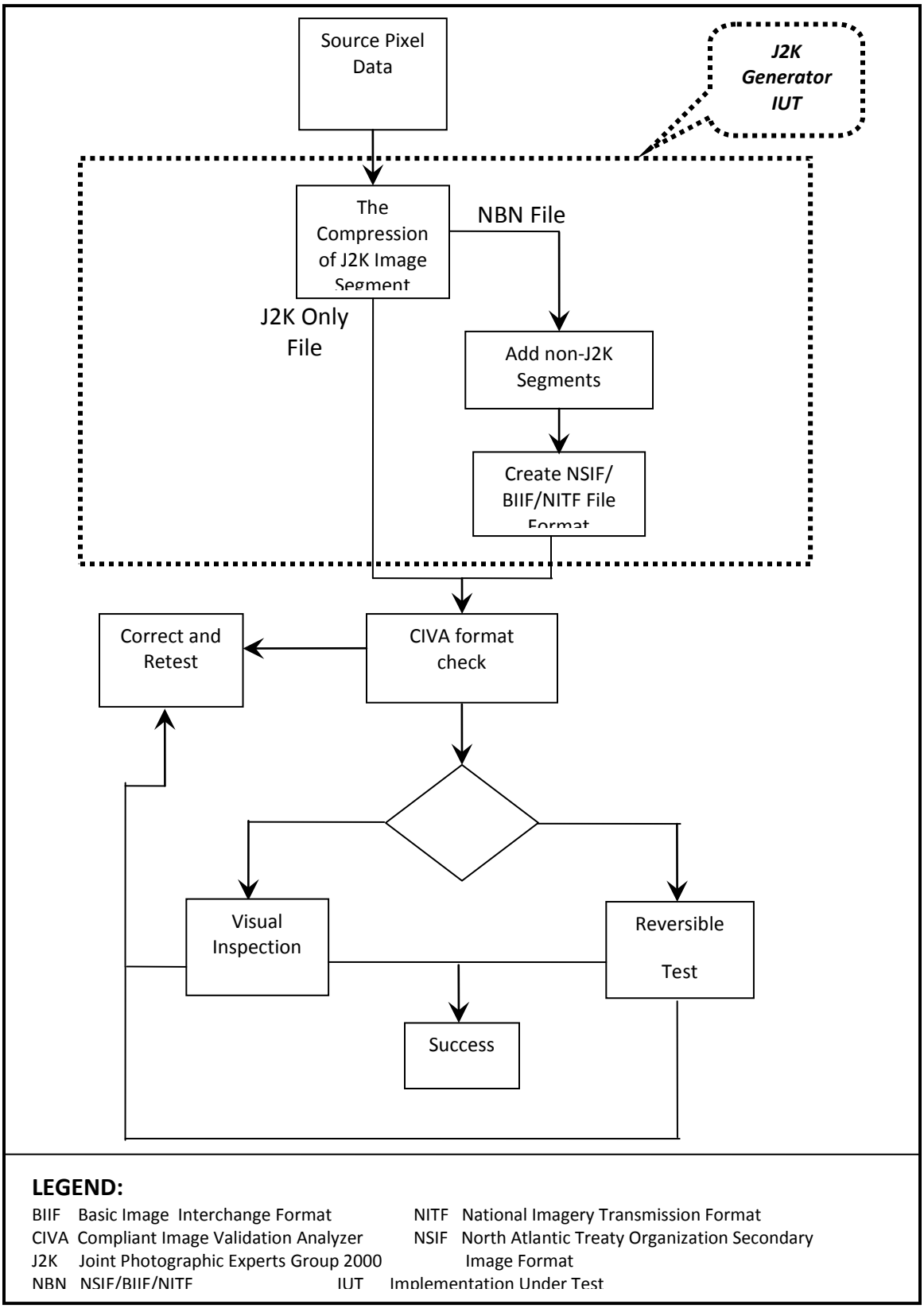

Figure 2. J2K Generate Test Process

8.4.2 Data Collection

8.4.2.1 Criteria Related Data

Criteria related data requirements apply to generate functions of an IUT.

(a) Generate. Testers will collect digital copies of the files generated by the IUT. The CIVA, a test tool developed by JITC, parses and analyzes file(s) visually and electronically for format and range compliance checks. The file(s) will be introduced to the trusted J2K interpreter to provide testers a displayed image for comparison to the source product. Additionally, for any source products created using a reversible 5-3 filter the file(s) will be decompressed and a binary comparison will be done using the source product to ensure the J2K compressed product is truly numerically lossless. Test team observations are recorded using manual and automated data collection means. The tester completes the appropriate generate summary tables in Annex C to select the criteria in each applicable subtest that has passed. If one of the criteria does not pass, testers will put a description of the problem in the Comments column. If an IUT does not support generation of a specific criteria or subtest, testers will mark the Pass Criteria column with “N/A”. The IUT meets all requirements for compliance once all possible functions the IUT can generate are measured against applicable subtest criteria and passed as valid data.

(b) Test Incident Reports (TIRs). In order to maintain an audit-trail of anomalies and observations made during the testing process, the test team will use TIRs. The use of TIRs provides a consistent method for tracking anomalies and observation(s) from time of discovery to final resolution. When possible, TIRs are categorized based on their impact on compliance and field operations. Figures 3, 4 and 5 provide an example of the TIR report documentation.

J2K/NBN System Summary of Test Incident Reports

TIR Number	Title/Description	Impact Level	Status	
			Opened (mm/dd/yy)	Closed (mm/dd/yy)
GEN-J2K-001	The IUT failed to mark the profile identifier correctly when generating J2K products.	1	01/01/08	
GEN-J2K-002	The IUT failed to include the required QCD marker segment in the Main Header of the JPC.	1	01/01/08	
GEN-J2K-003	The IUT failed to tile correctly in accordance with NPJE requirements.	1	01/01/08	

LEGEND:

dd	day	NBN	NSIFT/Basic Image Interchange Format/NITF
IUT	Implementation Under Test	NITF	National Imagery Transmission Format
J2K	Joint Photographic Experts Group 2000	NPJE	NSIF Preferred J2K Encoding
JPC	J2K Codestream	NSIF	NATO Secondary Imagery Format
mm	month	TIR	Test Incident Report
NATO	North Atlantic Treaty Organization	yy	year

Figure 3. Summary of TIRs

* **Test Incident Report (DTIR) System:** The TIR System identifies problems and expresses issues in five quantifiable levels of importance. The DTIR System provides a greater utility in the decision making process for Government and Commercial Program Offices when determining the priority of each impact and expenditures of funds for correcting the individual issues. The DTIR System employs weighted priority levels as follows:

LEVEL 1 – J2K/NBN Critical Compliance Issue: The problem clearly[1] violates one or more of the NBN related program documents or specifications, and is deemed to have an immediate adverse operational impact on the user community. Developers are directed to correct this level prior to the current NBN J2K registration. Examples of level 1 Test Incident Reports (TIRs) include unsound J2K/NBN file structural integrity, incorrect Complexity Level (CLEVEL), or non-ASCII in header areas, out-of-range values in a "prominent" or critical field of a Tagged Record Extension (TRE) or NBN header/sub-header.

LEVEL 2 - J2K/NBN Critical Interoperability Issue: The problem clearly violates one or more implementation program, related doctrine, or specifications documents for interfacing NBN applications and is deemed to have an immediate adverse operational impact on the user community. Developers are strongly encouraged to correct prior to the current J2K or NBN J2K registration. Examples of level 2 TIRs include non-conformant product specification contents of critical fields such as "ITITLE"/"FTITLE" formulation, inconsistent values among similar fields in a file that are not in harmony with each other, such as image acquisition time and the "IDATIM" field, insistent data mapping contents.

LEVEL 3 - J2K/NBN Compliance Technicality: The problem clearly violates one or more of the NBN related program documents; however, it appears to be a technical violation characterized as having no immediate operational impact on the user community. A Compliance Technicality will not impede current J2K or NBN J2K compliance registration efforts. Developers may elect to not correct the anomaly at the time of discovery. However, based on the severity for the problem it may need to be corrected prior to the next NBN registration event. Examples of level 3 TIRs include incorrect Computer Graphic Metafile font size that has no apparent immediate operational impact; main header "FL" field does not match actual stored file size, blank image sub-header "IID" field, blank "OSTAID" field, no leading zeros in an alphanumeric field, or TRE or header/sub-header value that is within its established range but still incorrect.

LEVEL 4 - J2K/NBN Interoperability Technicality: The problem clearly violates one or more interface implementation program, related doctrine, or specifications documents; however, it appears to be a technical violation characterized as having no immediate operational impact on the user community. Corrective actions will be recommended at the time of discovery. Examples of level 4 TIRs include identifying lower-case field entries when upper-case is specified or no leading zeros in an alphanumeric field.

LEVEL 5 - J2K/NBN Observation: The anomaly does not appear to violate any written or implied doctrine or specification; however, the finding may be of questionable practicality, utility, or functionality. Observations are presented as information only, and any further action will be at the discretion of the developer/program manager. Even though an observation is identified in this TIR, usability or impact may dictate corrective action by the developer prior to J2K or NBN J2K product registration. Examples of level 5 TIRs include 8-to-11 bit file conversions otherwise NBN-compliant, any "usability" issue, malfunctioning user interface options, blank image sub-header "ICOM" fields, and unsolicited but correct "IGEOLO" conversion, etc.

[1] "Clearly" is defined to mean that a document, page, and clause can be cited to indicate the violation

LEGEND:

ASCII	American Standard Code for Information Interchange	J2K	Joint Photographic Experts Group 2000	TIR	Test Incident Reports
CLEVEL	Complexity Level	NBN	North Atlantic Treaty Organization Secondary Imagery Format/Basic Image Interchange Format/National Imagery Transmission Format	TRE	Tagged Record Extension
DTIR	Dynamic Test Incident Report				

Figure 4. Test Incident Report System

TIR NUMBER: GEN-J2K-001 **TIR OPENED:** 01 JAN 2008
TIR UPDATED: _____ **TIR CLOSED:** _____

TEST INCIDENT REPORT
IUT Evaluation System Version 2.1

TEST CASE (S): All Generate Test Cases

STANDARD/SPECIFICATION: BPJ2K01.10 Table 7.6, SIZ Marker, Rsiz Field

CRITERIA: Rsiz field will be marked a Profile 1

RELATED TIRs: None

TITLE: The Rsiz field in the Image and Tile Size Marker Segment is incorrectly marked as unrestricted profile.

DESCRIPTION: The application under test is marking the Rsiz field in the Image and Tile Size (SIZ) Marker Segment with the binary value of "0000 0000 0000 0000" which represent the unrestricted J2K profile. The correct value of NBN products is the binary value of "0000 0000 0000 0010" which represents Profile-1 compliance.

IMPACT: Some applications will not process the resulting products assuming that these products contain factors beyond those supported for Profile-1 compliance.

RECOMMENDATION: Developer investigates and corrects this anomaly such that the RIZ field in the SIZ marker segment is marked with the correct profile identifier. This issue must be corrected prior to completion of current Compliance registration event.

_____
TEST DIRECTOR

CORRECTIVE ACTION:

CLOSED: _____ _____
TEST DIRECTOR **DATE**

LEGEND:

IUT Implementation Under Test	NBN North Atlantic Treaty Organization Secondary Imagery Format/Basic Image Interchange Format/National Imagery Transmission Format	TIR Test Incident Report
J2K Joint Photographic Experts 2000		

Figure 5. Sample TIR

8.4.2.2 Configuration Management Data

(a) Pre-test Configuration. Prior to testing, the tester collects and reviews JRF Test Registration forms (See Annex E) completed by the test sponsor. The IUT capabilities are reviewed by the tester, in relation to J2K functionality requirements; verification is made of which J2K functional capabilities have or have not been implemented on the system (see Annex B). The test sponsor will ensure the pre-test configuration is the same as the intended operational/fielded configuration. The IUT sponsor should notify the test director if for any reason the test configuration differs from the actual planned operational deployment configuration of the system, otherwise the test might be delayed.

(b) Configuration Changes Done during Testing. Changes may be made to the generator and/or the system during testing to correct any problems that arise. In the event this occurs, the test sponsor and test director will assess the impact of changes on the test objectives. The final test configuration should reflect the actual fielded/operational software and hardware configuration to ensure the fielded version is the tested version. Depending on the changes made, regression testing may be required, adding to the duration of the overall test event.

(c) Final Test Configuration. At the conclusion of the test, the IUTs J2K and if applicable the NBN executable(s) will have been identified and recorded. If, after the successful conclusion of the test, the sponsor makes changes or finds other problems during a final Quality Assurance test, they should notify the appropriate test agency at which time a determination will be made if any additional/regression testing is required. Annex B provides the configuration information recorded during the test and provided in the final test report. Furthermore, when feasible, the appropriate test agency will archive and retain a copy of the final base-line IUT application software, to include indefinite licenses and documentation. The final configuration is the only registered configuration, upon successful test completion.

8.4.2.3 Supplemental Data

Descriptions of problems or anomalies encountered in the generation of J2K files are manually recorded on data collection forms tailored to each test file/scenario and recorded in TIRs.

8.5 Presentation of Results

The following presentation of results is common for all subtests. Individual subtests may indicate additional data requirements pertaining to that subtest.

8.5.1 Criteria Related

The J2K or NBN J2K Compliance Test Report provides a test results summary matrix, which presents the pass/fail status of all subtests, and the overall compliance test. Table 1 provides an abbreviated example of this matrix.

Table 1. Sample Generation Test Results Summary

JPEG 2000 FUNCTIONAL SUPPORT CAPABILITY GENERATE/ENCODE FEATURE SUMMARY						
Compliance Criteria	**IUT Capability**	**R/O**	**Results**			**Comments**
			P	**F**	**N**	
1. Encode JPEG 2000, Part 1 Profile-1 Compliant Codestreams Unrestricted.						
1.1 SOC Marker.	G	R	X			
1.2 SOT Marker.	G	R	X			
1.3 SOD Marker.	G	R	X			
1.4 EOC Marker.	G	R	X			
1.5 SIZ Marker.	G	R	X			
1.6 COD Marker.						
Appears in the *Main Header* of the JPC.	G	R	X			
Appears no more than once in the first *Tile-Part Header* of any tile of the JPC.	N	O			X	
1.7 COC Marker.						
Appears no more than once per component within the *Main Header* of the JPC.	N	O			X	
Appears in the first *Tile-Part Header* of a given tile in the JPC.	N	O			X	
1.8 RGN Marker.						
Appears, no more than once per component, in the *Main Header* of the JPC.	N	O			X	
Appears in the first *Tile-Part Header* of a given tile in the JPC.	N	O			X	
1.9 QCD Marker.						
There is one, and only one, QCD marker (0xFF5C) appearing in the *Main Header* of the JPC.	G	R		X		JPC failed to include QCD segment.
No more than one appears in the first *Tile-Part Header* of any tile of the JPC.	N	O			X	
1.10 QCC Marker.						
Appears no more than once per component, within the *Main Header* of the JPC.	N	O			X	
Appears no more than once per component, in the first *Tile-Part Header* of a given tile in the JPC.	N	O			X	

LEGEND:

Capability:	JPC Joint Photographic Experts Group 2000 Codestream	Results:
G Generation		F Fail
N No generation	JPEG Joint Photographic Experts Group	N Not supported
IUT Implementation Under Test	O Optional	P Pass
	R Required	

When anomalies affecting compliance are detected, a summary narrative is used in the test report to identify and briefly describe the anomaly. The TIRs explain in sufficient detail all test criteria issues and are included in the test report as an Appendix. Reference(s) are included in the TIRs to specify the failed subtest criteria.

8.5.2 Other

A descriptive narrative provides anomalies and other findings.

8.6 Analysis and Discussion

The approach for analysis and discussion is common for all subtests. Individual subtests may indicate additional areas of focus pertaining to that subtest.

Based on the total analysis of test results, the test team will recommend one of the following to the test director:

- Recommend unconditional compliance registration
- Recommend compliance registration with comment on compliance findings and observations not significant enough to prevent registration but are provided as information only
- Recommend provisional compliance registration identifying compliance findings and observations not significant enough to warrant the cost and delay of immediate correction and retesting, but recommend correcting with the next system version update/release
- Recommend compliance registration be withheld until significant compliance findings identified are corrected and the system is successfully retested

8.6.1 Criteria Related

The test team will examine the collected test data to verify the IUT correctly generates J2K codestreams and/or NBN J2K formatted files. Overall compliance with all applicable subtest criteria was exercised in determining the IUT compliance in relation to the subtest objective. The analysis includes determining, for generation, that all required fields are present and, if so, verifying they contain the correct data. Testers will discuss and record all non-compliance instances of non-compliance with sponsors and/or developers to clarify the impact of non-compliance related issues based on operational impact to clarify the operational consequences.

8.6.2 Other

Testers will discuss other findings as necessary to clarify operational impacts of J2K evaluation and/or other NBN J2K-related issues.

9 Interpretation (Decoding) of LPJE, SPJE and/or NBN J2K Segments

The interpretation test process requires the IUT to interpret J2K and/or NBN control files (test cases) in accordance with the specified test scenarios. The test scenarios consist of a variety of J2K and NBN J2K files that individually focus on specific test criteria from a cross section of the subtests. Collectively, the test files cover all the test criteria identified in both BPJ2K01.10 and the Allied Engineering

Documentation Publication (AEDP) - 4 for NATO Secondary Imagery Format (NSIF) STANAG 4545 (Edition 2) Implementation Guide in the case of JPC data users.

For NBN testing most of the test combinations are tested within the test case files and they have been placed within the CLEVEL 03 test cases files with the assumption that if higher CLEVEL IUTs can process these products at lower CLEVELs they can process them at any CLEVEL. The testing however does attempt to cover a number of combinations at all CLEVELs and Cclasses in order to mitigate possible issues with present and future implementation; however, some limited risk may exist for interpreters.

The overall test approach for J2K decoding is based upon 6 high level operational scenarios to assess the extent of the JPC and when applicable NBN capabilities. The associated scenarios are broken down into sub-scenarios that cover specific requirements based on 83 test cases files based on the IUT capabilities for supported parameter variations, required and optional markers and marker segments as well as support for optional JPC and if applicable NBN data types based on operational requirements. Each test case file requests that the IUT present the pixels and associated data as intended by the encoded control files. Annex D provides details on each scenario, sub-scenario and individual test case files.

9.1 Objective

Testers will test the system to determine the degree to which the IUT interprets J2K and when applicable NBN J2K files compliant with the associated specifications.

9.2 Criteria

Each subtest is comprised of unique criteria as listed in that subtest.

9.3 Data Requirements

The following data requirements are common for all subtests. Individual subtests may indicate additional data requirements pertaining to that subtest.

9.3.1 Criteria Related.

- Digital copy of each reference test case presented to the IUT
- Digital and/or hard copy of each reference solution set used
- Digital and/or hard copy of comparison display values between reference test cases and the IUT
- Digital and/or hard copy of error messages based on occurrence

9.3.2 Configuration Management Data

See section 8.3.2.

9.3.3 Supplemental Data

See section 8.3.3.

9.4 Test Procedures for Interpretation

The following test procedures are common for all subtests. Individual subtests may indicate additional procedures pertaining to that subtest.

9.4.1 Test Conduct

9.4.1.1 Test Process

The interpretation test process requires the IUT to interpret J2K or applicable NBN J2K files in accordance with the specified test scenarios. The test scenarios consist of a variety of J2K capabilities individually focused on specific test criteria from a cross section of the subtests. Collectively, the NBN J2K test scenarios cover the entire test criteria identified in the NBN J2K specification. Figure 6 provides an overview of the interpret test process.

The interpret process begins with the reference test cases. These reference test cases are provided as J2K files or NBN files with J2K image segments embedded, and for each set, a file of expected values from user input and display values from the IUT correspondences. The steps for interpretation testing are as follows:

(a) The test team will create a set of control files containing all features identified in the criteria.

(b) These files will be loaded to a network file server, optical or magnetic media, or otherwise made accessible to the IUT.

(c) Each file will be accessed by the IUT and displayed, printed, and/or rendered in another manner by the IUT.

(d) The data in the rendered image will be compared to the data from a known correctly rendered control image.

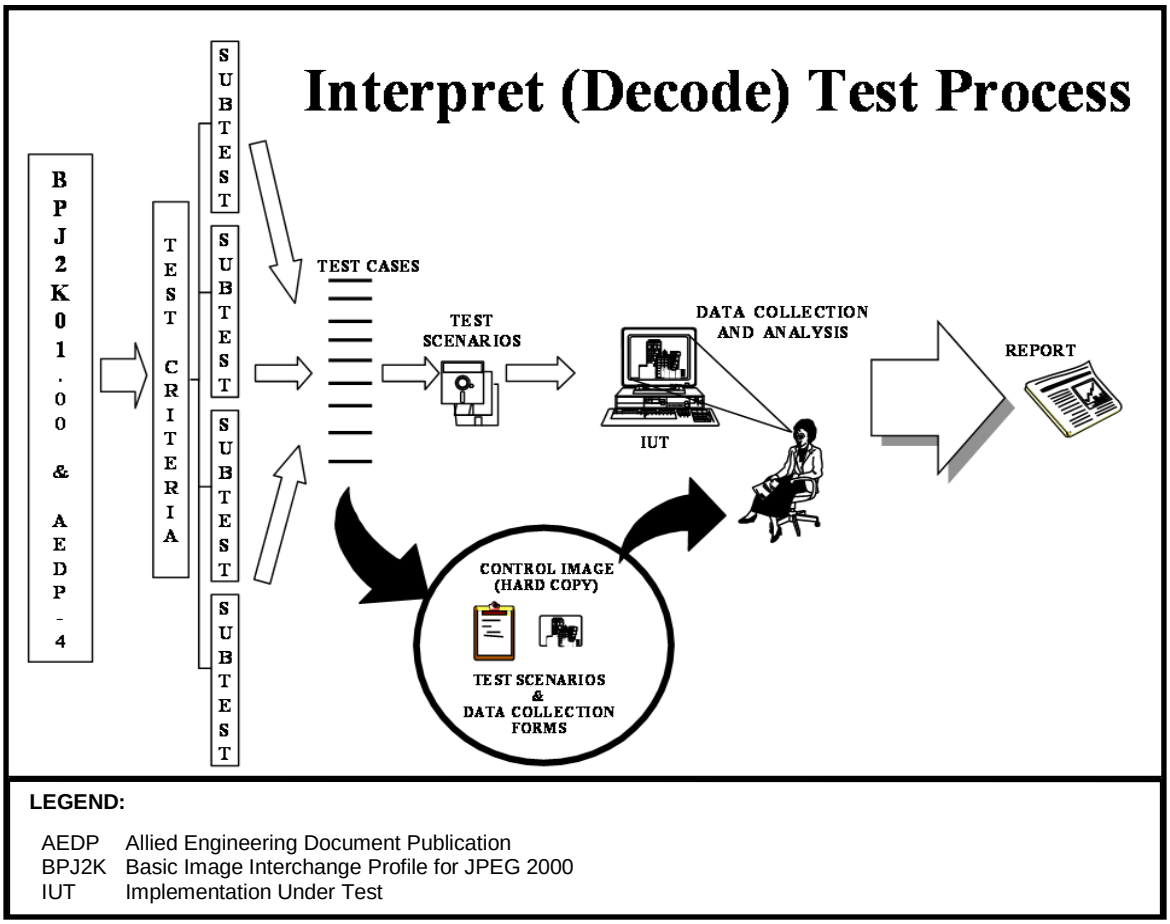

Figure 6. Interpret Test Process

9.4.1.2 Regression Testing

See section 8.4.1.2.

9.4.2 Data Collection

9.4.2.1 Criteria Related Data

Criteria related data requirements apply to interpret functions of an IUT:

(a) Interpret. Test team observations will be recorded using manual or automated data collection forms. The test team will record problems or anomalies as they apply to each test case/scenario. The tester completes the appropriate interpret tables in Annex C to select the criteria in each applicable subtest that the IUT passed. If the IUT does not pass a criterion, the tester will put a description of the problem in the Comments column. If an IUT does not support implementation of a specific criteria or subtest, the testers will mark the Pass Criteria column with “N/A”. Once the IUT passes all of the subtest criteria

the IUT is capable of interpreting, the IUT has met all requirements to reach compliance.
(b) TIRs. See Sections 8.4.2.1b and Figures 3 and 4.

9.4.2.2 Configuration Management Data

See section 8.4.2.2.

9.4.2.3 Supplemental Data

See section 8.4.2.3.

9.5 Presentation of Results

See section 8.5.

9.6 Analysis and Discussion

See section 8.6.

10 Repacking (Transcoding) of NBN J2K Segments

If supported by the IUT the repacking test process is required for demonstrating the ability and degree of the IUT to repack control files (test cases) in accordance with the specified test scenarios. Repacking reduces computational complexity of expand and recompress and the repackaging of the data prevents the incremental reductions in image quality that occurs when data is expanded and then recompressed. The test scenarios consist of a variety of J2K and NBN J2K files that individually focus on specific test criteria from a cross section of the subtests. Collectively, the test files cover all the test criteria as identified in both BPJ2K01.10 for repacking of the JPC and general NBN requirements as covered in the Allied Engineering Documentation Publication (AEDP) - 4 for NATO Secondary Imagery Format (NSIF) STANAG 4545 (Edition 2) Implementation Guide.

Within subtests, the test criteria cover all optional JPC repacking features. The overall test approach for J2K repackaging is based upon 3 high level operational scenarios to assess the extent of the JPC and NBN capabilities. The associated scenarios are broken down into sub-scenarios and are repeated based on the IUT capabilities for supported variations of repackaging. Each scenario requests the repacking of data into a processed product from an original source product, the resulting repacked JPC or NBN JPC Image Segment with the associated NBN wrapper applicable to the repacking scenario. Annex E provides details on each scenario, sub-scenario, and individual test case files.

10.1 Objective

The test agency tests the IUT to determine the degree to which the IUT can repack J2K or NBN J2K products in a manner compliant with the BPJ2K01.10 profile using test cases and scenarios.

10.2 Criteria

All criteria pertaining to individual subtests are listed under each subtest section.

10.3 Data Requirements

The following data requirements are common for all subtests. Individual subtests may indicate additional data requirements pertaining to that subtest.

10.3.1 Criteria Related.

See section 9.3.1.

10.3.2 Configuration Management Data

See section 8.3.2.

10.3.3 Supplemental Data

See section 8.3.3.

10.4 Test Procedures for Repackaging

The following test procedures are common for all subtests. Individual subtests may indicate additional procedures pertaining to that subtest.

10.4.1 Test Conduct

10.4.1.1 Test Process

The repacking test process requires the IUT to interpret J2K or NBN J2K files in accordance with the specified test scenarios for repacking. The test scenarios consist of a variety of J2K capabilities individually focused on specific test criteria from a cross section of the subtests. Collectively, the J2K test scenarios cover the entire test criteria identified in the BPJ2K01.10 and if applicable NBN specifications. Figure 7 shows the various repackaging paths and provides an overview of the repack process.

The repack process begins with J2K reference test cases. These reference test cases are provided as J2K or NBN files with an embedded J2K image segment and for

each scenario the expected changes per the IUT's repacking process into a resulting file. The steps for repacking testing are as follows:

(a) The test team will create a set of control files containing all features identified in the criteria.
(b) These files will be loaded to a network file server, optical or magnetic media, or otherwise made accessible to the IUT.
(c) Each file will be accessed by the IUT and displayed, if the interface allows repacking (transcoding) directly from the source product the testers will have the IUT repack in accordance with allowed options.
(d) The data in the repacked product will be rendered and compared to the source product to ensure they are visually identical. To ensure the resulting product was not decoded then re-encoded, an electronic review will be done to assess if the product was actually repacked.

10.4.1.2 Regression Testing

See section 8.4.1.2.

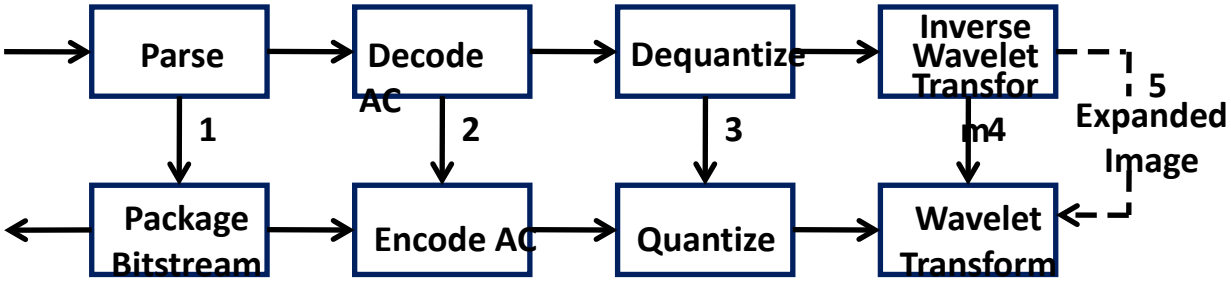

Figure 7. Repackaging Path Contrasted with Image Expansion and Recompression

10.4.2 Data Collection

10.4.2.1 Criteria Related Data

Criteria related data requirements apply to interpret functions of an IUT.

(a) Interpret. Test team observations will be recorded using manual or automated data collection forms. The test team will record problems or anomalies as they apply to each test case/scenario. The tester completes the appropriate repack tables in Annex C to select the criteria in each applicable subtest that has passed. If one of the criteria does not pass, the tester will put a description of the problem in the comments column. If an IUT does not support implementation of a specific criteria or subtest, the testers will mark the Pass Criteria column with "N/A". Once all of the subtest criteria the IUT is capable of repacking has passed, the IUT has met all requirements to reach compliance.

(b) Test Incident Reports (TIRs). See section 8.4.2.1b and Figures 3 and 4.

10.4.2.2 Configuration Management Data

See section 8.4.2.2.

10.4.2.3 Supplemental Data

See section 8.4.2.3.

10.5 Presentation of Results

See section 8.5.

10.6 Analysis and Discussion

See section 8.6.

Annex A
Subtests

SUBTEST 1, Minimum Required Markers and Marker Segments

Objective

Determine to what extent the Implementation Under Test (IUT) is able to generate required Markers and Marker Segments in the JPC. This subtest is required to be included in all generation test cases.

Criteria for Generation of Profiles 1 or 2 Up to Full Extend

Required Markers and Marker Segments:

- Start of Codestream (SOC), 0xFF4F
- Start of Tile-Part (SOT), 0xFF90
- Start of Data (SOD), 0xFF93
- End of Codestream (EOC), 0xFFD9
- Image and Tile Size (SIZ), 0xFF41
- Code Style Default (COD), 0xFF52
- Quantization Default (QCD), 0xFF5C

Data Requirements

See Sections 8.4.2, 8.4.2.1, 8.4.2.2, and 8.4.2.3.

Test Procedures

See Sections 8.4, 8.4.1, 8.4.1.1, and 8.4.1.2.

A predefined test file is generated containing a JPC for LPJE or SPJE profile 1 or 2 or an NBN JPEG 2000 image segment for profile-1, NPJE, EPJE, TJPE or LPJE. The product is provided to testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to a trusted JPEG 2000 and/or NBN Interpreter to provide testers a displayed image for comparison to the source product. The tester checks to see if the IUT passed all criteria listed in this subtest relating to required Markers and Marker Segments in the JPC.

Presentation of Results

A test results summary table and TIRs, as described in figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 8.6, 8.6.1, and 8.6.2.

SUBTEST 2, Ordering of Required Markers and Marker Segments

Objective

Determine to what extent the IUT is able to properly order required Markers and Marker Segments in the JPC. This subtest is required to be included in all generation test cases.

Criteria for Generation of Profiles 1 or 2 Up to Full Extend

Required order of Marker and Marker Segments:

- SOC
- SIZ
- COD and QCD in either order
- SOT
- SOD
- EOC

Data Requirements

See Sections 8.4.2, 8.4.2.1, 8.4.2.2, and 8.4.2.3.

Test Procedures

See Sections 8.4, 8.4.1, 8.4.1.1, and 8.4.1.2.

A predefined test file is generated containing a JPC for LPJE or SPJE profile 1 or 2 or an NBN JPEG 2000 image segment for profile-1, NPJE, EPJE, TJPE or LPJE. The product is provided to the testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to the trusted JPEG 2000 and/or NBN Interpreter to provide testers a displayed image for comparison to the source product. The tester checks to see if IUT passed all criteria listed in this subtest relating to proper ordering of required Markers and Marker Segments in the JPC.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 8.6, 8.6.1, and 8.6.2.

SUBTEST 3, Start of Tile-Part (SOT, 0xFF90) Marker Segment

Objective

Determine to what extent the IUT is able to generate and properly populate the SOT in the JPC. This subtest is required to be included in all generation test cases and will be repeated to demonstrate all supported variations in SOT parameter population.

Criteria for Generation of Profiles 1 or 2 Up to Full Extent

SOT Marker Segment:

- The SOT is required in the Tile Header of the JPC
- The SOT will only appear in a Tile Header
- The SOT is the first marker in each tile part and the first instance appears in Tile Header of the JPC directly after the last Main Header Marker
- Parameters are populated in accordance with Table D-1

Data Requirements

See Sections 8.4.2, 8.4.2.1, 8.4.2.2, and 8.4.2.3.

Test Procedures

See Sections 8.4, 8.4.1, 8.4.1.1, and 8.4.1.2.

A predefined file is generated containing a JPC for LPJE or SPJE profile 1 or 2 or an NBN JPEG 2000 image segment for profile-1, NPJE, EPJE, TJPE or LPJE for each supported variation in SOT parameter population. The product is provided to the testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to the trusted JPEG 2000 and/or NBN Interpreter to provide testers a displayed image for comparison to the source product. The tester checks to see if the IUT passed all criteria listed in this subtest relating to population of SOT Marker Segment in the JPC.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 8.6, 8.6.1, and 8.6.2.

SUBTEST 4, Image and Tile Size (SIZ, 0xFF51) Marker Segment

Objective

Determine to what extent the IUT is able to generate and properly populate the SIZ in the JPC. This subtest is required to be included in all generation test cases and will be repeated to demonstrate all supported variations in SIZ parameter population.

Criteria for Generation of Profiles 1 or 2 Up to Full Extent

SIZ Marker Segment:

- The SIZ is required in the Main Header of the JPC
- The SIZ comes directly after the SOC (0xFF4F) Marker and only appears in the Main Header of the JPC
- Parameters are populated in accordance with Table D-2

Data Requirements

See Sections 8.4.2, 8.4.2.1, 8.4.2.2, and 8.4.2.3.

Test Procedures

See Sections 8.4, 8.4.1, 8.4.1.1, and 8.4.1.2.

A predefined test file is generated containing a JPC for LPJE or SPJE profile 1 or 2 or an NBN JPEG 2000 image segment for profile-1, NPJE, EPJE, TJPE or LPJE for each supported variation in SIZ parameter population. The product is provided to the testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to the trusted JPEG 2000 and/or NBN Interpreter to provide testers a displayed image for comparison to the source product. The tester checks to see if the IUT passed all criteria listed in this subtest relating to population of SIZ Marker Segment in the JPC.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 8.6, 8.6.1, and 8.6.2.

SUBTEST 5, Code Style Default (COD, 0xFF52) Marker Segment

Objective

Determine to what extent the IUT is able to generate and properly populate the COD in the JPC. This subtest is required to be included in all generation test cases and will be repeated to demonstrate all supported variations in COD parameter population.

Criteria for Generation of Profiles 1 or 2 Up to Full Extent

COD Marker Segment:

- The COD Marker is required in the Main Header of the JPC
- The COD must come after the SIZ (0xFF51) Marker in the Main Header of the JPC, but may be ordered after other allowed Main Header Marker Segments
- The COD Marker Segment may optionally appear in the Tile Header of the JPC
- When COD Marker Segment is used in the Tile Header it will only appear in the first tile-part and must come after the SOT (0xFF90) Marker of the JPC, but may be ordered after other allowed Tile Header Markers
- A COD Marker Segment appearing in the Tile Header has precedence over the COD Marker Segment in the Main Header
- If the SOP Marker Segments or EPH Markers are used the COD must indicate their usage
- Parameters are populated in accordance with Tables D-3 to D-7

Data Requirements

See Sections 8.4.2, 8.4.2.1, 8.4.2.2, and 8.4.2.3.

Test Procedures

See Sections 8.4, 8.4.1, 8.4.1.1, and 8.4.1.2.

A predefined test file is generated containing a JPC for LPJE or SPJE profile 1 or 2 or an NBN JPEG 2000 image segment for profile-1, NPJE, EPJE, TJPE or LPJE for each supported variation in COD parameter population. The product is provided to the testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to the trusted JPEG 2000 and/or NBN Interpreter to provide testers a displayed image for comparison to the source product. The tester checks to see if the IUT passed all criteria listed in this subtest relating to population of COD Marker Segment in the JPC.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 8.6, 8.6.1, and 8.6.2.

SUBTEST 6, Coding Style Component (COC, 0xFF53) Marker Segment

Objective

Determine to what extent the IUT is able to generate and properly populate a COC in the JPC. This subtest is optional and will only be included if supported by the IUT in the generation of test cases and will be repeated to demonstrate all supported variations in COC parameter population.

Criteria for Generation of Profiles 1 or 2 Up to Full Extent

COC Marker Segment:

- The COC Marker is optional in the Main Header of the JPC
- There will be no more than one COC Marker Segment per any given component in the Main Header or in the Tile Header of a given tile
- The COC must come after the SIZ (0xFF51) Marker in the Main Header of the JPC, but may be ordered after other allowed Main Header Marker Segments
- COC Marker(s) in the Main Header have precedence over the Main Header default COD Marker for component(s) with a Coding Style that it is different than the default Main Header COD
- The COC Marker Segment may optionally appear in the Tile Header of JPC
- When COC Marker Segment is used in the Tile Header it will only appear in the first tile-part and must come after the SOT (0xFF90) Marker of the JPC, but may be ordered after other allowed Tile Header Markers
- A COC Marker Segment appearing in the Tile Header has precedence over same component COC Marker Segment if present in the Main Header or precedence over both the Main Header and/or Tile Header COD Markers for component(s) with a Coding Style that is different from either or both the Main Header or Tile Header if default COD(s).
- Parameters are populated in accordance with Tables D-6 to D-9

Data Requirements

See Sections 8.4.2, 8.4.2.1, 8.4.2.2, and 8.4.2.3.

Test Procedures

See Sections 8.4, 8.4.1, 8.4.1.1, and 8.4.1.2.

A predefined test file is generated containing a JPC for LPJE or SPJE profile 1 or 2 or an NBN JPEG 2000 image segment for profile-1, NPJE, EPJE, TJPE or LPJE for each supported variation in COC parameter population. The product is provided to testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to the trusted JPEG 2000 and/or NBN Interpreter for a providing testers a displayed image for comparison to the source product. The tester

checks to see if the IUT passed all criteria listed in this subtest relating to population of COC Marker Segment in the JPC.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 8.6, 8.6.1, and 8.6.2.

SUBTEST 7, Region of Interest (RGN, 0xFF5E) Marker Segment

Objective

Determine to what extent the IUT is able to generate and properly populate a RGN in the JPC. This subtest is optional and will only be included if supported by the IUT and will be repeated to demonstrate all supported variations in RGN parameter population.

Criteria for Generation of Profiles 1 or 2 Up to Full Extent

RGN Marker Segment:

- The RGN Marker is optional in the Main Header of the JPC
- The RGN must come after the SIZ (0xFF51) Marker in the Main Header of the JPC, but may be ordered after other allowed Main Header Marker Segments
- The RGN Marker Segment may optionally appear in the Tile Header of the JPC
- When RGN Marker Segment appears in the Tile Header it will only appear in the first tile-part and it must come after the SOT (0xFF90) Marker of the JPC, but may be ordered after other allowed Tile Header Markers
- When used in the Main Header it applies to one component across all tiles except those tiles with a Tile Header RGN Marker Segment that has precedence of the Main Header RGN Marker Segment component.
- Parameters are populated in accordance with Table D-10

Data Requirements

See Sections 8.4.2, 8.4.2.1, 8.4.2.2, and 8.4.2.3.

Test Procedures

See Sections 8.4, 8.4.1, 8.4.1.1, and 8.4.1.2.

A predefined test file is generated containing a JPC for LPJE or SPJE profile 1 or 2 or an NBN JPEG 2000 image segment for profile-1, NPJE, EPJE, TJPE, or LPJE for each supported variation in RGN parameter population. The product is provided to the testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to the trusted JPEG 2000 and/or NBN Interpreter to provide testers a displayed image for comparison to the source product. The tester checks to see if the IUT passed all criteria listed in this subtest relating to population of RGN Marker Segment in the JPC.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 8.6, 8.6.1, and 8.6.2.

SUBTEST 8, Quantization Default (QCD, 0xFF5C) Marker Segment

Objective

Determine to what extent the IUT is able to generate and properly populate the QCD in the JPC. This subtest is required to be included in all generation test cases and will be repeated to demonstrate all supported variations in QCD parameter population.

Criteria for Generation of Profiles 1 or 2 Up to Full Extent

QCD Marker Segment:

- The QCD Marker is required in the Main Header of the JPC
- The QCD must come after the SIZ (0xFF51) Marker in the Main Header of the JPC, but may be ordered after other allowed Main Header Marker Segments
- The QCD Marker Segment may optionally appear in the Tile Header of the JPC
- When QCD Marker Segment is used in the Tile Header it will only appear in the first tile-part and must come after the SOT (0xFF90) Marker of the JPC, but may be ordered after other allowed Tile Header Markers
- A QCD Marker Segment appearing in the Tile Header has precedence over the QCD Marker Segment in the Main Header
- Parameters are populated in accordance with Tables D-11 to D-14

Data Requirements

See Sections 8.4.2, 8.4.2.1, 8.4.2.2, and 8.4.2.3.

Test Procedures

See Sections 8.4, 8.4.1, 8.4.1.1, and 8.4.1.2.

A predefined test file is generated containing a JPC for LPJE or SPJE profile 1 or 2 or an NBN JPEG 2000 image segment for profile-1, NPJE, EPJE, TJPE or LPJE for each supported QCD parameter population. The product is provided to the testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to the trusted JPEG 2000 and/or NBN Interpreter to provide testers a displayed image for comparison to the source product. The tester checks to see if the IUT passed all criteria listed in this subtest relating to population of QCD Marker Segment in the JPC.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 8.6, 8.6.1, and 8.6.2.

SUBTEST 9, Quantization Component (QCC, 0xFF5D) Marker Segment

Objective

Determine to what extent the IUT is able to generate and properly populate a QCC in the JPC. This subtest is optional and will only be included if supported by the IUT and will be repeated to demonstrate all supported variations in QCC parameter population.

Criteria for Generation of Profiles 1 or 2 Up to Full Extent

QCC Marker Segment:

- There will be no more than one QCC Marker Segment per any given component in the Main Header or in the Tile Header of a given tile
- The QCC Marker is optional in the Main Header of the JPC
- The QCC must come after the SIZ (0xFF51) Marker in the Main Header of the JPC, but may be ordered after other allowed Main Header Marker Segments
- QCC Marker(s) in the Main Header have precedence over the Main Header default QCD Marker for component(s) with a different Quantization Style than the default Main Header QCD
- The QCC Marker Segment may optionally appear in the first tile-part of the Tile Header of the JPC
- When QCC Marker Segment is used in the Tile Header it will only appear in the first tile-part and must come after the SOT (0xFF90) Marker of the JPC, but may be ordered after other allowed Tile Header Markers
- A QCC Marker Segment appearing in the Tile Header has precedence over same component QCC Marker Segment if present in the Main Header or precedence over both the Main Header and/or Tile Header QCD Markers for component(s) with a Quantization Style that is different from either or both the Main Header or Tile Header if default QCD(s).
- Parameters are populated in accordance with Tables D-12 to D-15

Data Requirements

See Sections 8.4.2, 8.4.2.1, 8.4.2.2, and 8.4.2.3.

Test Procedures

See Sections 8.4, 8.4.1, 8.4.1.1, and 8.4.1.2.

A predefined test file is generated containing a JPC for LPJE or SPJE profile 1 or 2 or an NBN JPEG 2000 image segment for profile-1, NPJE, EPJE, TJPE, or LPJE for each supported variation in QCC parameter population. The product is provided to testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to the trusted JPEG 2000 and/or NBN Interpreter to provide testers a displayed image for comparison to the source product. The tester checks to

see if the IUT passed all criteria listed in this subtest relating to population of QCC Marker Segment in the JPC.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 8.6, 8.6.1, and 8.6.2.

SUBTEST 10, Progression Order Change (POC, 0xFF5F) Marker Segment

Objective

Determine to what extent the IUT is able to generate and properly populate a POC in the JPC. This subtest is optional and will only be included if supported by the IUT and will be repeated to demonstrate all supported variations in POC parameter population.

Criteria for Generation of Profiles 1 or 2 Up to Full Extent

POC Marker Segment:

- The POC Marker is optional in the Main Header of the JPC if included only one is allowed
- The POC must come after the SIZ (0xFF51) Marker in the Main Header of the JPC, but may be ordered after other allowed Main Header Marker Segments
- Only a single POC Marker Segment may optionally appear in the first tile-part of the Tile Header of a given tile of the JPC
- When POC Marker Segment appears in the Tile Header it must come after the SOT (0xFF90) Marker of the JPC, but may be ordered after other allowed Tile Header Markers
- The Progression Ordering in the POC has precedence over the Progression Ordering in the COD
- Parameters are populated in accordance with Tables D-5 and D-16

Data Requirements

See Sections 8.4.2, 8.4.2.1, 8.4.2.2, and 8.4.2.3.

Test Procedures

See Sections 8.4, 8.4.1, 8.4.1.1, and 8.4.1.2.

A predefined test file is generated containing a JPC for LPJE or SPJE profile 1 or 2 or an NBN JPEG 2000 image segment for profile-1, NPJE, EPJE, TJPE, or LPJE for each supported variation in POC parameter population. The product is provided to testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to the trusted JPEG 2000 and/or NBN Interpreter to provide testers a displayed image for comparison to the source product. The tester checks to see if the IUT passed all criteria listed in this subtest relating to population of POC Marker Segment in the JPC.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 8.6, 8.6.1, and 8.6.2.

SUBTEST 11, Tile-Part Length (TLM, 0xFF55) Marker Segment

Objective

Determine to what extent the IUT is able to generate and properly populate a TLM in the JPC. This subtest is optional and will only be included if supported by the IUT and will be repeated to demonstrate all supported variations in TLM parameter population.

Criteria for Generation of Profiles 1 or 2 Up to Full Extent

TLM Marker Segment:

- The TLM Marker Segment is optional and only appears in the Main Header, but is recommended for BPJ2K01.10 profiles
- Multiple TLM Marker Segments may be present
- The TLM must come after the SIZ (0xFF51) Marker in the Main Header of the JPC, but may be ordered after other allowed Main Header Marker Segments
- TLM Marker Segment(s) define the length in bytes from the beginning of the SOT Marker Segment for a tile-part to end of bit stream data for that tile-part
- Parameters are populated in accordance with Tables D-17 and D-18

Data Requirements

See Sections 8.4.2, 8.4.2.1, 8.4.2.2, and 8.4.2.3.

Test Procedures

See Sections 8.4, 8.4.1, 8.4.1.1, and 8.4.1.2.

A predefined test file is generated containing a JPC for LPJE or SPJE profile 1 or 2 or an NBN JPEG 2000 image segment for profile-1, NPJE, EPJE, TJPE, or LPJE for each supported variation in TLM parameter population. The product is provided to testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to the trusted JPEG 2000 and/or NBN Interpreter to provide testers a displayed image for comparison to the source product. The tester checks to see if the IUT passed all criteria listed in this subtest relating to population of TLM Marker Segment in the JPC.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5 are developed to record the evaluation results.

Analysis and Discussion

See Sections 8.6, 8.6.1, and 8.6.2.

SUBTEST 12, Packet Length Main Header (PLM, 0xFF57) Marker Segment

Objective

Determine to what extent the IUT is able to generate and properly populate a PLM in the JPC. This subtest is optional and will only be included if supported by the IUT and will be repeated to demonstrate all supported variations in PLM parameter population.

Criteria for Generation of Profiles 1 or 2 Up to Full Extent

PLM Marker Segment:

- The PLM Marker Segment is optional and only appears in the Main Header
- Multiple PLM Marker Segments may be present
- The PLM must come after the SIZ (0xFF51) Marker in the Main Header of the JPC, but may be ordered after other allowed Main Header Marker Segments
- PLM Marker Segment(s) define the number of bytes of packet header length information for the i^{th} tile-part in order as found in the codestream
- Parameters are populated in accordance with Table D-19

Data Requirements

See Sections 8.4.2, 8.4.2.1, 8.4.2.2, and 8.4.2.3.

Test Procedures

See Sections 8.4, 8.4.1, 8.4.1.1, and 8.4.1.2.

A predefined test file is generated containing a JPC for LPJE or SPJE profile 1 or 2 or an NBN JPEG 2000 image segment for Profile-1, NPJE, EPJE, TJPE, or LPJE for each supported variation in PLM parameter population. The product is provided to testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to the trusted JPEG 2000 and/or NBN Interpreter to provide testers a displayed image for comparison to the source product. The tester checks to see if the IUT passed all criteria listed in this subtest relating to population of PLM Marker Segment in the JPC.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 8.6, 8.6.1, and 8.6.2.

SUBTEST 13, Packet Length Tile Header (PLT, 0xFF58) Marker Segment

Objective

Determine to what extent the IUT is able to generate and properly populate a PLT in the JPC. This subtest is optional and will only be included if supported by the IUT and will be repeated to demonstrate all supported variations in PLT parameter population.

Criteria for Generation of Profiles 1 or 2 Up to Full Extent

PLT Marker Segment:

- The PLT Marker Segment is optional and only appears in the Tile Header
- The PLT Marker Segment can appear in any tile-part
- Multiple PLT Marker Segments may be present
- The PLT must come after the SOT (0xFF90) Marker in the Tile Header of the JPC, but appear before the packets whose lengths they describe
- Parameters are populated in accordance with Table D-20

Data Requirements

See Sections 8.4.2, 8.4.2.1, 8.4.2.2, and 8.4.2.3.

Test Procedures

See Sections 8.4, 8.4.1, 8.4.1.1, and 8.4.1.2.

A predefined file is generated containing a JPC for LPJE or SPJE profile 1 or 2 or an NBN JPEG 2000 image segment for profile-1, NPJE, EPJE, TJPE, or LPJE for each supported variation in PLT parameter population. The product is provided to testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to the trusted JPEG 2000 and/or NBN Interpreter to provide testers a displayed image for comparison to the source product. The tester checks to see if the IUT passed all criteria listed in this subtest relating to population of PLT Marker Segment in the JPC.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 8.6, 8.6.1, and 8.6.2.

SUBTEST 14, Packed Packet Main Header (PPM, 0xFF60) Marker Segment

Objective

Determine to what extent the IUT is able to generate and properly populate a PPM in the JPC. This subtest is optional and will only be included if supported by the IUT and will be repeated to demonstrate all supported variations in PPM parameter population.

Criteria for Generation of Profiles 1 or 2 Up to Full Extent

PPM Marker Segment:

- The PPM Marker Segment is optional and only appears in the Main Header
- Multiple PPM Marker Segments may be present
- If a PPM Marker Segment is present, all packet headers shall be found in the main header and a PPT Marker Segment is not allowed
- The PPM must come after the SIZ (0xFF51) Marker in the Main Header of the JPC, but may be ordered after other allowed Main Header Marker Segments
- PPM Marker Segment(s) define the number of bytes of packet header length information for the i^{th} tile-part in order as found in the codestream
- Parameters are populated in accordance with Table D-21

Data Requirements

See Sections 8.4.2, 8.4.2.1, 8.4.2.2, and 8.4.2.3.

Test Procedures

See Sections 8.4, 8.4.1, 8.4.1.1, and 8.4.1.2.

A predefined test file is generated containing a JPC for LPJE or SPJE profile 1 or 2 or an NBN JPEG 2000 image segment for profile-1, NPJE, EPJE, TJPE, or LPJE for each supported variation in PPM parameter population. The product is provided to testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to the trusted JPEG 2000 and/or NBN Interpreter to provide testers a displayed image for comparison to the source product. The tester checks to see if the IUT passed all criteria listed in this subtest relating to population of PPM Marker Segment in the JPC.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 8.6, 8.6.1, and 8.6.2.

SUBTEST 15, Packed Packet Tile Header (PPT, 0xFF61) Marker Segment

Objective

Determine to what extent the IUT is able to generate and populate a PPT in the JPC. This subtest is optional and will only be included if supported by the IUT and will be repeated to demonstrate all supported variations in PPT parameter population.

Criteria for Generation of Profiles 1 or 2 Up to Full Extent

PPT Marker Segment:

- The PPT Marker Segment is optional and only appears in the Tile Header
- The PPT Marker Segment can appear in any tile-part
- Multiple PLT Marker Segments may be present
- If the PPM Marker Segments is present, there will be no PPT Marker Segments
- The PPT must come after SOT (0xFF90) Marker in Tile Header of the JPC
- The PPT Marker Segment must appear in a tile-part header before the packets whose headers are contained in the PPT appear
- Parameters are populated in accordance with Table D-22

Data Requirements

See Sections 8.4.2, 8.4.2.1, 8.4.2.2, and 8.4.2.3.

Test Procedures

See Sections 8.4, 8.4.1, 8.4.1.1, and 8.4.1.2.

A predefined test file is generated containing a JPC for LPJE or SPJE profile 1 or 2 or an NBN JPEG 2000 image segment for profile-1, NPJE, EPJE, TJPE, or LPJE for each supported variation in PPT parameter population. The product is provided to testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to the trusted JPEG 2000 and/or NBN Interpreter to provide testers a displayed image for comparison to the source product. The tester checks to see if the IUT passed all criteria listed in this subtest relating to population of PPT Marker Segment in the JPC.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5 are developed to record the evaluation results.

Analysis and Discussion

See Sections 8.6, 8.6.1, and 8.6.2.

SUBTEST 16, Start of Packet (SOP, 0xFF91) Marker Segment

Objective

Determine to what extent the IUT is able to generate and properly populate a SOP in the JPC. This subtest is optional and will only be included if supported by the IUT and will be repeated to demonstrate all supported variations in SOP parameter population.

Criteria for Generation of Profiles 1 or 2 Up to Full Extent

SOP Marker Segment:

- The SOP Marker Segment is optional and only appears in the Bitstream
- The SOP Marker Segment may be used in front of each packet and shall not be used unless indicated in the proper COD Marker Segment.
- Whether or not an SOP Marker Segment is used for a given packet, the Nsop must be properly incremented for each packet in the Bitstream
- If the packet headers are moved into the PPM or PPT Marker Segments, the SOP Marker Segments may appear immediately before the packet bodies in the Bitstream
- The SOP must come after the Tile Header
- Parameters are populated in accordance with Table D-23

Data Requirements

See Sections 8.4.2, 8.4.2.1, 8.4.2.2, and 8.4.2.3.

Test Procedures

See Sections 8.4, 8.4.1, 8.4.1.1, and 8.4.1.2.

A predefined test file is generated containing a JPC for LPJE or SPJE profile 1 or 2 or an NBN JPEG 2000 image segment for profile-1, NPJE, EPJE, TJPE, or LPJE for each supported variation in SOP parameter population. The product is provided to testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to the trusted JPEG 2000 and/or NBN Interpreter to provide testers a displayed image for comparison to the source product. The tester checks to see if the IUT passed all criteria listed in this subtest relating to population of SOP Marker Segment in the JPC.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 8.6, 8.6.1, and 8.6.2.

SUBTEST 17, End of Packet Header (EPH, 0xFF92) Marker

Objective

Determine to what extent the IUT is able to generate an EPH Marker in the JPC. This subtest is optional and will only be included if supported by the IUT and will be repeated to demonstrate all supported variations in use of the EPH Marker.

Criteria for Generation of Profiles 1 or 2 Up to Full Extent

EPH Marker:

- The EPH Marker is optional and may appear in all areas of the JPC, Main Header, Tile Header or the Bitstream
- The EPH Marker Segment is used at the end of each packet and shall not be used unless indicated in the proper COD Marker Segment.
- If the EPH Marker is signaled in the appropriate COD, they must appear for every packet header
- If the packet headers are moved into the PPM or PPT Marker Segments, the EPH Marker populated in accordance with Table D-24 and shall appear after the packet header in the PPM or PPT Marker Segments

Data Requirements

See Sections 8.4.2, 8.4.2.1, 8.4.2.2, and 8.4.2.3.

Test Procedures

See Sections 8.4, 8.4.1, 8.4.1.1, and 8.4.1.2.

A predefined test file is generated containing a JPC for LPJE or SPJE profile 1 or 2 or an NBN JPEG 2000 image segment for profile-1, NPJE, EPJE, TJPE, or LPJE for each supported variation in the use of the EPH marker. The product is provided to testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to the trusted JPEG 2000 and/or NBN Interpreter to provide testers a displayed image for comparison to the source product. The tester checks to see if the IUT passed all criteria listed in this subtest relating to population of EPH Marker in the JPC.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 8.6, 8.6.1, and 8.6.2.

SUBTEST 18, Component Registration (CRG, 0xFF63) Marker Segment

Objective

Determine to what extent the IUT is able to generate and properly populate the CRG in the JPC. This subtest is optional and will only be included if supported by the IUT and will be repeated to demonstrate all supported variations in CRG parameter population.

Criteria for Generation of Profiles 1 or 2 Up to Full Extent

CRG Marker Segment:

- The CRG is optional with only one appearing in the Main Header of the JPC and applies to all tiles
- The CRG must come after the SIZ (0xFF51) Marker in the Main Header of the JPC, but may be ordered after other allowed Main Header Marker Segments
- Parameters are populated in accordance with Table D-25

Data Requirements

See Sections 8.4.2, 8.4.2.1, 8.4.2.2, and 8.4.2.3.

Test Procedures

See Sections 8.4, 8.4.1, 8.4.1.1, and 8.4.1.2.

A predefined test file is generated containing a JPC for LPJE or SPJE profile 1 or 2 or an NBN JPEG 2000 image segment for profile-1, NPJE, EPJE, TJPE, or LPJE for each supported variation in CRG parameter population. The product is provided to testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to the trusted JPEG 2000 and/or NBN Interpreter to provide testers a displayed image for comparison to the source product. The tester checks to see if the IUT passed all criteria listed in this subtest relating to population of CRG Marker Segment in the JPC.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 8.6, 8.6.1, and 8.6.2.

SUBTEST 19, Comment (COM, 0xFF64) Marker Segment

Objective

Determine to what extent the IUT is able to generate and properly populate the COM in the JPC. This subtest is optional and will only be included if supported by the IUT and will be repeated to demonstrate all supported variations in COM parameter population.

Criteria for Generation of Profiles 1 or 2 Up to Full Extent

COM Marker Segment:

- The COM is optional and many appear multi times in both the Main Header and the Tile Header
- The COM must come after the SIZ (0xFF51) Marker in the Main Header of the JPC or after the SOT (0xFF90) in the Tile Header
- Parameters are populated in accordance with Table D-26

Data Requirements

See Sections 8.4.2, 8.4.2.1, 8.4.2.2, and 8.4.2.3.

Test Procedures

See Sections 8.4, 8.4.1, 8.4.1.1, and 8.4.1.2.

A predefined test file is generated containing a JPC for LPJE or SPJE profile 1 or 2 or an NBN JPEG 2000 image segment for profile-1, NPJE, EPJE, TJPE, or LPJE for each supported COM parameter population. The product is provided to testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to the trusted JPEG 2000 and/or NBN Interpreter to provide testers a displayed image for comparison to the source product. The tester checks to see if the IUT passed all criteria listed in this subtest relating to population of COM Marker Segment in the JPC.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 8.6, 8.6.1, and 8.6.2.

SUBTEST 20, Empty Tiles

Objective

Determine to what extent the IUT is able to generate and properly populate the SIZ and SOT Marker Segments in the JPC. This subtest is optional and will only be included if the IUT supports the generation of empty tiles and will be repeated to demonstrate all supported variations in Empty Tile(s) population.

Criteria for Generation of Profiles 1 or 2 Up to Full Extent

Empty Tiles:

- The overall width (Xsiz) and height (Ysiz) of reference grid size of the SIZ Marker Segment is not effect by the empty tile(s)
- The overall width (XTsiz) and height (YTsiz) of one reference tile in the SIZ Marker Segment is not effect by the empty tile(s)
- Any TLMs will correctly account for empty tile(s)
- Empty Tile(s) will not contain any Tile Header Markers or Marker Segments or a Bitstream
- The raster order of tiles will be maintained when empty tile(s) are used
- Included SOTs will have proper tile indexing to skip count for empty tile(s)
- Parameters are populated in accordance with Tables D-1 and D-2

Data Requirements

See Sections 8.4.2, 8.4.2.1, 8.4.2.2, and 8.4.2.3.

Test Procedures

See Sections 8.4, 8.4.1, 8.4.1.1, and 8.4.1.2.

A predefined test file is generated containing a JPC for LPJE or SPJE profile 1 or 2 or an NBN JPEG 2000 image segment for profile-1, NPJE, EPJE, TJPE, or LPJE to demonstrate each supported Empty Tile(s) variation. The product is provided to testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to the trusted JPEG 2000 and/or NBN Interpreter to provide testers a displayed image for comparison to the source product. The tester checks to see if the IUT passed all criteria listed in this subtest relating to the population and creation of empty tile(s) in the JPC.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

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Analysis and Discussion

See Sections 8.6, 8.6.1, and 8.6.2.

SUBTEST 21, Multiple Codestreams

Objective

Determine to what extent the IUT is able to generate and properly populate multi JPC when created from a single image source. This subtest is optional and will only be included if supported by the IUT in the generation of test cases required for identical parameters.

Criteria for Generation of Profiles 1 or 2 Up to Full Extent

The Generation of Multiple Codestreams will contain identical Main Header compression parameters:

- quantization
- layering
- wavelet transform filter
- number of decomposition levels
- progression order
- tiling size
- codeblock size
- precinct size
- coding defaults
- Parameters are populated in accordance with Tables D-2, D-3 and D-11

Data Requirements

See Sections 8.4.2, 8.4.2.1, 8.4.2.2, and 8.4.2.3.

Test Procedures

See Sections 8.4, 8.4.1, 8.4.1.1, and 8.4.1.2.

A predefined test file is generated containing a JPC for LPJE or SPJE profile 1 or 2 or an NBN JPEG 2000 image segment for profile-1, NPJE, EPJE, TJPE, or LPJE. The product is provided to testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to the trusted JPEG 2000 and/or NBN Interpreter to provide testers a displayed image for comparison to the source product. The tester checks to see if the IUT passed all criteria listed in this subtest relating to the population and creation of multi JPC when created from a single image source.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 8.6, 8.6.1, and 8.6.2.

SUBTEST 22, Numerically Lossless Encoding

Objective

Determine to what extent the IUT is able to generate JPC products that are Numerically Lossless. This subtest is optional and will only be included if supported by the IUT.

Criteria for Generation of Profiles 1 or 2 Up to Full Extent

The Numerically Lossless JPC will be decoded into an uncompressed raster image and then testers will do a binary comparison to the original image file to validate that the results of the decoded JPC are identical to the original image source.

Data Requirements

See Sections 8.4.2, 8.4.2.1, 8.4.2.2, and 8.4.2.3.

Test Procedures

See Sections 8.4, 8.4.1, 8.4.1.1, and 8.4.1.2.

A predefined test file is generated containing a JPC for LPJE or SPJE profile 1 or 2 or an NBN JPEG 2000 image segment for profile-1, NPJE, EPJE, TJPE, or LPJE. The product is provided to testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to the trusted JPEG 2000 and/or NBN Interpreter to provide testers a displayed image for comparison to the source product. The tester checks to see if the IUT passed all criteria listed in this subtest relating to the creation of Numerically Lossless files.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 8.6, 8.6.1, and 8.6.2.

SUBTEST 23, NBN File Structure Values for Associated JPC Values

Objective

Determine to what extent the IUT is able to generate and properly populate the NBN Image Sub-header structure with values that are identical to JPC Values. This subtest is required to be included in all generation test cases for NBN producers.

Criteria for Generation of Profile-1 Up to Full Extent

NBN File Structure Values for Associated JPC Values:

- NROWS = [*Ysiz* / *IMAG_New*)] – [*YOsiz* / *IMAG_New*)]
- NCOLS = [*Xsiz* / *IMAG_New*)] – [*XOsiz* / *IMAG_New*)]
- PVTYPE
  - B for $\max_i (Ssiz^i) = 0$
  - INT for $\max_i (Ssiz^i) \in [1, 31]$
  - SI for $\max_i (Ssiz^i) \in [128,159]$.
- ABPP = NBPP = $\max_i (Ssiz^i \& 0x7F) + 1$
- COMRAT is set according the wavelet filtering and bitrate
- NBANDS Csiz 1 to 9, XBANDS Csiz 10 to 999 and NBANDS = 0
- NBPR = [(X*siz* – *XTO*)/*XTsiz*]
- NBPC = [(Y*siz* – *YTO*)/Y*Tsiz*]
- NPPBH = [*XTsiz*/($\min_i$(*XRsiz*^{i}))]
- NPPBV = [*YTsiz*/($\min_i$(*YRsiz*^{i}))]
- Parameters are populated in accordance with Tables D-2 and D-3

Data Requirements

See Sections 8.4.2, 8.4.2.1, 8.4.2.2, and 8.4.2.3.

Test Procedures

See Sections 8.4, 8.4.1, 8.4.1.1, and 8.4.1.2.

A predefined test file is generated containing an NBN JPEG 2000 image segment. The product is provided to testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to the trusted NBN JPEG 2000 Interpreter to provide testers a displayed image for comparison to the source product. The tester checks to see if the IUT passed all criteria listed in this subtest relating to the population and creation of the NBN Image sub-header structure.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 8.6, 8.6.1, and 8.6.2.

SUBTEST 24, NBN File Structure Function for Associated JPC Function

Objective

Determine to what extent the IUT is able to generate and properly populate the NBN Image Sub-header structure with values that represent function associated with the JPC. This subtest is required to be included in all generation test cases for NBN producers.

Criteria for Generation of Profile-1 Up to Full Extent

NBN File Structure Function for Associated JPC Function:

- IREP represent the source image product
- IC is set to C8 or M8
- IMODE is set to B
- IMAG is set to represent the resolution of the JPC
- TRE data in support of image segment is populated in accordance will established implementation specifications

Data Requirements

See Sections 8.4.2, 8.4.2.1, 8.4.2.2, and 8.4.2.3.

Test Procedures

See Sections 8.4, 8.4.1, 8.4.1.1, and 8.4.1.2.

A predefined test file is generated containing an NBN JPEG 2000 image segment. The product is provided to testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to the trusted NBN JPEG 2000 Interpreter to provide testers a displayed image for comparison to the source product. The tester checks to see if the IUT passed all criteria listed in this subtest relating to the population and creation of the NBN Image sub-header structure based on associated JPC functional support.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 8.6, 8.6.1, and 8.6.2.

SUBTEST 25, Minimum Required NPJE, EPJE, TPJE, LPJE and SPJE Markers and Marker Segments

Objective

Determine to what extent the IUT is able to generate required Markers and Marker Segments in the JPC per NPJE, EPJE, TPJE, LPJE, and SPJE requirements. This subtest will be included in all generation test cases in which compliance to NPJE, EPJE, TPJE, LPJE, and SPJE is required.

Criteria for Generation with NPJE, EPJE, TPJE, LPJE and SPJE Restrictions

Required NPJE, EPJE, TPJE, LPJE and SPJE Markers and Marker Segments:

- Start of Codestream (SOC), 0xFF4F
- Start of Tile-Part (SOT), 0xFF90
- Start of Data (SOD), 0xFF93
- End of Codestream (EOC), 0xFFD9
- Image and Tile Size (SIZ), 0xFF41
- Code Style Default (COD), 0xFF52
- Quantization Default (QCD), 0xFF5C

Data Requirements

See Sections 8.4.2, 8.4.2.1, 8.4.2.2, and 8.4.2.3.

Test Procedures

See Sections 8.4, 8.4.1, 8.4.1.1, and 8.4.1.2.

A predefined file is generated containing a JPC for LPJE or SPJE profile 1 or 2 or an NBN JPEG 2000 image segment for profile-1, NPJE, EPJE, TJPE, or LPJE. The product is provided to testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to the trusted JPEG 2000 and/or NBN Interpreter to provide testers a displayed image for comparison to the source product. The tester checks to see if the IUT passed all criteria listed in this subtest relating to required NPJE and EPJE Markers and Marker Segments in the JPC.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 8.6, 8.6.1, and 8.6.2.

SUBTEST 26, Ordering of Required NPJE, EPJE, TPJE, LPJE, and SPJE Markers and Marker Segments

Objective

Determine to what extent the IUT is able to properly order required Markers and Marker Segments in the JPC per NPJE, EPJE, TPJE, LPJE, and SPJE requirements. This subtest will be included in all generation test cases in which compliance to NPJE, EPJE, TPJE, LPJE, and SPJE is required.

Criteria for Generation with NPJE, EPJE, TPJE, LPJE, and SPJE Restrictions

Required order of Marker and Marker Segments:

- SOC
- SIZ
- COD, QCD, TLM in either order
- SOT
- PLT
- SOD
- EOC

Data Requirements

See Sections 8.4.2, 8.4.2.1, 8.4.2.2, and 8.4.2.3.

Test Procedures

See Sections 8.4, 8.4.1, 8.4.1.1, and 8.4.1.2.

A predefined file is generated containing a JPC for LPJE or SPJE profile 1 or 2 or an NBN JPEG 2000 image segment for profile-1, NPJE, EPJE, TJPE, or LPJE. The product is provided to testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to the trusted JPEG 2000 and/or NBN Interpreter to provide testers a displayed image for comparison to the source product. The tester checks to see if the IUT passed all criteria listed in this subtest relating to proper ordering of required Markers and Marker Segments in the JPC.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 8.6, 8.6.1, and 8.6.2.

SUBTEST 27, Start of Tile-Part (SOT, 0xFF90) Marker Segment NPJE Restrictions

Objective

Determine to what extent the IUT is able to generate and properly populate the SOT in the JPC per NPJE requirements. This subtest will be included in all generation test cases in which compliance to NPJE is required.

Criteria for Generation with NPJE Restrictions

SOT Marker Segment:

- The SOT is required in the Tile Header of the JPC
- The SOT will only appear in a Tile Header
- The SOT is the first marker in each tile part and the first instance appears in Tile Header of the JPC directly after the last Main Header Marker
- Psot must have the length of the tile-part
- Only one tile-part allowed
- TPsot will be set to “0”
- TNsot will be set to “1”
- For format of restricted parameters and for other parameters see Table D-1

Data Requirements

See Sections 8.4.2, 8.4.2.1, 8.4.2.2, and 8.4.2.3.

Test Procedures

See Sections 8.4, 8.4.1, 8.4.1.1, and 8.4.1.2.

A predefined file is generated containing an NBN JPEG 2000 image segment. The product is provided to testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to the trusted NBN JPEG 2000 Interpreter to provide testers a displayed image for comparison to the source product. The tester checks to see if the IUT passed all criteria listed in this subtest relating to NPJE population of SOT Marker Segment in the JPC.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 8.6, 8.6.1, and 8.6.2.

SUBTEST 28, Start of Tile-Part (SOT, 0xFF90) Marker Segment EPJE Restrictions

Objective

Determine to what extent the IUT is able to generate and properly populate the SOT in the JPC per EPJE requirements. This subtest will be included in all generation test cases in which compliance to EPJE is required.

Criteria for Generation with EPJE Restrictions

SOT Marker Segment:

- The SOT is required in the Tile Header of the JPC
- The SOT will only appear in a Tile Header
- The SOT is the first marker in each tile part and the first instance appears in Tile Header of the JPC directly after the last Main Header Marker
- Multi tile-parts are allowed
- Psot must have the length of the tile-part
- TPsot will be set to “1 to 254”
- TNsot must be defined and have values from “1 to 255”
- For format of restricted parameters and for other parameters see Table D-1

Data Requirements

See Sections 8.4.2, 8.4.2.1, 8.4.2.2, and 8.4.2.3.

Test Procedures

See Sections 8.4, 8.4.1, 8.4.1.1, and 8.4.1.2.

A predefined file is generated containing an NBN JPEG 2000 image segment. The product is provided to testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to a trusted NBN JPEG 2000 interpreter to provide testers a displayed image for comparison to the source product. The tester checks to see if the IUT passed all criteria listed in this subtest relating to EPJE population of SOT Marker Segment in the JPC.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 8.6, 8.6.1, and 8.6.2.

SUBTEST 29, Start of Tile-Part (SOT, 0xFF90) Marker Segment TPJE Restrictions

Objective

Determine to what extent the IUT is able to generate and properly populate the SOT in the JPC per TPJE requirements. This subtest will be included in all generation test cases in which compliance to TPJE is required.

Criteria for Generation with TPJE Restrictions

SOT Marker Segment:

- The SOT is required in the Tile Header of the JPC
- The SOT will only appear in a Tile Header
- The SOT is the first marker in each tile part and the first instance appears in Tile Header of the JPC directly after the last Main Header Marker
- Multi tile-parts are allowed
- Psot must have the length of the tile-part
- TPsot will be set to “0 to 9”
- TNsot must be defined and have values from “0, 1 or 6 to 10”
- For format of restricted parameters and for other parameters see Table D-1

Data Requirements

See Sections 8.4.2, 8.4.2.1, 8.4.2.2, and 8.4.2.3.

Test Procedures

See Sections 8.4, 8.4.1, 8.4.1.1, and 8.4.1.2.

A predefined file is generated containing an NBN JPEG 2000 image segment. The product is provided to testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to a trusted NBN JPEG 2000 interpreter to provide testers a displayed image for comparison to the source product. The tester checks to see if the IUT passed all criteria listed in this subtest relating to TPJE population of SOT Marker Segment in the JPC.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 8.6, 8.6.1, and 8.6.2.

SUBTEST 30, Start of Tile-Part (SOT, 0xFF90) Marker Segment LPJE and SPJE Restrictions

Objective

Determine to what extent the IUT is able to generate and properly populate the SOT in the JPC per LPJE and SPJE requirements. This subtest will be included in all generation test cases in which compliance to LPJE and SPJE is required.

Criteria for Generation with LPJE and SPJE Restrictions

SOT Marker Segment:

- The SOT is required in the Tile Header of the JPC
- The SOT will only appear in a Tile Header
- The SOT is the first marker in each tile part and the first instance appears in Tile Header of the JPC directly after the last Main Header Marker
- Multi tile-parts are allowed
- Psot must have the length of the tile-part
- TPsot will be set to “0 to 254”
- TNsot must be defined and have values from “0 to 255”
- For format of restricted parameters and for other parameters see Table D-1

Data Requirements

See Sections 8.4.2, 8.4.2.1, 8.4.2.2, and 8.4.2.3.

Test Procedures

See Sections 8.4, 8.4.1, 8.4.1.1, and 8.4.1.2.

A predefined file is generated containing a JPEG 2000 image. The product is provided to testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to a trusted JPEG 2000 Interpreter to provide testers a displayed image for comparison to the source product. The tester checks to see if the IUT passed all criteria listed in this subtest relating to LPJE or SPJE population of SOT Marker Segment in the JPC.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 8.6, 8.6.1, and 8.6.2.

SUBTEST 31, Image and Tile Size (SIZ, 0xFF51) Marker Segment with NPJE and EPJE Restrictions

Objective

Determine to what extent the IUT is able to generate and properly populate the SIZ in the JPC per NPJE or EPJE requirements. This subtest will be included in all generation test cases in which compliance to NPJE or EPJE is required.

Criteria for Generation with NPJE or with EPJE Restrictions

SIZ Marker Segment:

- The SIZ is required in the Main Header of the JPC
- The SIZ comes directly after the SOC (0xFF4F) Marker and only appears in the Main Header of the JPC
- The grid offset will be “0”, XOsiz = YOsiz = “0”
- For R0 the tile size will be 1024, XTsiz = YTsiz = “1024” for NPJE and EPJE
- The tile offset will be “0”, XTOsiz = YTOsiz = “0”
- All bands will be sampled at full resolution $XRsiz^i = YRsiz^i = 1$
- For format of restricted parameters and for other parameters see Table D-2

Data Requirements

See Sections 8.4.2, 8.4.2.1, 8.4.2.2, and 8.4.2.3.

Test Procedures

See Sections 8.4, 8.4.1, 8.4.1.1, and 8.4.1.2.

A predefined file is generated containing an NBN JPEG 2000 image segment. The product is provided to testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to a trusted NBN JPEG 2000 interpreter to provide testers a displayed image for comparison to the source product. The tester checks to see if the IUT passed all criteria listed in this subtest relating to NPJE or EPJE population of SIZ Marker Segment in the JPC.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 8.6, 8.6.1, and 8.6.2.

SUBTEST 32, Image and Tile Size (SIZ, 0xFF51) Marker Segment with TPJE Restrictions

Objective

Determine to what extent the IUT is able to generate and properly populate the SIZ in the JPC per TPJE requirements. This subtest will be included in all generation test cases in which compliance to TPJE is required.

Criteria for Generation with TPJE Restrictions

SIZ Marker Segment:

- The SIZ is required in the Main Header of the JPC
- The SIZ comes directly after the SOC (0xFF4F) Marker and only appears in the Main Header of the JPC
- The grid offset will be “0”, XOsiz = YOsiz = “0”
- For R0 the tile size will be 256, 512 or 1024, XTsiz = YTsiz = “256, 512 or 1024” for TPJE
- The tile offset will be “0”, XTOsiz = YTOsiz = “0”
- All bands will be sampled at full resolution $XRsiz^i = YRsiz^i = 1$
- For format of restricted parameters and for other parameters see Table D-2

Data Requirements

See Sections 8.4.2, 8.4.2.1, 8.4.2.2, and 8.4.2.3.

Test Procedures

See Sections 8.4, 8.4.1, 8.4.1.1, and 8.4.1.2.

A predefined file is generated containing an NBN JPEG 2000 image segment. The product is provided to testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to a trusted NBN JPEG 2000 interpreter to provide testers a displayed image for comparison to the source product. The tester checks to see if the IUT passed all criteria listed in this subtest relating to TPJE population of SIZ Marker Segment in the JPC.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 8.6, 8.6.1, and 8.6.2.

SUBTEST 33, Image and Tile Size (SIZ, 0xFF51) Marker Segment with LPJE and SPJE Restrictions

Objective

Determine to what extent the IUT is able to generate and properly populate the SIZ in the JPC per LPJE or SPJE requirements. This subtest will be included in all generation test cases in which compliance to LPJE or SPJE is required.

Criteria for Generation with LPJE or with SPJE Restrictions

SIZ Marker Segment:

- The SIZ is required in the Main Header of the JPC
- The SIZ comes directly after the SOC (0xFF4F) Marker and only appears in the Main Header of the JPC
- The grid offset XOsiz = YOsiz = "0 – (2^{32} - 2)"
- For R0 the tile size XTsiz = YTsiz = "no smaller than 256 and no larger than 8,192"
- The tile offset XTOsiz = YTOsiz = "0 – (2^{32} - 1)"
- Bands sampled $XRsiz^i$ = $YRsiz^i$ = "1 to 255"
- For format of restricted parameters and for other parameters see Table D-2

Data Requirements

See Sections 8.4.2, 8.4.2.1, 8.4.2.2, and 8.4.2.3.

Test Procedures

See Sections 8.4, 8.4.1, 8.4.1.1, and 8.4.1.2.

A predefined file is generated containing a JPEG 2000 image. The product is provided to testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to a trusted JPEG 2000 interpreter to provide testers a displayed image for comparison to the source product. The tester checks to see if the IUT passed all criteria listed in this subtest relating to LPJE or SPJE population of SIZ Marker Segment in the JPC.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 8.6, 8.6.1, and 8.6.2.

SUBTEST 34, Code Style Default (COD, 0xFF52) Marker Segment with NPJE Restrictions

Objective

Determine to what extent the IUT is able to generate and properly populate the COD in the JPC per NPJE requirements. This subtest will be included in all generation test cases in which compliance to NPJE is required.

Criteria for Generation with NPJE Restrictions

COD Marker Segment:

- The COD Marker is required in the Main Header of the JPC
- The COD must come after the SIZ (0xFF51) Marker in the Main Header of the JPC, but may be ordered after other allowed Main Header Marker Segments
- The COD Marker Segment is not recommended in the Tile Header of the JPC
- Scod will be “0”, for no SOP Marker Segments, no EPH Markers using maximum Precinct Size
- Progression Order will be “0” for layer – resolution level – component – position progression
- Number of Layers will either be “19” for visually lossless (9-7 filter) or “20” for numerically lossless (5-3 filter)
- Number of decomposition levels with be “5”
- Code-block width = Code-block height = “64”
- Code-block style will be “0” baseline or “1” if arithmetic coder by pass used
- Transformation will be “0 or 1”
- The Precinct Size is not present as defined as maximum in Scod
- For format of restricted and other parameters, see Tables D-3 through D-7

Data Requirements

See Sections 8.4.2, 8.4.2.1, 8.4.2.2, and 8.4.2.3.

Test Procedures

See Sections 8.4, 8.4.1, 8.4.1.1, and 8.4.1.2.

A predefined file is generated containing an NBN JPEG 2000 image segment. The product is provided to testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to a trusted NBN JPEG 2000 interpreter to provide testers a displayed image for comparison to the source product. The tester checks if the IUT passed all criteria listed in this subtest relating to NPJE population of COD Marker Segment in the JPC.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 8.6, 8.6.1, and 8.6.2.

SUBTEST 35, Code Style Default (COD, 0xFF52) Marker Segment with EPJE Restrictions

Objective

Determine to what extent the IUT is able to generate and properly populate the COD in the JPC per EPJE requirements. This subtest will be included in all generation test cases in which compliance to EPJE is required.

Criteria for Generation with EPJE Restrictions

COD Marker Segment:

- The COD Marker is required in the Main Header of the JPC
- The COD must come after the SIZ (0xFF51) Marker in the Main Header of the JPC, but may be ordered after other allowed Main Header Marker Segments
- The COD Marker Segment is not recommended in the Tile Header of the JPC
- Scod will be “0”, for no SOP Marker Segments, no EPH Markers using maximum Precinct Size
- Progression Order will be “1” for resolution level – layer – component - position progression
- Number of Layers will either be “19” for visually lossless (9-7 filter) or “20” for numerically lossless (5-3 filter)
- Number of decomposition levels with be “5”
- Code-block width = Code-block height = “64”
- Code-block style will be “0” baseline or “1” if arithmetic coder by pass used
- Transformation will be “0 or 1”
- The Precinct Size is not present as defined as maximum in Scod
- For format of restricted and other parameters, see Tables D-3 through D-7

Data Requirements

See Sections 8.4.2, 8.4.2.1, 8.4.2.2, and 8.4.2.3.

Test Procedures

See Sections 8.4, 8.4.1, 8.4.1.1, and 8.4.1.2.

A predefined file is generated containing an NBN JPEG 2000 image segment. The product is provided to testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to a trusted NBN JPEG 2000 interpreter to provide testers a displayed image for comparison to the source product. The tester checks to see if the IUT passed all criteria listed in this subtest relating to EPJE population of COD Marker Segment in the JPC.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 8.6, 8.6.1, and 8.6.2.

SUBTEST 36, Code Style Default (COD, 0xFF52) Marker Segment with TPJE Restrictions

Objective

Determine to what extent the IUT is able to generate and properly populate the COD in the JPC per TPJE requirements. This subtest will be included in all generation test cases in which compliance to TPJE is required.

Criteria for Generation with TPJE Restrictions

COD Marker Segment:

- The COD Marker is required in the Main Header of the JPC
- The COD must come after the SIZ (0xFF51) Marker in the Main Header of the JPC, but may be ordered after other allowed Main Header Marker Segments
- The COD Marker Segment is not recommended in the Tile Header of the JPC
- Scod will be “0”, for no SOP Marker Segments, no EPH Markers using maximum Precinct Size
- Progression Order will either “0” for layer-resolution level-component-position or “1” for resolution level – layer – component - position progression
- Number of Layers will either be “1 to 20” for lossy (9-7 filter) or “1 to 20” for numerically lossless (5-3 filter)
- Number of decomposition levels with be “5 to 9”
- Code-block width = Code-block height = “3 or 4”
- Code-block style will be “0”
- Transformation will be “0 or 1”
- The Precinct Size is not present
- For format of restricted and other parameters, see Tables D-3 through D-7

Data Requirements

See Sections 8.4.2, 8.4.2.1, 8.4.2.2, and 8.4.2.3.

Test Procedures

See Sections 8.4, 8.4.1, 8.4.1.1, and 8.4.1.2.

A predefined test file is generated containing an NBN JPEG 2000 image segment. The product is provided to testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to a trusted NBN JPEG 2000 interpreter to provide testers a displayed image for comparison to the source product. The tester checks to see if the IUT passed all criteria listed in this subtest relating to TPJE population of COD Marker Segment in the JPC.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 8.6, 8.6.1, and 8.6.2.

SUBTEST 37, Code Style Default (COD, 0xFF52) Marker Segment with LPJE and SPJE Restrictions

Objective

Determine to what extent the IUT is able to generate and properly populate the COD in the JPC per LPJE and SPJE requirements. This subtest will be included in all generation test cases in which compliance to LPJE or SPJE is required.

Criteria for Generation with LPJE Restrictions

COD Marker Segment:

- The COD Marker is required in the Main Header of the JPC
- The COD must come after the SIZ (0xFF51) Marker in the Main Header of the JPC, but may be ordered after other allowed Main Header Marker Segments
- The COD Marker Segment is not recommended in the Tile Header of the JPC
- Scod will be “0”, for no SOP Marker Segments, no EPH Markers using maximum Precinct Size
- Progression Order (See Table D-5)
- Number of Layers 1 – 65,535
- Number of decomposition levels with be “0 to 32”
- Code-block width = Code-block height = “0000 0000 – 0000 1000”
- Code-block style will be 0000 0000 – 0011 1111 (see Table D-6)
- Transformation will be “0 or 1”
- The Precinct Size = NA or 0000 0000 – 1111 1111 (see Table D-7)
- For format of restricted and other parameters, see Tables D-3 through D-7

Data Requirements

See Sections 8.4.2, 8.4.2.1, 8.4.2.2, and 8.4.2.3.

Test Procedures

See Sections 8.4, 8.4.1, 8.4.1.1, and 8.4.1.2.

A predefined test file is generated containing a JPEG 2000 image. The product is provided to testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to a trusted JPEG 2000 interpreter to provide testers a displayed image for comparison to the source product. The tester checks to see if the IUT passed all criteria listed in this subtest relating to LPJE or SPJE population of COD Marker Segment in the JPC.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 8.6, 8.6.1, and 8.6.2.

SUBTEST 38, Quantization Default (QCD, 0xFF5C) Marker Segment with NPJE and EPJE Restrictions

Objective

Determine to what extent the IUT is able to generate and properly populate the QCD in the JPC per NPJE or EPJE requirements. This subtest will be included in all generation test cases in which compliance to NPJE or EPJE is required.

Criteria for Generation with NPJE or with EPJE Restriction

QCD Marker Segment:

- The QCD Marker is required in the Main Header of the JPC
- The QCD must come after the SIZ (0xFF51) Marker in the Main Header of the JPC, but may be ordered after other allowed Main Header Marker Segments
- The QCD Marker Segment may optionally appear in the Tile Header of the JPC
- When QCD Marker Segment is used in the Tile Header it will only appear in the first tile-part and must come after the SOT (0xFF90) Marker of the JPC, but may be ordered after other allowed Tile Header Markers
- A QCD Marker Segment appearing in the Tile Header has precedence over the QCD Marker Segment in the Main Header
- Lqcd = “19” for 5-3 filter and Lqcd = “35” for 9-7 filter
- Sqcd = “40” for 5-3 filter and Sqcd = “42” for 9-7 filter
- $SPqcd^i$ will be 8 bits for 5-3 filter in accordance with Table D-13 and $SPqcd^i$ will be 16 bits for 9-7 filter in accordance with Table D-14
- For format of restricted parameters and for other parameters see Tables D-11 through D-13

Data Requirements

See Sections 8.4.2, 8.4.2.1, 8.4.2.2, and 8.4.2.3.

Test Procedures

See Sections 8.4, 8.4.1, 8.4.1.1, and 8.4.1.2.

A predefined test file is generated containing an NBN JPEG 2000 image segment. The product is provided to testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to a trusted NBN JPEG 2000 interpreter to provide testers a displayed image for comparison to the source product. The tester checks to see if the IUT passed all criteria listed in this subtest relating to NPJE or EPJE population of COD Marker Segment in the JPC.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 8.6, 8.6.1, and 8.6.2.

SUBTEST 39, Quantization Default (QCD, 0xFF5C) Marker Segment with TPJE Restrictions

Objective

Determine to what extent the IUT is able to generate and properly populate the QCD in the JPC per TPJE requirements. This subtest will be included in all generation test cases in which compliance to TPJE is required.

Criteria for Generation with TPJE Restriction

QCD Marker Segment:

- The QCD Marker is required in the Main Header of the JPC
- The QCD must come after the SIZ (0xFF51) Marker in the Main Header of the JPC, but may be ordered after other allowed Main Header Marker Segments
- The QCD Marker Segment may optionally appear in the Tile Header of the JPC
- When QCD Marker Segment is used in the Tile Header it will only appear in the first tile-part and must come after the SOT (0xFF90) Marker of the JPC, but may be ordered after other allowed Tile Header Markers
- A QCD Marker Segment appearing in the Tile Header has precedence over the QCD Marker Segment in the Main Header
- Lqcd = "$5 + (6 \cdot N_{Levels})$"
- Sqcd = "42"
- $SPqcd^{i}$ (see Table D-6).
- For format of restricted parameters and for other parameters see Tables D-11 through D-14

Data Requirements

See Sections 8.4.2, 8.4.2.1, 8.4.2.2, and 8.4.2.3.

Test Procedures

See Sections 8.4, 8.4.1, 8.4.1.1, and 8.4.1.2.

A predefined test file is generated containing an NBN JPEG 2000 image segment. The product is provided to testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to a trusted NBN JPEG 2000 interpreter to provide testers a displayed image for comparison to the source product. The tester checks to see if the IUT passed all criteria listed in this subtest relating to TPJE population of COD Marker Segment in the JPC.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 8.6, 8.6.1, and 8.6.2.

SUBTEST 40, Quantization Default (QCD, 0xFF5C) Marker Segment with LPJE and SPJE Restrictions

Objective

Determine to what extent the IUT is able to generate and properly populate the QCD in the JPC per LPJE or SPJE requirements. This subtest will be included in all generation test cases in which compliance to LPJE or SPJE is required.

Criteria for Generation with LPJE or SPJE Restriction

QCD Marker Segment:

- The QCD Marker is required in the Main Header of the JPC
- The QCD must come after the SIZ (0xFF51) Marker in the Main Header of the JPC, but may be ordered after other allowed Main Header Marker Segments
- The QCD Marker Segment may optionally appear in the Tile Header of the JPC
- When QCD Marker Segment is used in the Tile Header it will only appear in the first tile-part and must come after the SOT (0xFF90) Marker of the JPC, but may be ordered after other allowed Tile Header Markers
- A QCD Marker Segment appearing in the Tile Header has precedence over the QCD Marker Segment in the Main Header
- Lqcd = No quantization: Lqcd = $4 + 3N_{Levels}$ Scalar quantization derived: Lqcd = 5 Scalar quantization expounded: Lqcd = $5 + 6N_{Levels}$
- Sqcd = xxx0 0000, xxx0 0001, xxx0 0010, 000x xxxx - 111x xxxx (see Table D-12)
- $SPqcd^{i}$ = 8 (5-3R) or 16 (9-7I)
- For format of restricted parameters and for other parameters see Tables D-12 through D-14

Data Requirements

See Sections 8.4.2, 8.4.2.1, 8.4.2.2, and 8.4.2.3.

Test Procedures

See Sections 8.4, 8.4.1, 8.4.1.1, and 8.4.1.2.

A predefined test file is generated containing a JPEG 2000 image. The product is provided to testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to a trusted JPEG 2000 interpreter to provide testers a displayed image for comparison to the source product. The tester checks to see if the IUT passed all criteria listed in this subtest relating to TPJE population of COD Marker Segment in the JPC.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 8.6, 8.6.1, and 8.6.2.

SUBTEST 41, Quantization Component (QCC, 0xFF5D) Marker Segment with NPJE and EPJE Restrictions

Objective

Determine to what extent the IUT is able to generate and properly populate the QCC in the JPC per NPJE or EPJE requirements. This subtest will be included in all generation test cases in which compliance to NPJE or EPJE is required.

Criteria for Generation with NPJE or with EPJE Restriction

QCC Marker Segment:

- There will be no more than one QCC Marker Segment per any given component in the Main Header or in the Tile Header of a given tile
- The QCC Marker is optional in the Main Header of the JPC
- The QCC must come after the SIZ (0xFF51) Marker in the Main Header of the JPC, but may be ordered after other allowed Main Header Marker Segments
- QCC Marker(s) in the Main Header have precedence over the Main Header default QCD Marker for component(s) with a different Quantization Style than the default Main Header QCD
- The QCC Marker Segment may optionally appear in the first tile-part of the Tile Header of the JPC
- When QCC Marker Segment is used in the Tile Header it will only appear in the first tile-part and must come after the SOT (0xFF90) Marker of the JPC, but may be ordered after other allowed Tile Header Markers
- A QCC Marker Segment appearing in the Tile Header has precedence over same component QCC Marker Segment if present in the Main Header or precedence over both the Main Header and/or Tile Header QCD Markers for component(s) with a Quantization Style that is different from either or both the Main Header or Tile Header if default QCD(s).
- For Csiz in SIZ Marker Segment of less than 257 components, Lqcc = “20” for 5-3 filter and Lqcc = “36” for 9-7 filter, for Csiz in SIZ Marker Segment of 257 or more components, Lqcc = “21” for 5-3 filter and Lqcc = “37” for 9-7 filter,
- Sqcc = “40” for 5-3 filter and Sqcc = “42” for 9-7 filter
- $SPqcc^{i}$ will be 8 bits for 5-3 filter in accordance with Table D-13 and $SPqcc^{i}$ will be 16 bits for 9-7 filter in accordance with Table D-14
- For format of restricted parameters and for other parameters see Tables D-12 through D-15

Data Requirements

See Sections 8.4.2, 8.4.2.1, 8.4.2.2, and 8.4.2.3.

Test Procedures

See Sections 8.4, 8.4.1, 8.4.1.1, and 8.4.1.2.

A predefined test file is generated containing an NBN JPEG 2000 image segment. The product is provided to testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to a trusted NBN JPEG 2000 interpreter to provide testers a displayed image for comparison to the source product. The tester checks to see if the IUT passed all criteria listed in this subtest relating to NPJE or EPJE population of QCC Marker Segment in the JPC.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 8.6, 8.6.1, and 8.6.2.

SUBTEST 42, Quantization Component (QCC, 0xFF5D) Marker Segment with TPJE Restrictions

Objective

Determine to what extent the IUT is able to generate and properly populate the QCC in the JPC per TPJE requirements. This subtest will be included in all generation test cases in which compliance to TPJE is required.

Criteria for Generation with TPJE Restriction

QCC Marker Segment:

- There will be no more than one QCC Marker Segment per any given component in the Main Header or in the Tile Header of a given tile
- The QCC Marker is optional in the Main Header of the JPC
- The QCC must come after the SIZ (0xFF51) Marker in the Main Header of the JPC, but may be ordered after other allowed Main Header Marker Segments
- QCC Marker(s) in the Main Header have precedence over the Main Header default QCD Marker for component(s) with a different Quantization Style than the default Main Header QCD
- The QCC Marker Segment may optionally appear in the first tile-part of the Tile Header of the JPC
- When QCC Marker Segment is used in the Tile Header it will only appear in the first tile-part and must come after the SOT (0xFF90) Marker of the JPC, but may be ordered after other allowed Tile Header Markers
- A QCC Marker Segment appearing in the Tile Header has precedence over same component QCC Marker Segment if present in the Main Header or precedence over both the Main Header and/or Tile Header QCD Markers for component(s) with a Quantization Style that is different from either or both the Main Header or Tile Header if default QCD(s).
- For Csiz in SIZ Marker Segment of less than 257 components, Lqcc = “20” for 5-3 filter and Lqcc = “36” for 9-7 filter, for Csiz in SIZ Marker Segment of 257 or more components, Lqcc = “21” for 5-3 filter and Lqcc = “37” for 9-7 filter.
- Sqcc = “40” for 5-3 filter and Sqcc = “42” for 9-7 filter.
- $SPqcc^{i}$ will be 8 bits for 5-3 filter Exponent (εb) 0000 0xxx to 1111 1xxxx
- $SPqcc^{i}$ will be 16 bits for 9-7 filter Mantissa (μb) xxxx x000 0000 0000 to xxxx x111 1111 1111 Exponent (εb) 0000 0xxx to 1111 1xxxx.
- For format of restricted parameters and for other parameters see Tables D-12 through D-15.

Data Requirements

See Sections 8.4.2, 8.4.2.1, 8.4.2.2, and 8.4.2.3.

Test Procedures

See Sections 8.4, 8.4.1, 8.4.1.1, and 8.4.1.2.

A predefined test file is generated containing an NBN JPEG 2000 image segment. The product is provided to testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to a trusted NBN JPEG 2000 interpreter to provide testers a displayed image for comparison to the source product. The tester checks to see if the IUT passed all criteria listed in this subtest relating to TPJE population of QCC Marker Segment in the JPC.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 8.6, 8.6.1, and 8.6.2.

SUBTEST 43, Quantization Component (QCC, 0xFF5D) Marker Segment with LPJE or SPJE Restrictions

Objective

Determine to what extent the IUT is able to generate and properly populate the QCC in the JPC per LPJE or SPJE requirements. This subtest will be included in all generation test cases in which compliance to LPJE of SPJE is required.

Criteria for Generation with LPJE and SPJE Restriction

QCC Marker Segment:

- There will be no more than one QCC Marker Segment per any given component in the Main Header or in the Tile Header of a given tile
- The QCC Marker is optional in the Main Header of the JPC
- The QCC must come after the SIZ (0xFF51) Marker in the Main Header of the JPC, but may be ordered after other allowed Main Header Marker Segments
- QCC Marker(s) in the Main Header have precedence over the Main Header default QCD Marker for component(s) with a different Quantization Style than the default Main Header QCD
- The QCC Marker Segment may optionally appear in the first tile-part of the Tile Header of the JPC
- When QCC Marker Segment is used in the Tile Header it will only appear in the first tile-part and must come after the SOT (0xFF90) Marker of the JPC, but may be ordered after other allowed Tile Header Markers
- A QCC Marker Segment appearing in the Tile Header has precedence over same component QCC Marker Segment if present in the Main Header or precedence over both the Main Header and/or Tile Header QCD Markers for component(s) with a Quantization Style that is different from either or both the Main Header or Tile Header if default QCD(s).
- For Csiz in SIZ Marker Segment of less than 257 components, Lqcc = “20” for 5-3 filter and Lqcc = “36” for 9-7 filter, for Csiz in SIZ Marker Segment of 257 or more components, Lqcc = “21” for 5-3 filter and Lqcc = “37” for 9-7 filter.
- Sqcc = xxx0 0000 xxx0 0001 xxx0 0010 000x xxxx - 111x xxxx (see Table D-12).
- $SPqcc^i$ will be 8 bits for 5-3 filter.
- $SPqcc^i$ will be 16 bits for 9-7 filter.
- For format of restricted parameters and for other parameters see Tables D-12 through D-15.

Data Requirements

See Sections 8.4.2, 8.4.2.1, 8.4.2.2, and 8.4.2.3.

Test Procedures

See Sections 8.4, 8.4.1, 8.4.1.1, and 8.4.1.2.

A predefined test file is generated containing a JPEG 2000 image. The product is provided to testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to the trusted JPEG 2000 Interpreter to provide testers a displayed image for comparison to the source product. The tester checks to see if the IUT passed all criteria listed in this subtest relating to LPJE or SPJE population of QCC Marker Segment in the JPC.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 8.6, 8.6.1, and 8.6.2.

SUBTEST 44, Tile-Part Length (TLM, 0xFF55) Marker Segment with NPJE Restrictions

Objective

Determine to what extent the IUT is able to generate and properly populate the TLM in the JPC per NPJE requirements. This subtest will be included in all generation test cases in which compliance to NPJE is required.

Criteria for Generation with NPJE Restriction

TLM Marker Segment:

- The TLM Marker Segment is required for NPJE and only appears in the Main Header
- Multiple TLM Marker Segments may be present
- The TLM must come after the SIZ (0xFF51) Marker in the Main Header of the JPC, but may be ordered after other allowed Main Header Marker Segments
- TLM Marker Segment(s) define the length in bytes from the beginning of the SOT Marker Segment for a tile-part to end of bitstream data for that tile-part
- Ztlm = “0” meaning first TLM marker segment, the Ztlm will increment based on each occurrence of a TLM marker segment
- Stlm = “64” representing only one tile-part allowed and Ptlm parameter has 32 bits
- $Ttlm^i$ not present as defined in Stlm parameter
- $Ptlm^i$ will be 32 bits as defined in Stlm parameter present for all tiles including any Empty Tiles
- For format of restricted parameters and for other parameters see Tables D-17 and D-18

Data Requirements

See Sections 8.4.2, 8.4.2.1, 8.4.2.2, and 8.4.2.3.

Test Procedures

See Sections 8.4, 8.4.1, 8.4.1.1, and 8.4.1.2.

A predefined test file is generated containing an NBN JPEG 2000 image segment. The product is provided to testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to a trusted NBN JPEG 2000 interpreter to provide testers a displayed image for comparison to the source product. The tester checks to see if the IUT passed all criteria listed in this subtest relating to NPJE population of TLM Marker Segment in the JPC.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 8.6, 8.6.1, and 8.6.2.

SUBTEST 45, Tile-Part Length (TLM, 0xFF55) Marker Segment with EPJE Restrictions

Objective

Determine to what extent the IUT is able to generate and properly populate the TLM in the JPC per EPJE requirements. This subtest will be included in all generation test cases in which compliance to EPJE is required.

Criteria for Generation with EPJE Restriction

TLM Marker Segment:

- The TLM Marker Segment is required for EPJE and only appears in the Main Header.
- Multiple TLM Marker Segments may be present.
- The TLM must come after the SIZ (0xFF51) Marker in the Main Header of the JPC, but may be ordered after other allowed Main Header Marker Segments.
- TLM Marker Segment(s) define the length in bytes from the beginning of the SOT Marker Segment for a tile-part to end of bitstream data for that tile-part.
- Stlm = “0110 0000” ST = 2 and SP = 1.
- $Ttlm^i$ will list tile-part in order as they appear in the file “0 to 65534”.
- $Ptlm^i$ will be $14 – (2^{32} - 1)$.
- For format of restricted parameters and for other parameters see Tables D-17 and D-18.

Data Requirements

See Sections 8.4.2, 8.4.2.1, 8.4.2.2, and 8.4.2.3.

Test Procedures

See Sections 8.4, 8.4.1, 8.4.1.1, and 8.4.1.2.

A predefined test file is generated containing an NBN JPEG 2000 image segment. The product is provided to testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to a trusted NBN JPEG 2000 interpreter to provide testers a displayed image for comparison to the source product. The tester checks to see if the IUT passed all criteria listed in this subtest relating to EPJE population of TLM Marker Segment in the JPC.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 8.6, 8.6.1, and 8.6.2.

SUBTEST 46, Tile-Part Length (TLM, 0xFF55) Marker Segment with TPJE Restrictions

Objective

Determine to what extent the IUT is able to generate and properly populate the TLM in the JPC per TPJE requirements. This subtest will be included in all generation test cases in which compliance to TPJE is required.

Criteria for Generation with TPJE Restriction

TLM Marker Segment:

- The TLM Marker Segment is required for TPJE and only appears in the Main Header.
- Multiple TLM Marker Segments may be present.
- The TLM must come after the SIZ (0xFF51) Marker in the Main Header of the JPC, but may be ordered after other allowed Main Header Marker Segments.
- TLM Marker Segment(s) define the length in bytes from the beginning of the SOT Marker Segment for a tile-part to end of bitstream data for that tile-part.
- Stlm = for single TLM = 0100 0000, for multiple TLMs Stlm = 0110 0000.
- $Ttlm^i$ = single TLM: N/A, multiple TLMs “0 to 65534”.
- $Ptlm^i$ will be $14 – (2^{32} - 1)$.
- For format of restricted parameters and for other parameters see Tables D-17 and D-18.

Data Requirements

See Sections 8.4.2, 8.4.2.1, 8.4.2.2, and 8.4.2.3.

Test Procedures

See Sections 8.4, 8.4.1, 8.4.1.1, and 8.4.1.2.

A predefined file is generated containing an NBN JPEG 2000 image segment. The product is provided to testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to the trusted NBN JPEG 2000 Interpreter to provide testers a displayed image for comparison to source product. The tester checks to see if the IUT passed all criteria listed in this subtest relating to TPJE population of TLM Marker Segment in the JPC.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 8.6, 8.6.1, and 8.6.2.

SUBTEST 47, Tile-Part Length (TLM, 0xFF55) Marker Segment with LPJE or SPJE Restrictions

Objective

Determine to what extent the IUT is able to generate and properly populate the TLM in the JPC per LPJE or SPJE requirements. This subtest will be included in all generation test cases in which compliance to LPJE or SPJE is required.

Criteria for Generation with LPJE or SPJE Restriction

TLM Marker Segment:

- The TLM Marker Segment is required for LPJE or SPJE and only appears in the Main Header.
- Multiple TLM Marker Segments may be present.
- The TLM must come after the SIZ (0xFF51) Marker in the Main Header of the JPC, but may be ordered after other allowed Main Header Marker Segments.
- TLM Marker Segment(s) define the length in bytes from the beginning of the SOT Marker Segment for a tile-part to end of bitstream data for that tile-part.
- Stlm = (see Table D-18).
- $Ttlm^i$ = “0 to 65534”.
- $Ptlm^i$ = if 16 SP = 0 “14 – 65,535” or if 32 SP = 1 will be 14 – (2^{32} - 1).
- For format of restricted parameters and for other parameters see Tables D-17 and D-18.

Data Requirements

See Sections 8.4.2, 8.4.2.1, 8.4.2.2, and 8.4.2.3.

Test Procedures

See Sections 8.4, 8.4.1, 8.4.1.1, and 8.4.1.2.

A predefined file is generated containing a JPEG 2000 image. The product is provided to testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to a trusted JPEG 2000 interpreter to provide testers a displayed image for comparison to source product. The tester checks to see if all criteria listed in this subtest relating to TPJE population of TLM Marker Segment in the JPC have passed.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 8.6, 8.6.1, and 8.6.2.

SUBTEST 48, Packet Length Tile Header (PLT, 0xFF58) Marker Segment with NPJE Restrictions

Objective

Determine to what extent the IUT is able to generate and properly populate the PLT in the JPC per NPJE requirements. This subtest will be included in all generation test cases in which compliance to NPJE is required.

Criteria for Generation with NPJE Restriction

PLT Marker Segment:

- The PLT Marker Segment is required for NPJE; only appears in the Tile Header.
- The PLT Marker Segment can appear in any tile-part.
- Multiple PLT Marker Segments may be present.
- The PLT must come after the SOT (0xFF90) Marker in the Tile Header of the JPC, but appear before the packets whose lengths they describe
- The Zplt is restricted to “0 to 19”.
- For format of restricted parameters and for other parameters see Table D-20.

Data Requirements

See Sections 8.4.2, 8.4.2.1, 8.4.2.2, and 8.4.2.3.

Test Procedures

See Sections 8.4, 8.4.1, 8.4.1.1, and 8.4.1.2.

A predefined file is generated containing an NBN JPEG 2000 image segment. The product is provided to testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to a trusted NBN JPEG 2000 interpreter to provide testers a displayed image for comparison to source product. The tester checks to see if all criteria listed in this subtest relating to NPJE population of PLT Marker Segment in the JPC have passed.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 8.6, 8.6.1, and 8.6.2.

SUBTEST 49, Packet Length Tile Header (PLT, 0xFF58) Marker Segment with EPJE Restrictions

Objective

Determine to what extent the IUT is able to generate and properly populate the PLT in the JPC per EPJE requirements. This subtest will be included in all generation test cases in which compliance to EPJE is required.

Criteria for Generation with EPJE Restriction

PLT Marker Segment:

- The PLT Marker Segment is required for EPJE and there will be only one PLT marker segment per tile-part.
- The PLT must come after the SOT (0xFF90) Marker in the Tile Header of the JPC, but appear before the packets whose lengths they describe.
- The Zplt is restricted to “0”, indicating only one PLT is allowed in each tile-part header.
- For format of restricted parameters and for other parameters see Table D-20.

Data Requirements

See Sections 8.4.2, 8.4.2.1, 8.4.2.2, and 8.4.2.3.

Test Procedures

See Sections 8.4, 8.4.1, 8.4.1.1, and 8.4.1.2.

A predefined file is generated containing an NBN JPEG 2000 image segment. The product is provided to testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to a trusted NBN JPEG 2000 interpreter to provide testers a displayed image for comparison to source product. The tester checks to see if all criteria listed in this subtest relating to EPJE population of PLT Marker Segment in the JPC have passed.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 8.6, 8.6.1, and 8.6.2.

SUBTEST 50, Packet Length Tile Header (PLT, 0xFF58) Marker Segment with TPJE Restrictions

Objective

Determine to what extent the IUT is able to generate and properly populate the PLT in the JPC per TPJE requirements. This subtest will be included in all generation test cases in which compliance to TPJE is required.

Criteria for Generation with TPJE Restriction

PLT Marker Segment:

- The PLT Marker Segment is required for TPJE and there will be only one PLT marker segment per tile-part.
- The PLT must come after the SOT (0xFF90) Marker in the Tile Header of the JPC, but appear before the packets whose lengths they describe.
- The Zplt is restricted to "0 to (N_{Layers} – 1)".
- For format of restricted parameters and for other parameters see Table D-20.

Data Requirements

See Sections 8.4.2, 8.4.2.1, 8.4.2.2, and 8.4.2.3.

Test Procedures

See Sections 8.4, 8.4.1, 8.4.1.1, and 8.4.1.2.

A predefined file is generated containing an NBN JPEG 2000 image segment. The product is provided to testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to a trusted NBN JPEG 2000 interpreter to provide testers a displayed image for comparison to source product. The tester checks to see if all criteria listed in this subtest relating to TPJE population of PLT Marker Segment in the JPC have passed.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 8.6, 8.6.1, and 8.6.2.

SUBTEST 51, Packet Length Tile Header (PLT, 0xFF58) Marker Segment with LPJE and SPJE Restrictions

Objective

Determine to what extent the IUT is able to generate and properly populate the PLT in the JPC per LPJE or SPJE requirements. This subtest will be included in all generation test cases in which compliance to TPJE is required.

Criteria for Generation with LPJE or SPJE Restriction

PLT Marker Segment:

- The PLT Marker Segment is required for LPJE and SPJE and there will be only one PLT marker segment per tile-part.
- The PLT must come after the SOT (0xFF90) Marker in the Tile Header of the JPC, but appear before the packets whose lengths they describe.
- The Zplt is restricted to “0 – 255”.
- For format of restricted parameters and for other parameters see Table D-20.

Data Requirements

See Sections 8.4.2, 8.4.2.1, 8.4.2.2, and 8.4.2.3.

Test Procedures

See Sections 8.4, 8.4.1, 8.4.1.1, and 8.4.1.2.

A predefined file is generated containing a JPEG 2000 image. The product is provided to testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to a trusted JPEG 2000 interpreter to provide testers a displayed image for comparison to source product. The tester checks to see if all criteria listed in this subtest relating to TPJE population of PLT Marker Segment in the JPC have passed.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 8.6, 8.6.1, and 8.6.2.

SUBTEST 52, Marker and Marker Segments Not Recommended and Not Allowed for NPJE, EPJE, TPJE, LPJE, and SPJE

Objective

To ensure the IUT is making use of only allowed Markers and Marker Segments in the JPC per NPJE, EPJE, TPJE, LPJE, and SPJE requirements. This subtest will be included in all generation test cases in which compliance to NPJE, EPJE, TPJE, LPJE, or SPJE is required.

Criteria for Generation with NPJE, EPJE, TPJE, LPJE, and SPJE Restrictions

NPJE, EPJE, TPJE, LPJE, and SPJE Not Recommend and Not Allowed Markers and Marker Segments see Table D-32.

Data Requirements

See Sections 8.4.2, 8.4.2.1, 8.4.2.2, and 8.4.2.3.

Test Procedures

See Sections 8.4, 8.4.1, 8.4.1.1, and 8.4.1.2.

A predefined file is generated containing a JPC for LPJE or SPJE profile 1 or 2 or an NBN JPEG 2000 image segment for profile-1, NPJE, EPJE, TJPE, or LPJE. The product is provided to testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to the trusted JPEG 2000 and/or NBN interpreter to provide testers a displayed image for comparison to source product. The tester checks to see if all criteria listed in this subtest relating to not recommended NPJE, EPJE, TPJE, LPJE, and SPJE Marker and Marker Segments in the JPC have passed.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 8.6, 8.6.1, and 8.6.2.

SUBTEST 53, Generation of J2KLRA

Objective

Determine to what extent the IUT is able to generate and properly populate the J2KLRA (JPEG 2000 Layers, version A) Tagged Record Extension (TRE) which is recommended for NPJ, EPJE, TPJE, and LPJE (if encoded in an NBN file). This subtest will be included in all generation test cases in which the IUT creates the J2KLRA as part of a compliancy requirement.

Criteria for Generation of J2KLRA

J2KLRA:

- NPJE and LPJE optional, EPJE and TJPE mandatory.
- All TRE fields, except the conditional Nxxxx_I fields, are populated on initial generation.
- ORIG -Original compressed data will be populated with “0” NPJE, “2” EPJE, “4” TPJE, “6” LPJE or “8” Original Other.
- ORIG -Original compressed data having been parsed will be populated with “1” NPJE, “3” EPJE, “5” TPJE, “7” LPJE or “9” Original Other.
- NLEVELS_O - Number of Wavelet levels in original image will be “5” for NPJE and EPJE files, “5 to 9” for TPJE, “0 to 32” for LPJE.
- NLAYERS_O - Number of Layers in original image will be “19” for NPJE and EPJE Visually Lossless files, and “20” for NPJE and EPJE. Numerically Lossless files, “0 to 20” for TPJE and “0 to 999” for LPJE.
- For format of restricted parameters and for other parameters see Table D-27.

Data Requirements

See Sections 8.4.2, 8.4.2.1, 8.4.2.2, and 8.4.2.3.

Test Procedures

See Sections 8.4, 8.4.1, 8.4.1.1, and 8.4.1.2.

A predefined file is generated containing an NBN JPEG 2000 image segment. The product is provided to testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to a trusted NBN JPEG 2000 Interpreter to provide testers a displayed image for comparison to source product. The tester checks to see if all criteria listed in this subtest relating to J2KLRA population have passed.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 8.6, 8.6.1, and 8.6.2.

SUBTEST 54, Generation of Non-J2K NBN Segments

Objective

Determine to what extent the IUT is able to generate and properly populate non-J2K NBN Segments. This subtest will be included in all generation test cases in which the IUT creates the non-J2K NBN Segments.

Criteria for Generation of non-J2K NBN Segments

Non-J2K NBN Segments:

- Per applicable NBN and implementation specifications
- Data segments are placed after the NBN header fields in the following order:
  - Image Segment(s)
  - Graphic Segment(s)
  - Text Segment(s)
  - Data Extension Segment(s)
  - Reserved Extension Segment(s)
- Per restricted parameters and segments see Table D-28

Data Requirements

See Sections 8.4.2, 8.4.2.1, 8.4.2.2, and 8.4.2.3.

Test Procedures

See Sections 8.4, 8.4.1, 8.4.1.1, and 8.4.1.2.

A predefined file is generated containing an NBN JPEG 2000 image segment. The product is provided to testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to a trusted NBN JPEG 2000 interpreter to provide testers a displayed image for comparison to source product. The tester checks to see if all criteria listed in this subtest relating to Non-JPEG 2000 NBN Segments have passed.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 8.6, 8.6.1, and 8.6.2.

SUBTEST 55, Generation of NBN file header and CLEVEL population

Objective

Determine to what extent the IUT is able to generate CLEVEL and properly populate NBN file header. This subtest is required to be included in all generation test cases.

Criteria for Generation of NBN file header and CLEVEL population

NBN file header and CLEVEL population:

- NBN files are marked to the lowest CLEVEL for which they qualify
- NBN files can be generated at the CLEVEL and all lower CLEVELs, for which compliance is sought. (NOTE: Generation of lower CLEVELs may not apply to an IUT developed for specific limited functions.)
- Per applicable NBN and implementation specifications
- Per CLEVEL parameters see Table D-28

Data Requirements

See Sections 8.4.2, 8.4.2.1, 8.4.2.2, and 8.4.2.3.

Test Procedures

See Sections 8.4, 8.4.1, 8.4.1.1, and 8.4.1.2.

A predefined file is generated containing an NBN JPEG 2000 image segment. The product is provided to testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to a trusted NBN JPEG 2000 interpreter to provide testers a displayed image for comparison to source product. The tester checks to see if all criteria listed in this subtest relating to the generation of CLEVEL and properly population of NBN file header have passed.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 8.6, 8.6.1, and 8.6.2.

SUBTEST 56, Decoding of Minimally Required Markers and Marker Segments

Objective

Determine to what extent the IUT can decode test cases that contain the minimal required markers and marker segments of the JPC. This subtest is required to be included in all interpret test cases.

Criteria for Interpretation of Minimally Required Marker and Marker Segments

Supports the minimum required Marker and Marker Segments in the following order:

- Start of Codestream (SOC), 0xFF4F
- Image and Tile Size (SIZ), 0xFF41
  - In either order following SIZ:
    - Code Style Default (COD), 0xFF52
    - Quantization Default (QCD), 0xFF5C
- Start of Tile-Part (SOT), 0xFF90
- Start of Data (SOD), 0xFF93
- End of Codestream (EOC), 0xFFD9

Data Requirements

Tables E-4a and E-4b, test cases 1a through 1m, 1ah, 1ai, 1aj, 2ae and 2ai are applicable to the IUT Cclass and CLEVEL support.

See Sections 9.4.2, 9.4.2.1, 9.4.2.2, and 9.4.2.3.

Test Procedures

The tester runs the test cases associated with test scenario(s) for IUT and captures the resulting file.

See Sections 9.4, 9.4.1, 9.4.1.1, and 9.4.1.2.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 9.6, 9.6.1, and 9.6.2.

SUBTEST 57, Start of Tile-Part (SOT, 0xFF90) Marker Segment

Objective

Determine to what extent the IUT is able to interpret the SOT in the JPC to the maximum size of the supported Cclass and CLEVEL. This subtest is required to be included in all interpret test cases and will be repeated to demonstrate all supported variations in SOT parameter population.

Criteria for Interpretation Up to Full Extend of Profile

Interpret the SOT Marker Segment in the Tile Header of the JPC up to the bounds of the supported Cclass and CLEVEL in accordance with Table D-1.

Data Requirements

All test cases in Tables E-4a through E-4f are applicable based on IUT Cclass and CLEVEL support. This includes files that will evaluate empty and missing tiles as identified in Table E-4b test cases 2y and 2z.

See Sections 9.4.2, 9.4.2.1, 9.4.2.2, and 9.4.2.3.

Test Procedures

The tester runs the test cases associated with test scenario(s) for IUT and captures the resulting file.

See Sections 9.4, 9.4.1, 9.4.1.1, and 9.4.1.2.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 9.6, 9.6.1, and 9.6.2.

SUBTEST 58, Image and Tile Size (SIZ, 0xFF51) Marker Segment

Objective

Determine to what extent the IUT is able to interpret the SIZ in the JPC to the maximum size of the supported Cclass and CLEVEL. This subtest is required to be included in all interpret test cases and will be repeated to demonstrate all supported variations in SIZ parameter population.

Criteria for Interpretation Up to Full Extend of Profile

Interpret the SIZ Marker Segment in the Main Header of the JPC:

- Containing from 1 to 38 bit precision encoded data
- Created with image offset from origin values from 0 to (2^{31}-2)
- Created with tile offset from origin value from 0 to (2^{31}-2)
- Containing up to 16384 components
- For other parameters up to the bounds of the supported Cclass and CLEVEL in accordance with Table D-2

Data Requirements

All test cases in Tables E-4a through E-4f are applicable based on IUT Cclass and CLEVEL support.

See Sections 9.4.2, 9.4.2.1, 9.4.2.2, and 9.4.2.3.

Test Procedures

The tester runs the test cases associated with test scenario(s) for IUT and captures the resulting file.

See Sections 9.4, 9.4.1, 9.4.1.1, and 9.4.1.2.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 9.6, 9.6.1, and 9.6.2.

SUBTEST 59, Code Style Default (COD, 0xFF52) Marker Segment

Objective

Determine to what extent the IUT is able to interpret the COD in the JPC to the maximum size of the supported Cclass and CLEVEL. This subtest is required to be included in all interpret test cases and will be repeated to demonstrate all supported variations in COD parameter population.

Criteria for Interpretation Up to Full Extend of Profile

Interpret the COD Marker Segment in the Main Header or Tile Header of the JPC:

- Created with any of the following progression orders: LRCP, RLCP, RPCL, PCRL, and CPRL
- Created with up to 32 decomposition levels
- Created with 9-7 irreversible filtering
- Created with 5-3 reversible filtering
- Created with up to 65535 quality layers
- Created with precinct exponent values from 0 to 15
- Created with up to the maximum code block height or width
- For other parameters up to the bounds of the supported Cclass and CLEVEL in accordance with Tables D-3 through D-7

Data Requirements

All test cases in Tables E-4a through E-4f are applicable based on IUT Cclass and CLEVEL support for Main Header support and test case 2b to evaluate precedence of optional COD Marker Segment in the Tile Header.

See Sections 9.4.2, 9.4.2.1, 9.4.2.2, and 9.4.2.3.

Test Procedures

The tester runs the test cases associated with test scenario(s) for IUT and captures the resulting file.

See Sections 9.4, 9.4.1, 9.4.1.1, and 9.4.1.2.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 9.6, 9.6.1, and 9.6.2.

SUBTEST 60, Coding Style Component (COC, 0xFF53) Marker Segment

Objective

Determine to what extent the IUT is able to interpret the COC in the JPC to the maximum size of the supported Cclass and CLEVEL. This subtest is required to be included only in testing of products containing a COC Marker Segment and will be repeated to demonstrate all supported variations in COC parameter population.

Criteria for Interpretation Up to Full Extend of Profile

Interpret the COC Marker Segment in the Main Header or Tile Header of the JPC up to the bounds of the supported Cclass and CLEVEL in accordance with Tables D-6 through D-9.

Data Requirements

Table E-4b test cases 2c and 2d, 2ae and 2ai applicable to the IUT.

See Sections 9.4.2, 9.4.2.1, 9.4.2.2, and 9.4.2.3.

Test Procedures

The tester runs the test cases associated with test scenario(s) for IUT and captures the resulting file.

See Sections 9.4, 9.4.1, 9.4.1.1, and 9.4.1.2.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 9.6, 9.6.1, and 9.6.2.

SUBTEST 61, Region of Interest (RGN, 0xFF5E) Marker Segment

Objective

Determine to what extent the IUT is able to interpret the RGN in the JPC to the maximum size of the supported Cclass and CLEVEL. This subtest is required to be included only in testing of products containing a RGN Marker Segment and will be repeated to demonstrate all supported variations in RGN parameter population.

Criteria for Interpretation Up to Full Extend of Profile

Interpret the RGN Marker Segment in the Main Header or Tile Header of the JPC up to the bounds of the supported Cclass and CLEVEL in accordance with Table D-10.

Data Requirements

Table E-4b test cases 2e and 2f, 2ae and 2ai applicable to the IUT.

See Sections 9.4.2, 9.4.2.1, 9.4.2.2, and 9.4.2.3.

Test Procedures

The tester runs the test cases associated with test scenario(s) for IUT and captures the resulting file.

See Sections 9.4, 9.4.1, 9.4.1.1, and 9.4.1.2.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 9.6, 9.6.1, and 9.6.2.

SUBTEST 62, Quantization Default (QCD, 0xFF5C) Marker Segment

Objective

Determine to what extent the IUT is able to interpret the QCD in the JPC to the maximum size of the supported Cclass and CLEVEL. This subtest is required to be included in all interpret test cases and will be repeated to demonstrate all supported variations in QCD parameter population.

Criteria for Interpretation Up to Full Extend of Profile

Interpret the QCD Marker Segment in the Main Header or Tile Header of the JPC up to the bounds of the supported Cclass and CLEVEL in accordance with Tables D-11 through D-14.

Data Requirements

All test cases in Tables E-4a through E-4f are applicable based on IUT Cclass and CLEVEL support for Main Header support test case 2g and test case 2h to evaluate precedence of optional QCD Marker Segment in the Tile Header.

See Sections 9.4.2, 9.4.2.1, 9.4.2.2, and 9.4.2.3.

Test Procedures

The tester runs the test cases associated with test scenario(s) for IUT and captures the resulting file.

See Sections 9.4, 9.4.1, 9.4.1.1, and 9.4.1.2.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4 and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 9.6, 9.6.1, and 9.6.2.

SUBTEST 63, Quantization Component (QCC, 0xFF5D) Marker Segment

Objective

Determine to what extent the IUT is able to interpret the QCC in the JPC to the maximum size of the supported Cclass and CLEVEL. This subtest is required to be included only in testing of products containing a QCC Marker Segment and will be repeated to demonstrate all supported variations in QCC parameter population.

Criteria for Interpretation Up to Full Extend of Profile

Interpret the QCC Marker Segment in the Main Header or Tile Header of the JPC up to the bounds of the supported Cclass and CLEVEL in accordance with Tables D-12 through D-15.

Data Requirements

Table E-4b test cases 2i and 2j, 2ae and 2ai applicable to the IUT.

See Sections 9.4.2, 9.4.2.1, 9.4.2.2, and 9.4.2.3.

Test Procedures

The tester runs the test cases associated with test scenario(s) for IUT and captures the resulting file.

See Sections 9.4, 9.4.1, 9.4.1.1, and 9.4.1.2.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 9.6, 9.6.1, and 9.6.2.

SUBTEST 64, Progression Order Change (POC, 0xFF5F) Marker Segment

Objective

Determine to what extent the IUT is able to interpret the POC in the JPC to the maximum size of the supported Cclass and CLEVEL. This subtest is required to be included only in testing of products containing a POC Marker Segment and will be repeated to demonstrate all supported variations in POC parameter population.

Criteria for Interpretation Up to Full Extend of Profile

Interpret the POC Marker Segment in the Main Header or Tile Header of the JPC up to the bounds of the supported Cclass and CLEVEL in accordance with Tables D-5 and D-16.

Data Requirements

Table E-4b test cases 2k, 2l, 2ae, and 2ai applicable to the IUT.

See Sections 9.4.2, 9.4.2.1, 9.4.2.2, and 9.4.2.3.

Test Procedures

The tester runs the test cases associated with test scenario(s) for IUT and captures the resulting file.

See Sections 9.4, 9.4.1, 9.4.1.1, and 9.4.1.2.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 9.6, 9.6.1, and 9.6.2.

SUBTEST 65, Tile-Part Length (TLM, 0xFF55) Marker Segment

Objective

Determine to what extent the IUT is able to interpret the TLM in the JPC. This subtest is required to be included only in testing of products containing a TLM Marker Segment and will be repeated to demonstrate all supported variations in TLM parameter population.

Criteria for Interpretation Up to Full Extend of Profile

Interpret single or multi TLM Marker Segment in the Main Header of the JPC in accordance with Tables D-17 and D-18.

Data Requirements

Tables E-4a and E-4b test cases 1n through 1ag and 2m, 2ae, and 2ai applicable to the IUT Cclass and CLEVEL support.

See Sections 9.4.2, 9.4.2.1, 9.4.2.2, and 9.4.2.3.

Test Procedures

The tester runs the test cases associated with test scenario(s) for IUT and captures the resulting file.

See Sections 9.4, 9.4.1, 9.4.1.1, and 9.4.1.2.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 9.6, 9.6.1, and 9.6.2.

SUBTEST 66, Packet Length Main Header (PLM, 0xFF57) Marker Segment

Objective

Determine to what extent the IUT is able to interpret the PLM in the JPC. This subtest is required to be included only in testing of products containing a PLM Marker Segment and will be repeated to demonstrate all supported variations in PLM parameter population.

Criteria for Interpretation Up to Full Extend of Profile

Interpret single or multi PLM Marker Segment in the Main Header of the JPC in accordance with Table E-19.

Data Requirements

Table E-4b test cases 2n, 2ae, and 2ai files are applicable to the IUT.

See Sections 9.4.2, 9.4.2.1, 9.4.2.2, and 9.4.2.3.

Test Procedures

The tester runs the test cases associated with test scenario(s) for IUT and captures the resulting file.

See Sections 9.4, 9.4.1, 9.4.1.1, and 9.4.1.2.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 9.6, 9.6.1, and 9.6.2.

SUBTEST 67, Packet Length Tile Header (PLT, 0xFF58) Marker Segment

Objective

Determine to what extent the IUT is able to interpret the PLT in the JPC. This subtest is required to be included only in testing of products containing a PLT Marker Segment and will be repeated to demonstrate all supported variations in PLT parameter population.

Criteria for Interpretation Up to Full Extend of Profile

Interpret single or multi PLT Marker Segment in the Tile Header of the JPC in accordance with Table D-20.

Data Requirements

Tables E-4a and E-4b test cases 1n through 1ag and 2o, 2ae, and 2ai files applicable to the IUT Cclass and CLEVEL support.

See Sections 9.4.2, 9.4.2.1, 9.4.2.2, and 9.4.2.3.

Test Procedures

The tester runs the test cases associated with test scenario(s) for IUT and captures the resulting file.

See Sections 9.4, 9.4.1, 9.4.1.1, and 9.4.1.2.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 9.6, 9.6.1, and 9.6.2.

SUBTEST 68, Packed Packet Main Header (PPM, 0xFF60) Marker Segment

Objective

Determine to what extent the IUT is able to interpret the PPM in the JPC. This subtest is required to be included only in testing of products containing a PPM Marker Segment and will be repeated to demonstrate all supported variations in PPM parameter population.

Criteria for Interpretation Up to Full Extend of Profile

Interpret single or multi PPM Marker Segment in the Main Header of the JPC in accordance with Table D-21.

Data Requirements

Table E-4b test cases 2p, 2ae, and 2ai files are applicable to the IUT.

See Sections 9.4.2, 9.4.2.1, 9.4.2.2, and 9.4.2.3.

Test Procedures

The tester runs the test cases associated with test scenario(s) for IUT and captures the resulting file.

See Sections 9.4, 9.4.1, 9.4.1.1, and 9.4.1.2.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 9.6, 9.6.1, and 9.6.2.

SUBTEST 69, Packed Packet Tile Header (PPT, 0xFF61) Marker Segment

Objective

Determine to what extent the IUT is able to interpret the PPT in the JPC. This subtest is required to be included only in testing of products containing a PPT Marker Segment and will be repeated to demonstrate all supported variations in PPT parameter population.

Criteria for Interpretation Up to Full Extend of Profile

Interpret single or multi PPT Marker Segment in the Tile Header of the JPC in accordance with Table D-22.

Data Requirements

Table E-4b test cases 2q, 2ae, and 2ai files are applicable to the IUT.

See Sections 9.4.2, 9.4.2.1, 9.4.2.2, and 9.4.2.3.

Test Procedures

The tester runs the test cases associated with test scenario(s) for IUT and captures the resulting file.

See Sections 9.4, 9.4.1, 9.4.1.1, and 9.4.1.2.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 9.6, 9.6.1, and 9.6.2.

SUBTEST 70, Start of Packet (SOP, 0xFF91) Marker Segment

Objective

Determine to what extent the IUT is able to interpret the SOP in the JPC when bit errors have occurred. This subtest is required to be included only in testing of products containing a SOP Marker Segment and will be repeated for multi SOPs.

Criteria for Interpretation Up to Full Extend of Profile

The IUT supports SOP Marker Segment in the Bitstream of the JPC for error resilience to isolate individual packets and packet headers from each other in an environment where bit errors have occurred, see Table D-23.

Data Requirements

Table E-4b test cases 2r, 2ae, and 2ai files are applicable to the IUT.

See Sections 9.4.2, 9.4.2.1, 9.4.2.2, and 9.4.2.3.

Test Procedures

The tester runs the test cases associated with test scenario(s) for IUT and captures the resulting file.

See Sections 9.4, 9.4.1, 9.4.1.1, and 9.4.1.2.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4 and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 9.6, 9.6.1, and 9.6.2.

SUBTEST 71, End of Packet Header (EPH, 0xFF92) Marker

Objective

Determine to what extent the IUT is able to interpret the EPH in the JPC when bit errors have occurred. This subtest is required to be included only in testing of products containing an EPH Marker Segment and will be repeated for multi EPHs.

Criteria for Interpretation Up to Full Extend of Profile

The IUT supports EPH Marker in the Main Header, Tile Header and Bitstream of the JPC for error resilience to isolate individual packets and packet headers from each other in an environment where bit errors have occurred, Table D-24.

Data Requirements

Table E-4b test cases 2s through 2u, 2ae, and 2ai are applicable to the IUT.

See Sections 9.4.2, 9.4.2.1, 9.4.2.2, and 9.4.2.3.

Test Procedures

The tester runs the test cases associated with test scenario(s) for IUT and captures the resulting file.

See Sections 9.4, 9.4.1, 9.4.1.1, and 9.4.1.2.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 9.6, 9.6.1, and 9.6.2.

SUBTEST 72, Component Registration (CRG, 0xFF63) Marker Segment

Objective

Determine to if the IUT is able to interpret the CRG in the JPC. This subtest is optional for decode and is included only in testing of products containing a CRG Marker Segment.

Criteria for Interpretation Up to Full Extend of Profile

Interpretation of the CGM Marker Segment in the Main Header:

- The IUT skips passed the CRG Marker Segment without adverse decoding of other Markers and Marker Segments
- The IUT uses the informational CRG Marker Segment to assist in proper display and exploitation
- Supports CRG Marker Segment in accordance with Table D-25

Data Requirements

Table E-4b test cases 2v, 2ae, and 2ai files are applicable to the IUT.

See Sections 9.4.2, 9.4.2.1, 9.4.2.2, and 9.4.2.3.

Test Procedures

The tester runs the test cases associated with test scenario(s) for IUT and captures the resulting file.

See Sections 9.4, 9.4.1, 9.4.1.1, and 9.4.1.2.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 9.6, 9.6.1, and 9.6.2.

SUBTEST 73, Comment (COM, 0xFF64) Marker Segment

Objective

Determine to if the IUT is able to interpret the COM in the JPC. This subtest is optional for decode and is included only in testing of products containing a COM Marker Segment.

Criteria for Interpretation Up to Full Extend of Profile

Interpretation of the COM Marker Segment in the Main Header or Tile Header:

- The IUT skips passed the COM Marker Segment without adverse decoding of other Markers and Marker Segments
- The IUT uses the informational COM Marker Segment and displays the commented data
- Supports CRG Marker Segment in accordance with Table D-26

Data Requirements

Table E-4b test cases 2w, 2x, 2ae, and 2ai are applicable to the IUT.

See Sections 9.4.2, 9.4.2.1, 9.4.2.2, and 9.4.2.3.

Test Procedures

The tester runs the test cases associated with test scenario(s) for IUT and captures the resulting file.

See Sections 9.4, 9.4.1, 9.4.1.1, and 9.4.1.2.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 9.6, 9.6.1, and 9.6.2.

SUBTEST 74, Marker Segment Precedence Main Header over Main Header

Objective

Determine to if the IUT give precedence in decoding based on Marker Segment Precedence in the JPC. This subtest is required to be included only in testing of products containing Precedent Marker Segments and will be repeated to demonstrate all variations of Precedent Marker Segments.

Criteria for Interpretation Up to Full Extend of Profile

Interpretation of the Precedence Marker Segment in the Main Header:

- The IUT gives precedence to the COC over the COD for individual components in accordance with Tables D-3 through D-9
- The IUT gives precedence to the QCC over the QCD for individual components in accordance with Tables D-11 through D-15

Data Requirements

Table E-4b test cases 2c, 2i, 2ae, and 2ai are applicable to the IUT.

See Sections 9.4.2, 9.4.2.1, 9.4.2.2, and 9.4.2.3.

Test Procedures

The tester runs the test cases associated with test scenario(s) for IUT and captures the resulting file.

See Sections 9.4, 9.4.1, 9.4.1.1, and 9.4.1.2.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 9.6, 9.6.1, and 9.6.2.

SUBTEST 75, Marker Segment Precedence Tile Header over Tile Header

Objective

Determine to if the IUT give precedence in decoding based on Marker Segment Precedence in the JPC. This subtest is required to be included only in testing of products containing Precedent Marker Segments and will be repeated to demonstrate all variations of Precedent Marker Segments.

Criteria for Interpretation Up to Full Extend of Profile

Interpretation of the Precedence Marker Segment in the Tile Header:

- The IUT gives precedence to the COC over the COD for individual components in accordance with Tables D-3 through D-9
- The IUT gives precedence to the QCC over the QCD for individual components in accordance with Tables D-11 through D-15

Data Requirements

Table E-4b test cases 2c, 2i, 2ae, and 2ai are applicable to the IUT.

See Sections 9.4.2, 9.4.2.1, 9.4.2.2, and 9.4.2.3.

Test Procedures

The tester runs the test cases associated with test scenario(s) for IUT and captures the resulting file.

See Sections 9.4, 9.4.1, 9.4.1.1, and 9.4.1.2.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 9.6, 9.6.1, and 9.6.2.

SUBTEST 76, Marker Segment Precedence Tile Header over Main Header

Objective

Determine to if the IUT give precedence in decoding based on Marker Segment Precedence in the JPC. This subtest is required to be included only in testing of products containing Precedent Marker Segments and will be repeated to demonstrate all variations of Precedent Marker Segments.

Criteria for Interpretation Up to Full Extend of Profile

Interpretation of the Precedence Marker Segment in the Tile Header over Main Header Marker Segments:

- The IUT gives precedence to the individual Tile Header COD over the Main Header COD for individual tile in accordance with Tables D-3 through D-7
- The IUT gives precedence to the individual Tile Header COC over the Main Header COC for a given component in a tile accordance with Tables D-4 through D-8
- The IUT gives precedence to the individual Tile Header QCD over the Main Header QCD for individual tile in accordance with Tables D-11 through D-14
- The IUT gives precedence to the individual Tile Header QCC over the Main Header QCC for a given component in a tile in accordance with Tables D-12 through D-14
- The IUT gives precedence to the individual Tile Header RGN over the Main Header RGN for a given component in a tile in accordance with Tables D-12 through D-14
- The IUT gives precedence to the individual Tile Header POC over the Main Header POC for a given component in a tile in accordance with Tables D-12 through D-14

Data Requirements

Table E-4b test cases 2b, 2d, 2f, 2h, 2j, 2l, 2ae, and 2ai are applicable to the IUT.

See Sections 9.4.2, 9.4.2.1, 9.4.2.2, and 9.4.2.3.

Test Procedures

The tester runs the test cases associated with test scenario(s) for IUT and captures the resulting file.

See Sections 9.4, 9.4.1, 9.4.1.1, and 9.4.1.2.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 9.6, 9.6.1, and 9.6.2.

SUBTEST 77, Terminating Processing of NBN JPC Files

Objective

Determine if the IUT when encountering a JPC or an NBN JPC that exceeds their supported Cclass and/or CLEVEL may terminate processing without adversely affecting the operation of the interface. This subtest is required to be included for testing the ability of IUT to terminate JPC and/or NBN JPC files that exceed their support Cclass and/or CLEVEL. NBN testing is not required for non-NBN LPJE implementations or SPJE decoders.

Criteria for Interpretation Up to Full Extend of Profile

Termination of Product Processing:

- The IUT may refuse to process a product based on the CLEVEL exceeding the IUT capabilities and will provided the user a message to that effect
- If the IUT initiates decoding of the JPC and encounters parameters within the JPC that exceeded their supported Cclass, the IUT must Quit Decoding and will provided the user a message to effect
- For bounds see Tables D-17 through D-32

Data Requirements

Tables E-4a through E-4c test cases beyond the bounds of the tested Cclass (Profile 2) and CLEVELs beyond application supported applicable to the IUT.

See Sections 9.4.2, 9.4.2.1, 9.4.2.2, and 9.4.2.3.

Test Procedures

The tester runs the test cases associated with test scenario(s) for IUT and captures the resulting file.

See Sections 9.4, 9.4.1, 9.4.1.1, and 9.4.1.2.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 9.6, 9.6.1, and 9.6.2.

SUBTEST 78, Presentation of JPC with Reduced Processing

Objective

Determine if the IUT can decode and display the JPC image or image segment at any user select value. This subtest is required when the IUT supports reduced processing when the JPC contains multi Components, multi Layers, multi Decomposition Levels and multi Tiles.

Criteria for Interpretation Up to Full Extend of Profile

Presentation of JPC:

- The IUT displays the JPC at full resolution using one or three components, all Tiles, all Layers and all Decomposition Levels
- The IUT can display any selected Tile, using one or three components with any number of or all Layers and with any number of or all Decompositions Levels
- The IUT can display any component at full resolution, for any Tile, with any number of or all Decompositions Levels, and with any number of or all Layers
- The IUT can display less than the maximum number of Decompositions Levels, with one or three components, with any or all Tiles and with any number of or all Layers
- The IUT can display less than the maximum number of Layers, with one or three components, with any or all Tiles and with any number of or all Decomposition Levels

Data Requirements

Table E-4b test cases 2aa through 2ae and 2ai are applicable to the IUT.

See Sections 9.4.2, 9.4.2.1, 9.4.2.2, and 9.4.2.3.

Test Procedures

The tester runs the test cases associated with test scenario(s) for IUT and captures the resulting file.

See Sections 9.4, 9.4.1, 9.4.1.1, and 9.4.1.2.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 9.6, 9.6.1, and 9.6.2.

SUBTEST 79, JPC Precedence over NBN Image Sub-header for Associated Values

Objective

Determine if the IUT give precedence to JPC over the NBN Image Sub-header when encountering differences between them for associated values. This subtest will be included in testing of products containing differences in associated values to see that the IUT gives precedence to JPG values. Not required for LPJE or SPJE JPC only decoders.

Criteria for Interpretation Up to Full Extend of Profile

JPC Precedence:

- [*Ysiz* / *IMAG_New*)] – [*YOsiz* / *IMAG_New*)] over NROWS
- [*Xsiz* / *IMAG_New*)] – [*XOsiz* / *IMAG_New*)] over NCOLS
- $\max_i$ (Ssiz^i) = 0 if PTYPE other than B
- $\max_i$ (Ssiz^i) $\in$ [1, 31] = 1 to 31 if PTYPE is other than INT
- $\max_i$ (Ssiz^i) $\in$ [128,159] = 128 to 159 if PVTYPE is other than SI
- $\max_i$ (Ssiz^i & 0x7F) + 1 if not equal to ABPP and NBPP
- Csiz 1 to 9 over NBANDS
- Csiz 10 to 999 over XBANDS and NBANDS = 0
- [(X*siz* – *XTO*)/*XTsiz*] over NBPR
- [(Y*siz* – *YTO*)/Y*Tsiz*] over NBPC
- [*XTsiz*/($\min_i$(*XRsiz*^{i}))] over NPPBH
- [*YTsiz*/($\min_i$(*YRsiz*^{i}))] over NPPBV
- For JPC parameter details see Tables D-2 and D-3

Data Requirements

Table E-4c test case 6b files are applicable to the IUT.

See Sections 9.4.2, 9.4.2.1, 9.4.2.2, and 9.4.2.3.

Test Procedures

The tester runs the test cases associated with test scenario(s) for IUT and captures the resulting file.

See Sections 9.4, 9.4.1, 9.4.1.1, and 9.4.1.2.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 9.6, 9.6.1, and 9.6.2.

SUBTEST 80, Processing a Truncated JPC

Objective

Determine to if the IUT can decode available image data from a JPC that has been truncated. This subtest will be included to test the IUT when they encounter a JPC that has been truncated.

Criteria for Interpretation Up to Full Extend of Profile

Truncated Product Processing:

- The IUT decodes available image data from a JPC that has been truncated
- The IUT alerts users that compressed file is truncated or incomplete with respect to the JPC Marker Segments and format information

Data Requirements

Table E-4c test case 6a files are applicable to the IUT.

See Sections 9.4.2, 9.4.2.1, 9.4.2.2, and 9.4.2.3.

Test Procedures

The tester runs the test cases associated with test scenario(s) for IUT and captures the resulting file.

See Sections 9.4, 9.4.1, 9.4.1.1, and 9.4.1.2.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 9.6, 9.6.1, and 9.6.2.

SUBTEST 81, Interpretation of Non-J2K NBN Segments

Objective

Determine to what extent the IUT is able to interpret and display/present NBN files with non-J2K NBN Segments. This subtest is included in interpret test cases which include non-J2K NBN Segments. Not required for LPJE or SPJE JPC only decoders.

Criteria for Interpretation of Non-J2K NBN Segments

Non-J2K NBN Segments:

- Per applicable NBN and implementation specifications
- For details on segments see Table D-28

Criteria for Interpretation Up to Full Extend of Profile

Truncated Product Processing:

- The IUT decodes available image data from a JPC that has been truncated
- The IUT alerts users that compressed file is truncated or incomplete with respect to the JPC Marker Segments and format information

Data Requirements

Table E-4b test cases 3a through 3i are applicable to the IUT.

See Sections 9.4.2, 9.4.2.1, 9.4.2.2, and 9.4.2.3.

Test Procedures

The tester runs the test cases associated with test scenario(s) for IUT and captures the resulting file.

See Sections 9.4, 9.4.1, 9.4.1.1, and 9.4.1.2.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 9.6, 9.6.1, and 9.6.2.

SUBTEST 82, Interpretation of J2KLRA

Objective

Determine to what extent the IUT is able to parse and display a properly populate the J2KLRA TRE. This subtest will be included in all interpretation test cases in which a J2KLRA TRE is contained. Not required for LPJE or SPJE JPC only decoders.

Criteria for Interpretation of J2KLRA

The interpretation of the J2KLRA TRE is optional and if supported the IUT will present the data contained in the TRE to the user using the IUT interface.

Data Requirements

Tables E-4a and E-4b test cases 1n through 1ag and 2af and 2ag files applicable to the IUT Cclass and CLEVEL support.

See Sections 9.4.2, 9.4.2.1, 9.4.2.2, and 9.4.2.3.

Test Procedures

The tester runs the test cases associated with test scenario(s) for IUT and captures the resulting file.

See Sections 9.4, 9.4.1, 9.4.1.1, and 9.4.1.2.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 9.6, 9.6.1, and 9.6.2.

SUBTEST 83, Interpret J2K File Format

Objective

Determine to what extent the IUT is able to parse and display J2K file formatted NBN image segments. This subtest will be included in all interpretation test cases in which the NBN image segment contains a J2K file formatted NBN image segment.

Criteria for Interpretation of J2K File Format

J2K File Format:

- The IUT decodes and displays the first compressed image from a JP2 formatted file containing more than one image
- The IUT skips by or ignores, without adverse effect, any JP2 boxes that it does not understand
- The IUT accurately decodes supported JP2 boxes contained within a JP2 files
- The IUT as a minimum unparsed and process the codestream

Data Requirements

Tables E-4d and E-4e test cases 4a, 4b, 4c, 5a, 5b, and 5c are applicable to the IUT.

See Sections 9.4.2, 9.4.2.1, 9.4.2.2, and 9.4.2.3.

Test Procedures

The tester runs the test cases associated with test scenario(s) for IUT and captures the resulting file.

See Sections 9.4, 9.4.1, 9.4.1.1, and 9.4.1.2.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 9.6, 9.6.1, and 9.6.2.

SUBTEST 84, Decomposition Levels (Resolution)

Objective

Determine if the IUT is able to repackage the JPC with fewer decomposition levels than contained in original source JPC. This subtest is required to be included if repackaging with fewer decomposition levels is supported.

Criteria for Repacking Decomposition Levels

Decomposition Level Parameter Changes:

- XRsiz modification
- YRsiz modification
- Nlayers modification
- Nlevels modification
- Lqcd modification
- SPqcd modification
- Ptlm modification
- Psot modification
- Lplt modification
- lplt some may be removed
- Packets some may be removed
- SOP/EPH may be deleted
- NROWS/NCOLS modification, only for NBN producers, not applicable to non-NBN LPJE or SPJE implementations
- NPPBH/NPPBV modification, only for NBN producers, not applicable to non-NBN LPJE or SPJE implementations
- COMRAT modification, only for NBN producers, not applicable to non-NBN LPJE or SPJE implementations
- IMAG modification, only for NBN producers, not applicable to non-NBN LPJE or SPJE implementations
- J2KLRA modification, only for NBN producers, not applicable to non-NBN LPJE or SPJE implementations
- For associated parameters see Tables D-1, D-2, D-3, D-11, D-17, and D-20

Data Requirements

Tables E-4a through E-4c test cases repackaged in accordance with requirements applicable to the IUT.

See Sections 10.4.2, 10.4.2.1, 10.4.2.2, and 10.4.2.3.

Test Procedures

See Sections 10.4, 10.4.1, 10.4.1.1, and 10.4.1.2.

The predefined file containing a JPC for LPJE or SPJE or an NBN JPEG 2000 image segment for Profile-1, NPJE, EPJE, or TJPE is repackaged. The resulting product is provided to testers and evaluated using CIVA to check for formatting errors. The product will be introduced to trusted JPEG 2000 and/or NBN Interpreter to provide testers displayed image for comparison to source product. The tester checks if all criteria listed in this subtest relating to repackaging of fewer Decomposition Levels in the JPC have passed.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 10.6, 10.6.1, and 10.6.2.

SUBTEST 85, Quality Layers (Reduction)

Objective

Determines if the IUT is able to repackage the JPC with fewer quality layers then contained in the original source JPC. This subtest is required to be included if repackaging with fewer quality layers is supported.

Criteria for Repacking Quality Layers

Quality Layers Parameter Changes:

- Nlayers modification
- Ptlm modification
- PLT some will be removed
- Packets some may be removed
- SOP/EPH may be deleted
- COMRAT modification, only for NBN producers, not applicable to non-NBN LPJE or SPJE implementations
- J2KLRA modification, only for NBN producers, not applicable to non-NBN LPJE or SPJE implementations
- For associated parameters see Tables D-3, D-17, and D-20

Data Requirements

Table E-4a test cases 1n through 1ag applicable to the IUT.

See Sections 10.4.2, 10.4.2.1, 10.4.2.2, and 10.4.2.3.

Test Procedures

See Sections 10.4, 10.4.1, 10.4.1.1, and 10.4.1.2.

The predefined file containing a JPC for LPJE or SPJE or an NBN JPEG 2000 image segment for Profile-1, NPJE, EPJE, or TJPE is repackaged. The resulting product is provided to testers and evaluated using CIVA to check for formatting errors. The product will be introduced to trusted a JPEG 2000 and/or NBN interpreter to provide testers displayed image for comparison to source product. The tester checks to see if all criteria listed in this subtest relating to repackaging of fewer Quality Layers in the JPC have passed.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 10.6, 10.6.1, and 10.6.2.

SUBTEST 86, Components (Fewer Bands)

Objective

Determines if the IUT is able to repackage the JPC with fewer components then those contained in the original source JPC. This subtest is required to be included if repackaging with fewer components is supported.

Criteria for Repacking Fewer Components

Components Parameter Changes:

- Csiz modification
- Ssiz some will be removed
- XRsiz some be removed
- YRsiz some be removed
- Ptlm modification
- Psot modification
- Lplt modification
- lplt some will be removed
- Packets some may be removed
- SOP/EPH may be deleted
- NBANDS/XBANDS modification, only for NBN producers, not applicable to non-NBN LPJE or SPJE implementations
- J2KLRA modification, only for NBN producers, not applicable to non-NBN LPJE or SPJE implementations
- For associated parameters see Tables D-1, D-2, D-3, D-17, and D-20

Data Requirements

Table E-4a test cases 1n through 1ag applicable to the IUT.

See Sections 10.4.2, 10.4.2.1, 10.4.2.2, and 10.4.2.3.

Test Procedures

See Sections 10.4, 10.4.1, 10.4.1.1, and 10.4.1.2.

The predefined file containing a JPC for LPJE or SPJE or an NBN JPEG 2000 image segment for Profile-1, NPJE, EPJE, or TJPE is repackaged. The resulting product is provided to testers and evaluated using CIVA to check for formatting errors. The product will be introduced to trusted a JPEG 2000 and/or NBN interpreter to provide testers a displayed image for comparison to source product. The tester checks to see if all criteria listed in this subtest relating to repackaging of fewer Components in the JPC have passed.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 10.6, 10.6.1, and 10.6.2.

SUBTEST 87, Positional Subset (Chipping) On Tile Boundaries

Objective

Determines if the IUT is able to repackage the JPC with a subset of fewer pixels then those contained in the original source JPC. This subtest is required to be included if repackaging with fewer pixels on tile boundaries is supported.

Criteria for Repacking Positional Subset on Tile Boundaries

Pixel Parameter Changes:

- Xsiz modification
- Ysiz modification
- XOsiz may be modified base on subset process
- YOsiz may be modified base on subset process
- XTsiz may be modified base on subset process
- YTsiz may be modified base on subset process
- Ltlm modification
- Ztlm modification
- Ptlm if emptied modification
- Emptied Tiles remove Tile Header and data
- lsot modification
- Psot if emptied modification
- PLT removed if emptied
- Packets some may be removed
- SOP/EPH may be deleted
- NROWS/NCOLS modification, only for NBN producers, not applicable to non-NBN LPJE or SPJE implementations
- NBPR/NBPC modification, only for NBN producers, not applicable to non-NBN LPJE or SPJE implementations
- ILOG modification, only for NBN producers, not applicable to non-NBN LPJE or SPJE implementations
- IMAG modification, only for NBN producers, not applicable to non-NBN LPJE or SPJE implementations
- ICHIPB modification, only for NBN producers, not applicable to non-NBN LPJE or SPJE implementations
- For associated parameters see Tables D-1, D-2, D-3, D-17, and D-20

Data Requirements

Table E-3a test cases 1n through 1ag applicable to the IUT.

See Sections 10.4.2, 10.4.2.1, 10.4.2.2, and 10.4.2.3.

Test Procedures

See Sections 10.4, 10.4.1, 10.4.1.1, and 10.4.1.2.

The predefined file containing a JPC for LPJE or SPJE or an NBN JPEG 2000 image segment for Profile-1, NPJE, EPJE, or TJPE is repackaged. The resulting product is provided to testers and evaluated using CIVA to check for formatting errors. The product will be introduced to a JPEG 2000 and/or NBN interpreter to provide testers displayed image for comparison to source product. The tester checks to see if all criteria listed in this subtest relating to repackaging of fewer pixels on tile boundaries in the JPC have passed.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 10.6, 10.6.1, and 10.6.2.

SUBTEST 88, Positional Subset (Chipping) Off Tile Boundaries

Objective

Determines if the IUT is able to repackage the JPC with a subset of fewer pixels then those contained in the original source JPC. This subtest is required to be included if repackaging with fewer pixels off of tile boundaries is supported.

Criteria for Repacking Positional Subset off Tile Boundaries

Pixel Parameter Changes:

- Xsiz modification
- Ysiz modification
- XOsiz may be modified base on subset process
- YOsiz may be modified base on subset process
- XTOsiz may be modified base on subset process
- YTOsiz may be modified base on subset process
- Ltlm modification
- Ztlm modification
- Ptlm if emptied modification
- Emptied Tiles remove Tile Header and data
- lsot modification
- Psot if emptied modification
- PLT removed if emptied
- Packets some may be removed
- SOP/EPH may be deleted
- NROWS/NCOLS modification, only for NBN producers, not applicable to non-NBN LPJE or SPJE implementations
- NBPR/NBPC modification, only for NBN producers, not applicable to non-NBN LPJE or SPJE implementations
- ILOG modification, only for NBN producers, not applicable to non-NBN LPJE or SPJE implementations
- IMAG modification, only for NBN producers, not applicable to non-NBN LPJE or SPJE implementations
- ICHIPB modification, only for NBN producers, not applicable to non-NBN LPJE or SPJE implementations
- For associated parameters see Tables D-1, D-2, D-3, D-17 and D-20

Data Requirements

Table E-3a test case 1n through 1ag applicable to the IUT.

See Sections 10.4.2, 10.4.2.1, 10.4.2.2, and 10.4.2.3.

Test Procedures

See Sections 10.4, 10.4.1, 10.4.1.1, and 10.4.1.2.

The predefined file containing a JPC for LPJE or SPJE or an NBN JPEG 2000 image segment for profile-1, NPJE, EPJE, or TJPE is repackaged. The resulting product is provided to testers and evaluated using CIVA to check for formatting errors. The product will be introduced to trusted a JPEG 2000 and/or NBN interpreter to provide testers displayed image for comparison to source product. The tester checks to see if all criteria listed in this subtest relating to repackaging of fewer pixels off of tile boundaries in the JPC have passed.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 10.6, 10.6.1, and 10.6.2.

SUBTEST 89, Positional Subset (Chipping) on Codeblock Boundaries

Objective

Determines if the IUT is able to repackage the JPC with a subset of fewer pixels then those contained in the original source JPC. This subtest is required to be included if repackaging with fewer pixels on codeblock boundaries is supported.

Criteria for Repacking Positional Subset on Codeblock Boundaries

Pixel Parameter Changes:

- Xsiz modification
- Ysiz modification
- XOsiz may be modified base on subset process
- YOsiz may be modified base on subset process
- XTOsiz may be modified base on subset process
- YTOsiz may be modified base on subset process
- Ltlm modification
- Ztlm modification
- Ptlm if emptied modification
- Emptied Tiles remove Tile Header and data
- lsot modification
- Psot if emptied modification
- PLT removed if emptied
- Packets some may be removed
- SOP/EPH may be deleted
- NROWS/NCOLS modification, only for NBN producers, not applicable to non-NBN LPJE or SPJE implementations
- NBPR/NBPC modification, only for NBN producers, not applicable to non-NBN LPJE or SPJE implementations
- ILOG modification, only for NBN producers, not applicable to non-NBN LPJE or SPJE implementations
- IMAG modification, only for NBN producers, not applicable to non-NBN LPJE or SPJE implementations
- ICHIPB modification, only for NBN producers, not applicable to non-NBN LPJE or SPJE implementations
- For associated parameters see Tables D-1, D-2, D-3, D-17, and D-20

Data Requirements

Table E-3a test cases 1n through 1ag applicable to the IUT.

See Sections 10.4.2, 10.4.2.1, 10.4.2.2, and 10.4.2.3.

Test Procedures

See Sections 10.4, 10.4.1, 10.4.1.1, and 10.4.1.2.

The predefined file containing a JPC for LPJE or SPJE or an NBN JPEG 2000 image segment for Profile-1, NPJE, EPJE, or TJPE is repackaged. The resulting product is provided to testers and evaluated using CIVA to check for formatting errors. The product will be introduced to trusted a JPEG 2000 and/or NBN interpreter to provide testers displayed image for comparison to source product. The tester checks to see if all criteria listed in this subtest relating to repackaging of fewer pixels on codeblock boundaries in the JPC have passed.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 10.6, 10.6.1, and 10.6.2.

SUBTEST 90, Progression Order

Objective

Determines if the IUT is able to repackage the JPC with a progression order change, different then the progression order contained in the original source JPC. This subtest is required to be included if repackaging the progression order is supported.

Criteria for Repacking with Progression Order Change

Progression Order Changes:

- Ltlm modification
- Ztlm modification
- Stlm modification
- Ttlm modification
- Ptlm modification
- Psot modification
- TPsot modification
- TNsot modification
- PLT modification
- Lplt modification
- Zplt modification
- lplt modification
- Packets reordered across tile-parts
- SOP/EPH may be deleted
- J2KLRA modification, only for NBN producers, not applicable to non-NBN LPJE or SPJE implementations
- For associated parameters see Tables D-1, D-3, D-17, and D-20

Data Requirements

Table E-3a test cases 1n through 1ag applicable to the IUT.

See Sections 10.4.2, 10.4.2.1, 10.4.2.2, and 10.4.2.3.

Test Procedures

See Sections 10.4, 10.4.1, 10.4.1.1, and 10.4.1.2.

The predefined file containing a JPC for LPJE or SPJE or an NBN JPEG 2000 image segment for profile-1, NPJE, EPJE, or TJPE is repackaged. The resulting product is provided to testers and evaluated using CIVA to check for formatting errors. Additionally, the product will be introduced to a trusted JPEG 2000 and/or NBN interpreter to provide testers a displayed image for comparison to source product. The tester checks to see if all criteria listed in this subtest relating to repackaging with progression order change in the JPC have passed.

Presentation of Results

A test results summary table and TIRs, as described in Figures 3, 4, and 5, are developed to record the evaluation results.

Analysis and Discussion

See Sections 10.6, 10.6.1, and 10.6.2.

Annex B
Test Requirements Summary

Table B-1. Encode JPEG 2000, Part 1

	Compressed Stream Feature	Reference Annex D of AEDP-4 Edition 2	R/O	Reference BPJ2K01.10 / ISO N2678
1.1	SOC Marker	4.1.1	R	Tables 7-1 & 7-2
1.2	SOT Marker	4.1.2	R	Tables 7-1 & 7-3
1.3	SOD Marker	4.1.3	R	Tables 7-1 & 7-4
1.4	EOC Marker	4.1.4	R	Tables 7-1 & 7-5
1.5	SIZ Marker	4.1.5	R	Tables 7-1 & 7-6
1.6	COD Marker	4.1.6	R	Tables 7-1 & 7-7
1.7	COC Marker	4.1.7	O	Tables 7-1 & 7-12
1.8	RGN Marker	4.1.8	O	Tables 7-1 & 7-14
1.9	QCD Marker	4.1.9	R	Tables 7-1 & 7-15
1.10	QCC Marker	4.1.10	O	Tables 7-1 & 7-19
1.11	POC Marker	4.1.11	O	Tables 7-1 & 7-20
1.12	TLM Marker	4.1.12	O	Tables 7-1 & 7-21
1.13	PLM Marker	4.1.13	O	Tables 7-1 & 7-23
1.14	PLT Marker	4.1.14	O	Tables 7-1 & 7-25
1.15	PPM Marker	4.1.15	O	Tables 7-1 & 7-26
1.16	PPT Marker	4.1.16	O	Tables 7-1 & 7-27
1.17	SOP Marker	4.1.17	O	Tables 7-1 & 7-28
1.18	EPH Marker	4.1.18	O	Tables 7-1 & 7-29
1.19	CRG Marker	4.1.19	O	Tables 7-1 & 7-30
1.20	COM Marker	4.1.20	O	Tables 7-1 & 7-31
1.21	9-7I Filtering	4.1.21	O	Tables 7-7 & 7-12
1.22	5-3R Filtering	4.1.22	O	Tables 7-7 & 7-12
1.23	Progression Order	4.1.23	O	Tables 7-7, A-9
1.24	Wavelet Decomposition	4.1.24	R	Table 7-7
1.25	Profile Indicator	4.1.25	R	Table 7-6
1.26	Layer Numbers	4.1.26	R	Table 7-7
1.27	Empty Tiles	4.1.27	O	Clauses 8.5.1 & 8.5.2
1.28	Component	4.1.28	R	Clauses 7-6
1.29	Codeblock Size	4.1.29	R	Tables 7-7, D-10, E-6 & F-5
1.30	EncodeLL Resolution	4.1.30	O	Clause 7.8
1.31	Multiple Codestreams	4.1.31	O	Clauses 7-1, D-4, E-4, H-1, & G-1
1.32	Minimal J2K File Formats	4.1.32	O	Clause D.1.1, E.1.1, F.1.1, G.1 & H.1

LEGEND:

AEDP	Allied Engineering Document Publication	ISO	International Organization for Standardization	LL	Low-Low
BPJ2K	Basic Image Interchange Format Profile for JPEG 2000	J2K	JPEG 2000	O	Optional
		JPEG	Joint Photographic Experts Group	R	Required

Table B-2. Encode JPEG 2000 NPJE Constrained

	Compressed Stream Feature	Reference Annex D of AEDP-4 Edition 2	R/O	Reference BPJ2K01.10 and Comment
2.1	L-R-C-P Progression Order	4.2.1	R	Table D-10
2.2	Five level Wavelet Decomposition	4.2.2	R	Table D-10
2.3	Profile Indicator	4.2.3	R	Table D-9
2.4	Layers Number*	4.2.4	R	Table D-10
2.5	Tile Size	4.2.5	R	Table D-9
2.6	Tile-Parts	4.2.6	R	Table D-13
2.7	Fixed Tiles	4.2.7	R	Annex D AEDP-4 - All tiles within the J2K codestream have the same number of components, layers, and decomposition levels.
2.8	TLM Markers	4.2.8	O	Table D- 4
2.9	PLT Markers	4.2.9	R	Clause D-2
2.10	Code Block Size 64 by 64	4.2.10	R	Clause D.1.1 & Table D-10
2.11	Image Offset (XOsiz and YOsiz)	4.2.11	R	Table D-9
2.12	Tile Offset (XTOsiz and YTOsiz)	4.2.12	R	Table D-9
2.13	Component Scaling (XRsiz and YRsiz)	4.2.13	R	Table D-9
2.14	J2KLRA TRE Present	4.2.14	O	Optional per AEDP, Clause 8.3 & Table A-1
2.15	Precinct Size	4.2.15	R	Table D-10
2.16	Minimal J2K File Format (JP2)	4.2.16	R	AEDP-4 not allowed optional pre Clause 8.1

LEGEND:

AEDP	Allied Engineering Document Publication	JPEG	Joint Photographic Experts Group	O	Optional
BPJ2K	Basic Image Interchange Format Profile for JPEG 2000	LRCP	Layer - resolution level - component – position	R	Required
J2K	JPEG 2000	NPJE	North Atlantic Treaty Organization Secondary Imagery Format Preferred JPEG 2000 Encoding	TRE	Tagged Record Extension
JP2	J2K Minimal Interchange Format				

Table B-3. Encode JPEG 2000 EPJE Constrained

	Compressed Stream Feature	Reference Annex D of AEDP-4 Edition 2	R/O	Reference BPJ2K01.10 and Comment
3.1	RLCP Progression Order	4.3.1	R	Table E-6
3.2	Five level Wavelet Decomposition	4.3.2	R	Table E-6
3.3	Profile Indicator	4.3.3	R	Table D-9
3.4	Layers Number*	4.3.4	R	Table E-6
3.5	Tile Size	4.3.5	R	Table D-9
3.6	Tile-Parts	4.3.6	R	Table E-7
3.7	Fixed Tiles	4.3.6.4	R	Annex D AEDP-4 - All tiles within the J2K codestream have the same number of components, layers, and decomposition levels.
3.8	TLM Markers	4.3.7	R	Table E-4
3.9	PLT Markers	4.3.8	R	Table E-3
3.10	Code Block Size 64 by 64	4.3.9	R	Table E-6
3.11	Image Offset (XOsiz and YOsiz)	4.3.10	R	Table D-9
3.12	Tile Offset (XTOsiz and YTOsiz)	4.3.11	R	Table D-9
3.13	Component Scaling (XRsiz and YRsiz)	4.3.12	R	Table D-9
3.14	J2KLRA TRE Present	4.3.13	R	Clause E.4.8
3.15	Precinct Size	4.3.14	R	Table E-6
3.16	Minimal J2K File Format (JP2)	4.3.15	R	AEDP-4 not allowed optional pre Clause 8.1

LEGEND:

AEDP	Allied Engineering Document Publication	J2K	JPEG 2000	R	Required
BPJ2K	Basic Image Interchange Format Profile for JPEG 2000	JP2	J2K Minimal Interchange Format	RLCP	Resolution Level, Layer, Component, Position Progression
EPJE	Exploitation Preferred JPEG 2000 Encoding	JPEG	Joint Photographic Experts Group	TRE	Tagged Record Extension
		O	Optional		

Table B-4. Encode JPEG 2000 TPJE Constrained

	Compressed Stream Feature	Reference Annex D of AEDP-4 Edition 2	R/O	Reference BPJ2K01.10 and Comment
4.1	L-R-C-P Progression Order R-L-C-P Progression Order	4.4.1	R	Table F-5
4.2	Five level Wavelet Decomposition	4.4.2	R	Table F-5
4.3	Profile Indicator	4.4.3	R	Table F-4
4.4	Layers Number*	4.4.4	R	Table F-5
4.5	Tile Size	4.4.5	R	Table F-4
4.6	Tile-Parts	4.4.6	R	Table F-10
4.7	Fixed Tiles	4.4.6.3	R	Annex D AEDP-4 - All tiles within the J2K codestream have the same number of components, layers, and decomposition levels.
4.8	TLM Markers	4.4.7	O	Clause F.3.1
4.9	PLT Markers	4.4.8	R	Clause F.4.2.3
4.10	Code Block Size 32x32, 32x64, 64x32 or 64x64	4.4.9	R	Table F-5
4.11	Image Offset (XOsiz and YOsiz)	4.4.10	R	Table F-4
4.12	Tile Offset (XTOsiz and YTOsiz)	4.4.11	R	Table F-4
4.13	Component Scaling (XRsiz and YRsiz)	4.4.12	R	Table F-4
4.14	J2KLRA TRE Present	4.4.13	R	Clause F.8.1
4.15	Precinct Size	4.4.14	R	Table F-5
4.16	Minimal J2K File Format (JP2)	4.4.15	R	AEDP-4 not allowed optional pre Clause 8.1

LEGEND:

AEDP	Allied Engineering Document Publication	JPEG	Joint Photographic Experts Group	RLCP	Resolution level- layer – component – position
BPJ2K	Basic Image Interchange Format Profile for JPEG 2000	LRCP	Layer - resolution level - component – position	TPJE	Tactical Preferred JPEG 2000 Encoding
J2K	JPEG 2000	O	Optional	TRE	Tagged Record Extension
JP2	J2K Minimal Interchange Format	R	Required		

Table B-5. Encode JPEG 2000 LPJE Constrained

	Compressed Stream Feature	Reference Annex D of AEDP-4 Edition 2	R/O	Reference BPJ2K01.10 and Comment
5.1	All allowed	4.5.1	R	Table 7-9
5.2	Five level Wavelet Decomposition	4.5.2	R	Table 7-9
5.3	Profile Indicator	4.5.3	R	Table G-2
5.4	Layers Number*	4.5.4	R	Table 7-7
5.5	Tile Size	4.5.5	R	Table G-2
5.6	Tile-Parts	4.5.6	R	Table 7-21
5.7	Fixed Tiles	4.5.9	O	Annex D AEDP-4 may vary unless encoded in an NBN file then, all tiles within the J2K codestream have the same number of components, layers, and decomposition levels.
5.8	TLM Markers	4.5.10	O	Table G- 1
5.9	PLT Markers	4.5.11	R	Clause G.4.4.2
5.10	Code Block Size	4.5.12	R	Table 7-7
5.11	Image Offset (XOsiz and YOsiz)	4.5.13	R	Table G-2
5.12	Tile Offset (XTOsiz and YTOsiz)	4.5.14	R	Table G-2
5.13	Component Scaling (XRsiz and YRsiz)	4.5.15	R	Table G-2
5.14	J2KLRA TRE Present	4.5.16	R	Required per AEDP in encoded in NBN file
5.15	Precinct Size	4.5.17	R	Table 7-7
5.16	Minimal J2K File Format (JP2)	4.5.16	O	Clause 9.1

LEGEND:

AEDP	Allied Engineering Document Publication	JPEG	Joint Photographic Experts Group	NBN	NATO Secondary Imagery Format/BIIF/National Imagery Transmission Format
BIIF	Basic Image Interchange Format	LPJE	Large Volume Streaming Data Preferred JPEG 2000 Encoding	O	Optional
BPJ2K	BIIF Profile for JPEG 2000	NATO	North Atlantic Treaty Organization	R	Required
J2K	JPEG 2000			TRE	Tagged Record Extension
JP2	J2K Minimal Interchange Format				

Table B-6. Encode JPEG 2000 SPJE Constrained

	Compressed Stream Feature	Reference Annex D of AEDP-4 Edition 2	R/O	Reference BPJ2K01.10 and Comment
6.1	All allowed	4.6.1	R	Table 7-9
6.2	Five level Wavelet Decomposition	4.6.2	R	Table 7-9
6.3	Profile Indicator	4.6.3	R	Table H-2
6.4	Layers Number*	4.6.4	R	Table 7-7
6.5	Tile Size	4.6.5	R	Table H-2
6.6	Tile-Parts	4.6.6	R	Table 7-21
6.7	Fixed Tiles	4.6.7	O	Not addressed may vary per bounds of Profile.
6.8	TLM Markers	4.7.25	O	Table H- 1
6.9	PLT Markers	4.7.27	R	Clause H.4.4.2
6.10	Code Block Size	4.7.19	R	Table 7-7
6.11	Image Offset (XOsiz and YOsiz)	4.7.17	R	Table H-2
6.12	Tile Offset (XTOsiz and YTOsiz)	4.7.18	R	Table H-2
6.13	Component Scaling (XRsiz and YRsiz)	4.7.18	R	Table H-2
6.14	J2KLRA TRE Present	n/a	n/a	Not addressed may vary.
6.15	Precinct Size	4.7.8	R	Table 7-7
6.16	Minimal J2K File Format (JP2)	n/a	n/a	Not addressed may vary.

LEGEND:

AEDP	Allied Engineering Document Publication	JP2	J2K Minimal Interchange Format	R	Required
BPJ2K	Basic Image Interchange Format Profile for JPEG 2000	JPEG	Joint Photographic Experts Group	SPJE	STANAG 7023 Preferred JPEG 2000 Encoding
J2K	JPEG 2000	N/A	Not Applicable	STANAG	Standardization Agreement
		O	Optional	TRE	Tagged Record Extension

Table B-7. Decode JPEG 2000 Part 1 Profile-1

	Compressed Stream Feature	Reference Annex D of AEDP-4 Edition 2	R/O	Reference BPJ2K01.10 / ISO N2678 and Comment
4.1	9-7I Filtering	4.7.1	R	Table 7-12 & Appendix A
4.1	5-3R Filtering	4.7.2	R	Table 7-12 & Appendix A
4.3	Progression Order	4.7.3	R	Tables 7-7 & 7-12
4.4	Wavelet Decomposition	4.7.4	R	Table 7-7
4.5	Quality Layers	4.7.5	R	Table 7-7
4.6	Image/Grid Size	4.7.6	O	Table 7-6
4.7	Tile Size	4.7.7	O	Table 7-6
4.8	Precinct Size	4.7.8	O	Table 7-7
4.9	Empty Tiles	4.7.9	R	Clauses 8.5.1 & 8.5.2
4.10	Missing Tiles	4.7.10	R	Clauses 8.5.1 & 8.5.2
4.11	Components	4.7.11	O	Clauses 7-6
4.12	1 – 38 Bit Precision	4.7.12	R	Tables 7-6 & 8.2
	N/A Clauses missing from source document.	4.7.13, 4.7.14, 4.7.15, 4.7.16		
4.13	Image Origin	4.7.17	R	Table 7-6
4.14	Tile Origin	4.7.18	R	Table 7-6
4.15	Code Block Size	4.7.19	R	Table 7-7
4.16	COC Marker	4.7.20	R	Tables 7-1 & 7-12
4.17	RGN Marker	4.7.21	R	Tables 7-1 & 7-14
4.18	QCD Marker	4.7.22	R	Tables 7-1 & 7-15
4.19	QCC Marker	4.7.23	R	Tables 7-1 & 7-19
4.20	POC Marker	4.7.24	R	Tables 7-1 & 7-20
4.21	TLM Marker	4.7.25	R	Tables 7-1 & 7-21
4.22	PLM Marker	4.7.26	R	Tables 7-1 & 7-23
4.23	PLT Marker	4.7.27	R	Tables 7-1 & 7-24
4.24	PPM Marker	4.7.28	R	Tables 7-1 & 7-25
4.25	PPT Marker	4.7.29	R	Tables 7-1 & 7-26
4.26	SOP Marker	4.7.30	R	Tables 7-1 & 7-27
4.27	EPH Marker	4.7.31	R	Tables 7-1 & 7-28
4.28	CRG Marker	4.7.32	R	Tables 7-1 & 7-29
4.29	COM Marker	4.7.33	R	Tables 7-1 & 7-30
4.30	Marker Precedence	4.7.34	R	Table 7-1
4.31	Decoder Cclass Guarantee	4.7.35	R	Table 8 / ISO/IEC 15444-4:2002 Annex C & E, per Cclass and CLEVEL.
4.32	Quit Decoding	4.7.36	R	Described in ISO/IEC 15444-4:2002 Part 4, Annex A without adversely affecting the operation of the IUT
4.33	Reduced Resolution	4.7.37	O	Table 7-6, ISO/IEC WD15444-4:2002
4.34	Reduced Component	4.7.38	O	Clause A.3
4.35	Reduced Quality	4.7.39	O	Clause A.3
4.36	Reduced Tile	4.7.40	O	Clause A.3
4.37	Display NBN J2K	4.7.41	R	Clauses 5 & 8
4.38	Truncated File	4.7.42	R	Clauses A.2.6 & B.4
4.39	Truncated File Warning	4.7.43	R	Note: Per Clause 5.1.3.3 of N-0105
4.40	NBN Data Length Precedence	4.7.44	R	Clause 8.1

Table B-7. Decode JPEG 2000 Part 1 Profile (continued)

	Compressed Stream Feature	Reference Annex D of AEDP-4 Edition 2	R/O	Reference BPJ2K01.10 / ISO N2678 and Comment

LEGEND:

AEDP	Allied Engineering Document Publication	ISO	International Organization for Standardization	N/A	Not Applicable
BPJ2K	Basic Image Interchange Format Profile for JPEG 2000	IUT	Implementation Under Test	NBN	North Atlantic Treaty Organization Secondary Imagery Format Basic Image Interchange Format/National Imagery Transmission Format
CLEVEL	Complexity Level	J2K	Joint Photographic Experts Group 2000		
IEC	International Electrotechnical Commission	JPEG	Joint Photographic Experts Group	O	Optional
				R	Required

Table B-8. Repack JPEG 2000 Codestream

	Repack Feature	Reference Annex D of AEDP-4 Edition 2	R/O	Reference BPJ2K01.10 and Comment
5.1	Positional Subset (Chipping)	4.8.1	O	Clauses A.7.1, A.7.2, B.2 & B.3
	1 On Tile Boundaries			Clauses A.3.1, A.5 & B.2
	2 Off Tile Boundaries			Clauses A.3.1 & B.3
	3 On Code Block Boundaries			Clause B.3
5.2	Empty Tiles	4.8.2	O	Clauses A.7.1, A.7.2 & B.2; (missing tiles not allowed)
5.3	Reduced Resolution	4.8.3	O	Clauses A.3.2, A.5.2.2, A.6, A.7 & B.1
5.4	Reduced Component	4.8.4	O	Clauses A.7 & A.7.1
5.5	Reduced Layers	4.8.5	O	Clauses A.3.2, A.5.2.1, A.7 & B.4
5.6	Region of Interest	4.8.6	O	Clauses A.2.5, A.3.5 & B.2
5.7	Progression Order	4.8.7	O	Clause A.8
5.8	Repackage NBN J2K to NBN J2K files Profile 1	4.8.8	O	Clause A.7
5.9	Repackage NBN J2K to NPJE, EPJE and TPJE NBN files	4.8.9	O	Clause A.7
5.10	Header Correction 1 JPEG 2000 Markers 2 NBN Header 3 J2KLRA	4.8.10	R	Clause A.7
5.11	Parameter Broadening	4.8.11	O	Appendix A

LEGEND:

AEDP	Allied Engineering Document Publication	J2K	Joint Photographic Experts Group 2000	NPJE	North Atlantic Treaty Organization Secondary Imagery Format Preferred JPEG 2000 Encoding
BPJ2K	Basic Image Interchange Format Profile for JPEG 2000	JPEG	Joint Photographic Experts Group		
EPJE	Exploitation Preferred Joint Photographic Experts Group 2000 Encoding	NBN	North Atlantic Treaty Organization Secondary Imagery Format/Basic Image Interchange Format/National Imagery Transmission Format	O	Optional
				R	Required
				TPJE	Tactical Preferred JPEG 2000 Encoding

Table B-9. J2K File Format

	J2K File Format Feature	Reference Annex D of AEDP-4 Edition 2	R/O	Reference BPJ2K01.10 and Comment
6.1	JP2 file	4.9	R	Clause 5 & ISO/IEC FCD 15444-4 Annex H
6.2	Supported JP2 Boxes	4.9	R	Clause 5 & ISO/IEC FCD 15444-4 Annex H
6.3	Unknown JP2 Boxes	Not Referenced	R	Clause 8.1

LEGEND:

AEDP	Allied Engineering Document Publication	ISO	International Organization for Standardization	JP2	Joint Photographic Experts Group2000 Minimal Interchange Format
BPJ2K	Basic Image Interchange Format for JPEG 2000	J2K	Joint Photographic Experts Group 2000	O	Optional
IEC	International Electrotechnical Commission			R	Required

Table B-10. File Structure

	Image Sub-header Field	Reference Annex D of AEDP-4 Edition 2	R/O	Reference BPJ2K01.10 and Comment
7.1	NROWS NCOLS	4.10.1	R	Table 8-2
7.2	PVTYPE	4.10.2	R	Table 8-2
7.3	IREP	4.10.3	R	Table 8-2
7.4	ABPP	4.10.4	R	Table 8-2
7.5	NBPP	4.10.5	R	Table 8-2
7.6	IC	4.10.6	R	Table 8-2, Image Compression code at least one must be supported.
			O	1 C8 No data masking. 2 M8 Block Mask. 3 M8 Pad Pixel Mask.
7.7	COMRAT	4.10.7	R	Table 8-2, Compression Rate code at least one must be supported.
			O	1 NL Nxyz 2 VL Vxyz 3 Lossy wxyz
7.8	NBANDS XBANDS	4.10.8	R	Table 8-2
7.9	IMODE	4.10.9	R	Table 8-2
7.10	NBPR NBPC	4.10.10	R	Table 8-2
7.11	NPPBH NPPBV	4.10.11	R	Table 8-2
7.12	IMAG	4.10.12	R	Table 8-2

LEGEND:

AEDP	Allied Engineering Document Publication	C8	Joint Photographic Experts Group 2000 Compression	O	Optional
BPJ2K	Basic Image Interchange Format Profile for Joint Photographic Experts Group 2000	M8	Masked Joint Photographic Experts Group 2000 Compression	R	Required
		NL	Numerically Lossless	VL	Visually Lossless

Table B-11. J2KLRA TRE

	J2KLRA Field	Reference Annex D of AEDP-4 Edition 2	R/O	Reference BPJ2K01.10 and Comment
8.1	Original TRE	4.11.1	O	Table 8-3
8.2	ORIG	4.11.2	O	Table 8-3
8.3	NLEVELS_O	4.11.3	O	Table 8-3
8.4	NBANDS_O	4.11.4	O	Table 8-3
8.5	NLAYERS_O	4.11.5	O	Table 8-3
8.6	$LAYER\_ID_n$	4.11.6	O	Table 8-3
8.7	$BITRATE_n$	4.11.7	O	Table 8-3
8.8	Repackaged TRE	4.11.8	O	Table 8-3
8.9	NLEVELS_I	4.11.9	O	Table 8-3
8.10	NLAYERS_I	4.11.10	O	Table 8-3
8.11	NBANDS_I	4.11.11	O	Table 8-3

Note: These features are for optional encoding.

LEGEND:

AEDP	Allied Engineering Document Publication	BPJ2K	Basic Image Interchange Format Profile for Joint Photographic Experts Group 2000	O	Optional
				R	Required
				TRE	Tagged Record Extension

Table B-12. CLEVEL Ranges

	CLEVEL Criteria	Reference Annex D of AEDP-4 Edition 2	R/O	Reference BPJ2K01.10 and Comment
9.1	CLEVEL Marking: Marks the NBN J2K files at the lowest CLEVEL for which they qualify.	4.12.1	R	Clause 5
9.2	Interpret CLEVEL: Required to interpret NBN J2K files at the CLEVEL and all lower CLEVELs, for which compliance is sought.	4.12.2	R	Clause 5
9.3	Generate CLEVEL: Can only generate NBN J2K files at the CLEVEL and all lower CLEVELs, for which compliance is sought..	4.12.3	O	Clause 5
9.4	CLEVEL Components: Required to decode J2K codestreams containing up to the maximum number of allowed components for the NBN CLEVEL for which compliance is sought.	4.12.4	R	Clause 5

Note: All features are optional for encoding.

LEGEND:

AEDP	Allied Engineering Document Publication	J2K	Joint Photographic Experts Group 2000	NBN	NSIF/BIIF/NITF
BIIF	Basic Image Interchange Format	NITF	National Imagery Transmission Format	O	Optional
BPJ2K	BIIF Profile for J2K	NSIF	North Atlantic Treaty Organization Secondary Imagery Format	R	Required
CLEVEL	Complexity Level				

Annex C
Capabilities of Implementation Under Test (IUT)

Table C-1. Generate/Encode

JPEG 2000 FUNCTIONAL SUPPORT CAPABILITY GENERATE/ENCODE FEATURE SUMMARY						
System:	**Date:**					
Compliance Criteria	**IUT Capability**	**R/O**	**Results**			**Comments**
			P	**F**	**N**	
1. Encode JPEG 2000, Part 1 Profile-1 Compliant Codestreams Unrestricted.						
1.1 SOC Marker. The SOC marker (0xFF4F) is the first marker segment in the JPC. The SOC Marker only appears in the *Main Header* of the JPC.		R				
1.2 SOT Marker. The SOT marker (0xFF90) is the first marker segment in each tile part of the JPC. The SOT marker only appears in *Tile Headers* of the JPC. (Note: Psot ≠ 0, for every SOT prior to the last SOT in the JPC.)		R				
1.3 SOD Marker. The SOD marker (0xFF93) is the last marker segment of each tile part header in the JPC. The SOD marker only appears in *Tile Headers* of the JPC.		R				
1.4 EOC Marker. The EOC marker (0xFFD9) is the last marker segment in the JPC. The EOC marker only appears in the *Bitstream* portion of the JPC.		R				
1.5 SIZ Marker. The SIZ marker (0xFF51) is the second marker segment in the main header of the JPC. The SIZ marker only appears in the *Main Header* of the JPC.		R				
1.6 COD Marker. The COD marker (0xFF52), the COD markers do not appear in the *Bitstream* of the JPC.						
Appears in the *Main Header* of the JPC.		R				
Appears no more than once in the first *Tile-Part Header* of any tile of the JPC.		O				
1.7 COC Marker. The COC marker (0xFF53), the COC markers do not appear in the *Bitstream* of the JPC.						
Appears no more than once per component within the *Main Header* of the JPC.		O				
Appears in the first *Tile-Part Header* of a given tile in the JPC.		O				
1.8 RGN Marker. RGN marker (0xFF5E), the RGN markers do not appear in the *Bitstream* of the JPC.						
Appears, no more than once per component, in the first *Main Header* of the JPC.		O				
Appears no more than once per component, in the first *Tile-Part Header* of a given tile in the JPC.		O				
1.9 QCD Marker. The QCD marker (0xFF5C), the QCD markers do not appear in the *Bitstream* of the JPC.						
There is one, and only one, QCD marker (0xFF5C) appearing in the *Main Header* of the JPC.		R				
No more than one appears in the first *Tile-Part Header* of any tile of the JPC.		O				
1.10 QCC Marker. The QCC marker (0xFF5D) the QCC markers do not appear in the *Bitstream* of the JPC.						
Appears no more than once per component, within the *Main Header* of the JPC.		O				
Appears no more than once per component, in the first *Tile-Part Header* of a given tile in the JPC.		O				

Table C-1. Generate/Encode (continued)

JPEG 2000 FUNCTIONAL SUPPORT CAPABILITY GENERATE/ENCODE FEATURE SUMMARY						
System:		**Date:**				
Compliance Criteria	**IUT Capability**	**R/O**	**Results**			**Comments**
			P	**F**	**N**	
1.11 POC Marker. POC markers (0xFF5F), POC markers do not appear in the *Bitstream* of the JPC.						
Appear only once in any *Main Header* of the JPC.		O				
Appear only once in any *Tile-Part Header* of the JPC.		O				
1.12 TLM Marker. TLM markers (0xFF55) only appear in the *Main Header* of the JPC.		O				
1.13 PLM Marker. PLM markers (0xFF57) only appear in the *Main Header* of the JPC.		O				
1.14 PLT Marker. PLT markers (0xFF58) only appear in the *Tile Header* of the JPC. The PLT marker must appear in any tile-part header before the packets whose lengths they describe.		O				
1.15 PPM Marker. PPM markers (0xFF60) only appear in the *Main Header* of the JPC. If present, all packet headers are present in the main header of the JPC and no PPT markers (0xFF61) are allowed in the same JPC with PPM markers.		O				
1.16 PPT Marker. A PPT marker (0xFF61) only appears in the *Tile Header* of the JPC. The PPT marker must appear in any *Tile-Part Header* before the packets whose headers are contained in the PPT appear of the JPC and no PPM markers (0xFF60) are allowed in the same JPC with PPT markers.		O				
1.17 SOP Marker. A SOP marker (0xFF91) only appears in the *Bitstream* portion of the JPC.		O				
1.18 EPH Marker. The EPH markers (0xFF92) may appear in the *Bitstream* portion of the JPC.		O				
May appear in the *Main Header* of the JPC.		O				
May appear in the *Tile Header* of the JPC.		O				
1.19 CRG Marker. The CRG marker (0xFF63) only appears in the *Main Header* of the JPC.		O				
1.20 COM Marker. COM markers (0xFF64), the COM markers do not appear in the *Bitstream* of the JPC.						
Appear in the *Main Header* of the JPC.		O				
Appear in the *Tile Header* of the JPC.		O				
1.21 Wavelet Filtering.						
NL encoding 5.3 filtering.		O				
Other than numerically lossless encoding, VL or Lossy 9-7 filtering.		O				
1.22 Progression Order. The JPC contains any of the allowed progression orders, to include: LRCP, RLCP, RPCL, PCRL, and CPRL. One of the following 5 orders is required (0 ≤ Progression Order field value ≤ 4).						
Layer – resolution level – component – position progression (LRCP) bit values (0000 0000).		O				
Resolution level- layer – component – position progression (RLCP) bit values (0000 0001).		O				
Resolution level – position – component – layer progression (RPCL) bit values (0000 0010).		O				
Position – component – resolution level – layer progression (PCRL) bit values (0000 0011).		O				
Component – position – resolution level – layer progression (CPRL) bit values (0000 0100).		O				
1.23 Wavelet Decomposition. The JPC contains between 0 and 32 decomposition levels. (0 ≤ N_{levels} field value ≤ 32.)		R				

Table C-1. Generate/Encode (continued)

JPEG 2000 FUNCTIONAL SUPPORT CAPABILITY GENERATE/ENCODE FEATURE SUMMARY							
System:			**Date:**				
Compliance Criteria	**IUT Capability**	**R/O**	**Results**			**Comments**
			P	**F**	**N**	
1.24 Profile Indicator. The JPC must contain a profile indicator value that either signals Profile-1 or the Profile-0 a subset of Profile-1. One or the other is required for support.						
Rsiz = 0x0002 indicates a Profile-1 compliant codestream		O				
Rsiz = 0x0001 indicates a Profile-0 compliant codestream		O				
1.25 Layer Numbers. The JPC contains between 1 and 65535 quality layers. ($1 \leq N_{layers}$ field value ≤ 65535.)		R				
1.26 Empty Tiles. Per user selection, the JPC may contain empty tiles.		O				
1.27 Components. The JPC contains a maximum of 16384 components. ($1 \leq$ Csiz field value ≤ 16384.)		R				
1.28 RGN Marker Limit. The SPrgn value is less than or equal to 37. Required if RGN marker is present in the codestream.		O				
1.29 Code Block Size. The code block height and width value is 64 or less. (xcb ≤ 6, ycb ≤ 6 .)		R				
1.30 Encode LL Resolution. For each tile in the image, the LL (0) subband is ≤ 128.						
Profile-0, PPT and PPM markers are not allowed and COD, COC, QCD and QCC markers will only be in the *Main Header*. LL resolution if one tile is used for whole image,(Xsiz –XOsiz)/D(I) ≤ YOsiz)/D(I) (Ysiz ≤ 128 where D (I)= 2^number of decomposition levels" in SPcod or SPcoc, for I = component 0 to 2.		O				
Profile-1, No restriction on the placement of PPT, PPM, COD, COC, QCD and QCC markers. LL resolution if one tile is used for whole image, (Xsiz – XOsiz)/D(I) (Ysiz – YOsiz)/D(I) ≤ 12 decomposition levels" in SPcod or SPcoc, for I = component 0 to 3.		O				
1.31 Multiple Codestreams. If product contains multi NBN J2K compressed image segments that are created from a single source image, each will contain identical compression parameters. i.e. quantization, layering, wavelet transform filter, number of decomposition levels, progression order, tiling size, codeblock size, precinct size, and coding defaults.		O				
1.32 Numerically Lossless Encoding. When fully decoded, by a reference J2K decoder implementation, the reversible numerically lossless encoded JPC is identical to the original image data. Required if numerically lossless encoding is supported.		O				

LEGEND:

CPRL	Component – position – resolution level – layer	LRCP	Layer – resolution level – component - position	Results:	
IUT	Implementation Under Test	NBN	North Atlantic Treaty Organization Secondary Imagery Format/Basic Image Interchange Format/National Imagery Transmission Format	F	Fail
J2K	Joint Photographic Experts Group 2000			N	Not Supported by IUT
JPC	Joint Photographic Experts Group 2000 Codestream	NL	Numerically Lossless	P	Pass
JPEG	Joint Photographic Experts Group	NSIF	NATO Secondary Imagery Format	RLCP	Resolution level- layer – component – position
LL	Low-Low	PCRL	Position – component – resolution level – layer	RPCL	Resolution level – position – component – layer
		R/O:	Required/Optional	VL	Visually Lossless

Table C-2. Generate/Encode NPJE

JPEG 2000 FUNCTIONAL SUPPORT CAPABILITY GENERATE/ENCODE FEATURE SUMMARY						
System:	**Date:**					
Compliance Criteria	**IUT Capability**	**R/O**	**Results**			**Comments**
			P	**F**	**N**	
2. Constrained NSIF Preferred JPEG 2000 Encoding (NPJE) Codestreams Only required if IUT supports production of NPJE products. An IUT correctly encodes image arrays into JPCs within the criteria of ISO/IEC 15444-1:2002 JPEG 2000 Image Coding System listed in Table B-1 and the NPJE constraints described in the BPJ2K01.10 and summarized in this table.						Note: Overall support for NPJE is optional. However, if supported by the IUT, the features listed in this table as "R" (required) are the minimum requirement for NPJE support.
2.1 L-R-C-P Progression Order. The progression order of JPC is Layer-Resolution-Component-Position (LRCP). All packets for the 1st tile layer resolution and component, followed by the 2nd component, then the 3rd component and so on through all components. This is followed by all packets for the 1st tile, layer, 2nd resolution and all its components.		R				
2.2 Wavelet Decomposition. The JPC contains 5 wavelet decomposition levels. (N_{levels} = 5.)		R				
2.3 Profile Indicator. The JPC contains a profile indicator value of 2 (Rsiz = 0x0002), which signals Profile-1		R				
2.4 Layer Numbers. NBN files containing JPC include the appropriate number of quality layers and target bit rates. The target bit rates associated with the quality layers are nominal bit rates. A given scene's content might prevent the final few layers from reaching their target bit-rates. One of the following three NL, VL or Lossy are required						
The JPC contains 20 quality layers for *NL* compressed imagery.		O				
The JPC contains 19 quality layers for *VL* compressed imagery.		O				
The JPC contains the corresponding number of layers and target bit rates for *Lossy* compressed imagery as selected by the operator.		O				
2.5 Tiling. Size of the J2K reference tiles is 1024 x 1024 (XTsiz=YTsiz= 0x0400).		R				
2.6 Tile Parts. Encoded tiles within the JPC contain only one tile-part. Tile parts must appear in raster order within the JPC without omission or repetition. Psot ≠ 0 for the last SOT in the codestream.		R				
2.7 Fixed Tiles. All tiles within the JPC have the same number of components, layers, and decomposition levels.		R				
2.8 TLM Markers. JPC contains TLM markers, with Stlm = 0100 0000 (i.e. ST = 0 and SP = 1)		R				
2.9 PLT Markers. JPC contains PLT markers. For each tile, one PLT marker is required for each layer		R				
2.10 Code Block Size. JPC utilizes a code block size of 64 by 64 (xcb=ycb=6).		R				
2.11 Image Offset. Image offset values (XOsiz and YOsiz) are set to zero.		R				
2.12 Tile Offset. Tile offset values (XTOsiz and YTOsiz) are set to zero.		R				
2.13 Component Scaling/Separation. The sample separation values, XRsiz and YRsiz, are set to "1".		R				
2.14 J2KLRA TRE. The J2KLRA TRE may be included in NBN files containing J2K encoded data.		O				

Table C-2 Generate/Encode NPJE (continued)

JPEG 2000 FUNCTIONAL SUPPORT CAPABILITY GENERATE/ENCODE FEATURE SUMMARY						
System:		**Date:**				
Compliance Criteria	**IUT Capability**	**R/O**	**Results**			**Comments**
			P	**F**	**N**	
2.15 Precinct Size. J2K code stream contains a precinct size of 2^15 x 2^15. (PPx = 0xF, PPy = 0xF)		R				
2.16 Minimal J2K File Formats. NBN NPJE file does not contain JP2 header boxes.		R				

LEGEND:

BPJ2K	Basic Image Interchange Format Profile for J2K	JPC	Joint Photographic Experts Group Codestream	NSIF	North Atlantic Treaty Organization Secondary Imagery Format
IEC	International Electrotechnical Commission	JPEG	Joint Photographic Experts Group	R/O:	Required/Optional
ISO	International Organization for Standardization	LRCP	Layer-Resolution-Component-Position	Results:	
IUT	Implementation Under Test	NBN	NSIF/Basic Image Interchange Format/National Imagery Transmission Format	F	Fail
J2K	Joint Photographic Experts Group 2000	NL	Numerically Lossless	N	Not Supported by IUT
JP2	Joint Photographic Experts Group 2000 Minimal Interchange Format	NPJE	NSIF Preferred Joint Photographic Experts Group 2000 Encoding	P	Pass
				TRE	Tagged Record Extension
				VL	Visually Lossless

Table C-3. Generate/Encode EPJE

JPEG 2000 FUNCTIONAL SUPPORT CAPABILITY GENERATE/ENCODE FEATURE SUMMARY						
System:	**Date:**					
Compliance Criteria	**IUT Capability**	**R/O**	**Results**			**Comments**
			P	**F**	**N**	
3. Constrained EPJE Codestreams, Only required if IUT supports production of EPJE products. An IUT correctly encodes image arrays into JPCs within the criteria of ISO/IEC 15444-1:2002 JPEG 2000 Image Coding System listed in Table B-1 and the EPJE constraints described in the BPJ2K01.10 and summarized in this table.						Note: Overall support for EPJE is optional. However, if supported by the IUT, the features listed in this table as "R" (required) are the minimum requirement for EPJE support.
3.1 R-L-C-P Progression Order. The progression order of JPC is Resolution-Layer-Component-Position (RLCP). (Progression Order field = 0x1).		R				
3.2 Wavelet Decomposition. The JPC contains 5 wavelet decomposition levels. (N_{levels} = 5.)		R				
3.3 Profile Indicator. The JPC contains a profile indicator value of 2 (Rsiz = 0x0002), which signals Profile-1.		R				
3.4 Layer Numbers. NBN files containing JPC include the appropriate number of quality layers and target bit rates. The target bit rates associated with the quality layers are nominal bit rates. A given scene's content might prevent the final few layers from reaching their target bit-rates. One of the following three NL, VL or Lossy are required						
The JPC contains 20 quality layers for *NL* compressed imagery.		O				
The JPC contains 19 quality layers for *VL* compressed imagery.		O				
The JPC contains the corresponding number of layers and target bit rates for *Lossy* compressed imagery as selected by the operator.		O				
3.5 Tiling. Size of the J2K reference tiles is 1024 x 1024 (XTsiz=YTsiz= 0x0400).		R				
3.6 Tile Parts.						
Encoded tiles within the JPC contain six tile-parts per tile with each tile-part containing packets from a single resolution within the tile.		R				
All tile-parts, across all tiles, for a given resolution are contiguous and in raster order within the JPC.		R				
For the SOT in each tile-part, Psot ≠ 0 and TNsot ≠ 0.		R				
3.7 Fixed Tiles. All tiles within the JPC have the same number of components, layers, and decomposition levels.		R				
3.8 TLM Markers. JPC contains TLM markers, with Stlm = 0100 0000 (i.e. ST = 0 and SP = 1).		R				
3.9 PLT Markers. JPC contains PLT markers. One PLT per tile-part..		R				
3.10 Code Block Size. JPC utilizes a code block size of 64 by 64 (xcb=ycb=6).		R				
3.11 Image Offset. Image offset values (XOsiz and YOsiz) are set to zero.		R				
3.12 Tile Offset. Tile offset values (XTOsiz and YTOsiz) are set to zero.		R				
3.13 Component Scaling/Separation. The sample separation values, XRsiz and YRsiz, are set to "1".		R				
3.14 J2KLRA TRE. J2KLRA TRE is included in NBN files containing J2K encoded data.		R				

Table C-3. Generate/Encode EPJE (continued)

JPEG 2000 FUNCTIONAL SUPPORT CAPABILITY GENERATE/ENCODE FEATURE SUMMARY						
System:		**Date:**				
Compliance Criteria	**IUT Capability**	**R/O**	**Results**			**Comments**
			P	**F**	**N**	
3.15 Precinct Size. J2K code stream contains a precinct size of 2^15 x 2^15. (PPx = 0xF, PPy = 0xF).		R				
3.16 Minimal J2K File Formats. NBN EPJE file does not contain JP2 header boxes.		R				
3.17 Main Header Markers. J2K main header only contains the following markers; SOC, SIZ, COD, QCD, QCC, TLM. (Use of the QCC marker is optional).		R				
3.18 Marker Order MH. Main Header markers are in the following order; SOC, SIZ, COD, QCD, QCC, TLM.		R				

LEGEND:

EPJE	Exploitation Preferred Joint Photographic Experts Group 2000 Encoding	JP2	Joint Photographic Experts Group 2000 Minimal Interchange Format	NL	Numerically Lossless
IEC	International Electrotechnical Commission	JPC	Joint Photographic Experts Group Codestream	R/O:	Required/Optional
ISO	International Organization for Standardization	JPEG	Joint Photographic Experts Group	Results:	
IUT	Implementation Under Test	NBN	North Atlantic Treaty Organization Secondary Imagery Format/Basic Image Interchange Format/National Imagery Transmission Format	F	Fail
J2K	Joint Photographic Experts Group 2000			N	Not Supported by IUT
				P	Pass
				RLCP	Resolution-Layer-Component-Position
				TRE	Tagged Record Extension
				VL	Visually Lossless

Table C-4. Generate/Encode TPJE

JPEG 2000 FUNCTIONAL SUPPORT CAPABILITY GENERATE/ENCODE FEATURE SUMMARY						
System:	**Date:**					
Compliance Criteria	**IUT Capability**	**R/O**	**Results**			**Comments**
			P	**F**	**N**	
4. Constrained TPJE Codestreams, Only required if IUT supports production of TPJE products. An IUT correctly encodes image arrays into JPCs within the criteria of ISO/IEC 15444-1:2002 JPEG 2000 Image Coding System listed in Table B-1 and the EPJE constraints described in the BPJ2K01.10 and summarized in this table.						Note: Overall support for TPJE is optional. However, if supported by the IUT, the features listed in this table as "R" (required) are the minimum requirement for TPJE support.
4.1 L-R-C-P Progression Order. The progression order of JPC is Layer-Resolution-Component-Position (LRCP). All packets for the 1st tile layer resolution and component, followed by the 2nd component, then the 3rd component and so on through all components. This is followed by all packets for the 1st tile, layer, 2nd resolution and all its components. **R-L-C-P Progression Order.** The progression order of JPC is Resolution-Layer-Component-Position (RLCP). (Progression Order field = 0x1).		R				One or the other
4.2 Wavelet Decomposition. The JPC contains 5 to 9 wavelet decomposition levels.		R				
4.3 Profile Indicator. The JPC contains a profile indicator value of 2 (Rsiz = 0x0002), which signals Profile-1.		R				
4.4 Layer Numbers. NBN files containing JPC include the appropriate number of quality layers and target bit rates. The target bit rates associated with the quality layers are nominal bit rates. A given scene's content might prevent the final few layers from reaching their target bit-rates. One of the following three NL, VL or Lossy are required						
The JPC contains 20 quality layers for *NL* compressed imagery.		O				
The JPC contains 19 quality layers for *VL* compressed imagery.		O				
The JPC contains the corresponding number of layers and target bit rates for *Lossy* compressed imagery as selected by the operator.		O				
4.5 Tiling. Size of the J2K reference tiles is 1024 x 1024 (XTsiz=YTsiz= 0x0400).		R				
4.6 Tile Parts.						
Encoded tiles within the JPC contain six tile-parts per tile with each tile-part containing packets from a single resolution within the tile.		R				
All tile-parts, across all tiles, for a given resolution are contiguous and in raster order within the JPC.		R				
For the SOT in each tile-part, Psot ≠ 0 and TNsot ≠ 0.		R				
4.7 Fixed Tiles. All tiles within the JPC have the same number of components, layers, and decomposition levels.		R				
4.8 TLM Markers. JPC contains TLM markers, with Stlm = 0100 0000 (i.e. ST = 0 and SP = 1).		R				
4.9 PLT Markers. JPC contains PLT markers. One PLT per tile-part.		R				
4.10 Code Block Size. JPC utilizes a code block size of 32x32, 32x64, 64x32 or 64x64.		R				
4.11 Image Offset. Image offset values (XOsiz and YOsiz) are set to zero.		R				

Table C-4. Generate/Encode TPJE (continued)

JPEG 2000 FUNCTIONAL SUPPORT CAPABILITY GENERATE/ENCODE FEATURE SUMMARY						
System:		**Date:**				
Compliance Criteria	**IUT Capability**	**R/O**	**Results**			**Comments**
			P	**F**	**N**	
4.12 Tile Offset. Tile offset values (XTOsiz and YTOsiz) are set to zero.		R				
4.13 Component Scaling/Separation. The sample separation values, XRsiz and YRsiz, are set to "1".		R				
4.14 J2KLRA TRE. J2KLRA TRE is included in NBN files containing J2K encoded data.		R				
4.15 Precinct Size. J2K code stream contains a precinct size of 2^15 x 2^15. (PPx = 0xF, PPy = 0xF).		R				
4.16 Minimal J2K File Formats. NBN TPJE file does not contain JP2 header boxes.		R				
4.17 Main Header Markers. J2K main header only contains the following markers; SOC, SIZ, COD, QCD, QCC, TLM. (Use of the QCC marker is optional).		R				
4.18 Marker Order MH. Main Header markers are in the following order; SOC, SIZ, COD, QCD, QCC, TLM.		R				

LEGEND:

BPJ2K	Basic Image Interchange Format Profile for JPEG 2000	JPC	Joint Photographic Experts Group Codestream	R/O:	Required/Optional
EPJE	Exploitation Preferred Joint Photographic Experts Group 2000 Encoding	JPEG	Joint Photographic Experts Group	Results:	
		LRCP	Layer-Resolution-Component-Position	F	Fail
IEC	International Electrotechnical Commission	NBN	North Atlantic Treaty Organization Secondary Imagery Format/Basic Image Interchange Format/National Imagery Transmission Format	N	Not Supported by IUT
ISO	International Organization for Standardization			P	Pass
IUT	Implementation Under Test			RLCP	Resolution-Layer-Component-Position
J2K	Joint Photographic Experts Group 2000	NL	Numerically Lossless	TPJE	Tactical Preferred JPEG 2000 Encoding
JP2	Joint Photographic Experts Group 2000 Minimal Interchange Format			TRE	Tagged Record Extension
				VL	Visually Lossless

Table C-5. Generate/Encode LPJE

JPEG 2000 FUNCTIONAL SUPPORT CAPABILITY GENERATE/ENCODE FEATURE SUMMARY						
System:	**Date:**					
Compliance Criteria	**IUT Capability**	**R/O**	**Results**			**Comments**
			P	**F**	**N**	
5. Constrained LPJE Codestreams, Only required if IUT supports production of LPJE products. An IUT correctly encodes image arrays into JPCs within the criteria of ISO/IEC 15444-1:2002 JPEG 2000 Image Coding System listed in Table B-1 and the EPJE constraints described in the BPJ2K01.10 and summarized in this table.						Note: Overall support for LPJE is optional. However, if supported by the IUT, the features listed in this table as "R" (required) are the minimum requirement for LPJE support.
5.1 L-R-C-P Progression Order. The progression order of JPC is Layer-Resolution-Component-Position. **R-L-C-P Progression Order.** The progression order of JPC is Resolution-Layer-Component-Position. **R-P-C-L Progression Order.** The progression order of JPC is Resolution level-position-component-layer progression **P-C-R-L Progression Order.** The progression order of JPC is Position-component-resolution level-layer progression **C-P_R-L Progression Order.** The progression order of JPC is Component-position-resolution level-layer progression		R				One or the other
5.2 Wavelet Decomposition. The JPC may contain wavelet decomposition levels allowed by full extent of Table 7-7.		R				
5.3 Profile Indicator. The JPC contains one of the following profile indicator values:						
(Rsiz = 0x0001), which signals Profile-0. (Rsiz = 0x0002), which signals Profile-1. (Rsiz = 0x0000), which signals Profile-2. Note: If encoded to NBN file for NBN compliance only Profiles 0 and 1 are allowed.		R				
5.4 Layer Numbers. The JPC include the appropriate number of quality layers and target bit rates allowed by full extent of Table 7-7.		O				
5.5 Tiling. Size of the J2K reference tiles allowed by full extent of Table 7-7.		R				
5.6 Tile Parts. Encoded tiles within the JPC allowing by full extent of Table 7-3.						
5.7 TLM Markers. JPC contains TLM markers, allowed by full extent of Table 7-21.		R				
5.8 PLT Markers. JPC contains PLT markers, allowing by full extent of Table 7-3.		R				
5.9 Code Block Size. JPC utilizes a code block sizes allowed by full extent of Table 7-7.		R				
5.10 Image Offset. Image offset values to full extent of Table G-2.		R				
5.11 Tile Offset. Tile offset values to full extent of Table G-2.		R				
5.12 Component Scaling/Separation. The sample separation values to full extent of Table G-2.		R				

Table C-5. Generate/Encode LPJE (continued)

JPEG 2000 FUNCTIONAL SUPPORT CAPABILITY GENERATE/ENCODE FEATURE SUMMARY						
System:		**Date:**				
Compliance Criteria	**IUT Capability**	**R/O**	**Results**			**Comments**
			P	**F**	**N**	
5.13 J2KLRA TRE. J2KLRA TRE is included in NBN files containing J2K encoded data.		O				
5.14 Precinct Size. J2K code stream contains to full extent of Table 7-7.		R				
5.15 Minimal J2K File Formats. NBN LPJE file may contain JP2 header boxes.		O				
5.16 Main Header Markers. J2K main header only contains the following markers; SOC, SIZ, COD, QCD, QCC, TLM. (Use of the QCC marker is optional).		R				
5.17 Marker Order MH. Main Header markers are in the following order; SOC, SIZ, COD, QCD, QCC, TLM.		R				

LEGEND:

BPJ2K	Basic Image Interchange Format Profile for JPEG 2000	JP2	Joint Photographic Experts Group 2000 Minimal Interchange Format	PCRL	Position-component-resolution level-layer
CPRL	Component-position-resolution level	JPC	Joint Photographic Experts Group Codestream	RLCP	Resolution-Layer-Component-Position
EPJE	Exploitation Preferred Joint Photographic Experts Group 2000 Encoding	JPEG	Joint Photographic Experts Group	RPCL	Resolution level-position-component-layer
IEC	International Electrotechnical Commission	LPJE	Large Volume Streaming Data Preferred JPEG 2000 Encoding	R/O:	Required/Optional
ISO	International Organization for Standardization	LRCP	Layer-Resolution-Component-Position	Results:	
IUT	Implementation Under Test	NBN	North Atlantic Treaty Organization Secondary Imagery Format/Basic Image Interchange Format/National Imagery Transmission Format	F	Fail
J2K	Joint Photographic Experts Group 2000			N	Not Supported by IUT
				P	Pass
				TRE	Tagged Record Extension

Table C-6. Generate/Encode SPJE

JPEG 2000 FUNCTIONAL SUPPORT CAPABILITY GENERATE/ENCODE FEATURE SUMMARY						
System:	**Date:**					
Compliance Criteria	**IUT Capability**	**R/O**	**Results**			**Comments**
			P	**F**	**N**	
6. Constrained SPJE Codestreams, Only required if IUT supports production of SPJE products. An IUT correctly encodes image arrays into JPCs within the criteria of ISO/IEC 15444-1:2002 JPEG 2000 Image Coding System listed in Table B-1 and the EPJE constraints described in the BPJ2K01.10 and summarized in this table.						Note: Overall support for SPJE is optional. However, if supported by the IUT, the features listed in this table as "R" (required) are the minimum requirement for SPJE support.
6.1 L-R-C-P Progression Order. The progression order of JPC is Layer-Resolution-Component-Position. **R-L-C-P Progression Order.** The progression order of JPC is Resolution-Layer-Component-Position. **R-P-C-L Progression Order.** The progression order of JPC is Resolution level-position-component-layer progression **P-C-R-L Progression Order.** The progression order of JPC is Position-component-resolution level-layer progression **C-P_R-L Progression Order.** The progression order of JPC is Component-position-resolution level-layer progression		R				One or the other
6.2 Wavelet Decomposition. The JPC may contain wavelet decomposition levels allowed by full extent of Table 7-7.		R				
6.3 Profile Indicator. The JPC contains one of the following profile indicator values:						
(Rsiz = 0x0001), which signals Profile-0. (Rsiz = 0x0002), which signals Profile-1. (Rsiz = 0x0000), which signals Profile-2. Note: If encoded to NBN file for NBN compliance only Profiles 0 and 1 are allowed.		R				
6.4 Layer Numbers. The JPC include the appropriate number of quality layers and target bit rates allowed by full extent of Table 7-7.		O				
6.5 Tiling. Size of the J2K reference tiles allowed by full extent of Table 7-7.		R				
6.6 Tile Parts. Encoded tiles within the JPC allowing by full extent of Table 7-3.						
6.7 TLM Markers. JPC contains TLM markers, allowed by full extent of Table 7-21.		R				
6.8 PLT Markers. JPC contains PLT markers, allowing by full extent of Table 7-3.		R				
6.9 Code Block Size. JPC utilizes a code block sizes allowed by full extent of Table 7-7.		R				
6.10 Image Offset. Image offset values to full extent of Table G-2.		R				
6.11 Tile Offset. Tile offset values to full extent of Table G-2.		R				
6.12 Component Scaling/Separation. The sample separation values to full extent of Table G-2.		R				

Table C-6. Generate/Encode SPJE (continued)

JPEG 2000 FUNCTIONAL SUPPORT CAPABILITY GENERATE/ENCODE FEATURE SUMMARY						
System:		**Date:**				
Compliance Criteria	**IUT Capability**	**R/O**	**Results**			**Comments**
			P	**F**	**N**	
6.13 Precinct Size. J2K code stream contains to full extent of Table 7-7.		R				
6.14 Minimal J2K File Formats. NBN LPJE file may contain JP2 header boxes.		O				
6.15 Main Header Markers. J2K main header only contains the following markers; SOC, SIZ, COD, QCD, QCC, TLM. (Use of the QCC marker is optional).		R				
6.16 Marker Order MH. Main Header markers are in the following order; SOC, SIZ, COD, QCD, QCC, TLM.		R				

LEGEND:

BPJ2K	Basic Image Interchange Format Profile for JPEG 2000	JP2	Joint Photographic Experts Group 2000 Minimal Interchange Format	PCRL	Position-component-resolution level-layer
CPRL	Component-position-resolution level	JPC	Joint Photographic Experts Group Codestream	R/O:	Required/Optional
EPJE	Exploitation Preferred Joint Photographic Experts Group 2000 Encoding	JPEG	Joint Photographic Experts Group	Results: F	Fail
IEC	International Electrotechnical Commission	LPJE	Large Volume Streaming Data Preferred JPEG 2000 Encoding	N	Not Supported by IUT
ISO	International Organization for Standardization	LRCP	Layer-Resolution-Component-Position	P	Pass
IUT	Implementation Under Test	NBN	North Atlantic Treaty Organization Secondary Imagery Format/Basic Image Interchange Format/National Imagery Transmission Format	RLCP	Resolution-Layer-Component-Position
J2K	Joint Photographic Experts Group 2000			RPCL	Resolution level-position-component-layer
				SPJE	Standardization Agreement 7023 Preferred JPEG 2000 Encoding

Table C-7. Interpret/Decode

JPEG 2000 FUNCTIONAL SUPPORT CAPABILITY INTERPRET/DECODE FEATURE SUMMARY						
System:	**Date:**					
Compliance Criteria	**IUT Capability**	**R/O**	**Results**			**Comments**
			P	**F**	**N**	
7. Decode JPEG 2000, Part 1 Profile-1 Compliant Codestreams Unrestricted. An IUT must correctly decode any valid JPEG 2000 ISO 15444 Part-1, Profile-1 or subset Profile-0 codestream to the limit of its available resources, and CLEVEL constraints.						
7.1 9-7I Filtering. IUT decodes JPC created with 9-7 irreversible filtering.		R				
7.2 5-3R Filtering. IUT decodes JPC created with 5-3 reversible filtering.		R				
7.3 Progression Order. IUT decodes JPC created with each of the following progression orders: LRCP, RLCP, RPCL, PCRL, and CPRL.		R				
7.4 Wavelet Decomposition. IUT decodes JPC created with 32 decomposition levels.		R				
7.5 Quality Layers. IUT decodes JPC created with 65535 quality layers.		R				
7.6 Image/Grid Size. IUT decodes JPC created with reference grid sizes from 1x1 to $(2^{31}-1) \times (2^{31}-1)$.		O				
7.7 Tile Size. IUT decodes JPC created with tile sizes from 1x1 to $(2^{31}-1) \times (2^{31}-1)$.		O				
7.8 Precinct Size. IUT decodes JPC created with precinct exponent values from 0 to 15. ($0x0 \leq PPx \leq 0xF$, $0x0 \leq PPy \leq 0xF$.)		O				
7.9 Empty Tiles. IUT decodes JPC containing empty tiles.		R				
7.10 Missing Tiles. IUT decodes JPC in which packets for entire tiles are missing.		R				
7.11 Components. IUT decodes JPC containing up to 16384 components. IUT must support to the extent of NBN CLEVELs.		O				
7.12 1 - 38 Bit Precision. IUT decodes JPC containing from 1 to 38 bit precision encoded data.		R				
7.13 Image Origin. IUT decodes JPC created with image offset from origin values from 0 to $(2^{31}-2)$.		R				
7.14 Tile Origin. IUT decodes JPC with tile offset from origin value from 0 to $(2^{31}-2)$.		R				
7.15 Code Block Size. IUT decodes JPC with code block height or width exponent offset values from 2 to 6. (Code block exponent offset are further restricted so that xcb + ycb <=12).		R				
7.16 COC Marker. IUT decodes JPC containing COC marker (0xFF53) segments.		R				
7.17 RGN Marker. IUT decodes JPC containing ROI marker (0xF5E) segments.		R				
7.18 QCD Marker. IUT decodes JPC containing Quantization Default marker (0xF5C) segments.		R				
7.19 QCC Marker. IUT decodes JPC containing QCC marker (0xFF5D) segments.		R				
7.20 POC Marker. IUT decodes JPC containing POC marker (0xFF5F) segments.		R				
7.21 TLM Marker. IUT decodes JPC containing TLM marker (0xFF55) segments.		R				
7.22 PLM Marker. IUT decodes JPC containing PLM marker (0xFF57) segments.		R				

Table C-7. Interpret/Decode (continued)

JPEG 2000 FUNCTIONAL SUPPORT CAPABILITY INTERPRET/DECODE FEATURE SUMMARY						
System:	**Date:**					
Compliance Criteria	**IUT Capability**	**R/O**	**Results**			**Comments**
			P	**F**	**N**	
7.23 PLT Marker. IUT decodes JPC containing PLT marker (0xFF58) segments.		R				
7.24 PPM Marker. IUT decodes JPC containing PPM marker (0xFF60) segments.		R				
7.25 PPT Marker. IUT decodes JPC containing PPT marker (0xFF61) segments.		R				
7.26 SOP Marker. IUT decodes JPC containing SOP marker (0xFF91) segments.		R				
7.27 EPH Marker. IUT decodes JPC containing EPH marker (0xFF92) segments.		R				
7.28 CRG Marker. IUT decodes JPC containing CRG marker (0xFF63) segments.		R				
7.29 COM Marker. IUT decodes JPC containing COM marker (0xFF64) segments.		R				
7.30 Marker Precedence. IUT decodes JPC giving precedence to markers in the tile header versus the JPEG main header.		R				
7.31 Decoder Cclass Guarantee. IUT has sufficient resources to accurately decode JPC according to the IUT's compliance class (Cclass), JPC's Profile and IUT's CLEVEL. The definitions of J2K Cclasses parameters are described in ISO/IEC 15444-4:2002 Information Technology - JPEG 2000 Image coding system – Part 4, Annex A.						
Cclass 0. IUT accurately decodes the Profile-0 ISO test codestreams, to within the allowable error levels for implementations of this Cclass defined in Annex C, Table C-28.						
CLEVEL 03.		O				Must support one or more
CLEVEL 05, if capable of this CLEVEL required.		O				
CLEVEL 06, if capable of this CLEVEL required.		O				
CLEVEL 07/09, if capable of this CLEVEL required.		O				
Without NBN Wrapper		O				
Cclass 1. IUT accurately decodes the Profile-0 ISO test codestreams, to within the allowable error levels for implementations of this Cclass defined in Annex C, Table C-28.						
CLEVEL 03.		R				Must support one or more
CLEVEL 05, if capable of this CLEVEL required.		O				
CLEVEL 06, if capable of this CLEVEL required.		O				
CLEVEL 07/09, if capable of this CLEVEL required.		O				
Without NBN Wrapper		O				
Cclass 2. IUT accurately decodes the Profile-1 ISO test codestreams, to within the allowable error levels for implementations of this Cclass defined in Annex C, Table C-28.						
CLEVEL 03, IUT guarantees resources for all Cclass parameters, except Size, Components, N_{cb}, and N_{comp}.		P				
CLEVEL 05, if capable of this CLEVEL required and IUT guarantees resources for all Cclass parameters, except Size, N_{cb}, and N_{comp}.		P				
CLEVEL 06, if capable of this CLEVEL required and IUT guarantees resources for all Cclass parameters, except N_{cb}, and N_{comp}.		P				
CLEVEL 07/09, if capable of this CLEVEL must fully decode.		O				
Without NBN Wrapper		O				

Table C-7. Interpret/Decode (continued)

JPEG 2000 FUNCTIONAL SUPPORT CAPABILITY INTERPRET/DECODE FEATURE SUMMARY						
System:		**Date:**				
Compliance Criteria	**IUT Capability**	**R/O**	**Results**			**Comments**
			P	**F**	**N**	
7.32 Quit Decoding. IUT quits decoding JPC that exceed the Cclass decoder limitations described in ISO/IEC 15444-4:2002 Part 4, Annex A without adversely affecting the operation of the IUT. An IUT need not decode, or may quit decoding a JPC once that codestream exceeds the Cclass decoder guarantees.		R				
7.33 Cclass 1 Profile-0. IUT accurately decodes the Profile-0 ISO test codestreams, to within the allowable error levels for Cclass 1 implementations defined in Annex B.		R				
7.34 Cclass 1 Profile-1. IUT accurately decodes the Profile-1 ISO test codestreams, to within the allowable error levels for Cclass 1 implementations defined in Annex B.		R				
7.35 Reduced Resolution. IUT decodes JPC to any user-selected resolution encoded within the JPC.		R				
7.36 Reduced Component. IUT decodes any user-selected component encoded within the JPC.		R				
7.37 Reduced Quality. IUT decodes JPC to any user-selected quality layer encoded within the JPC.		R				
7.38 Reduced Tile. IUT decodes any user-selected tile encoded within the JPC.		R				
7.39 Display NBN J2K. When displaying imagery decoded from NBN J2K files, IUT displays the image data according to guidelines for displaying NBN images, i.e. attention to Display and Attachment levels, IREPBAND, NROWS, NCOLS and ILOC values.		R				
7.40 Truncated File. IUT decodes available image data from a JPC that has been truncated.		R				
7.41 Truncated File Warning. IUT alerts users that compressed file is truncated or incomplete with respect to the JPEG 2000 header and format information.		R				
7.42 NSIF Data Length Precedence. IUT ingest and decodes NSIF segments giving precedence to the segment data length specified in the NSIF main header versus lengths or parameters specified within the segment data area.		R				
7.43 Tile Header Supersede Main Header Marker Segments. IUT when decoding marker segments must allow the tile header marker to supersede the main header marker, and apply only to the given tile.		R				
7.44 SOD Marker. IUT decodes JPC containing SOT marker (0xFF90) segments.		R				
7.45 NSIF JPC Values Precedence over Image Sub-header. IUT ingest and decodes NSIF segments giving precedence for all JPEG 2000 formats, the information with the JPC portions of the bitstream are given precedence.		R				

LEGEND:

CLEVEL	Complexity Level	JPEG	Joint Photographic Experts Group	PCRL	Position-component-resolution level-layer
CPRL	Component-position-resolution level	LRCP	Layer-Resolution-Component-Position	R/O:	Required/Optional
IEC	International Electrotechnical Commission	NBN	North Atlantic Treaty Organization Secondary Imagery Format/Basic Image Interchange Format/National Imagery Transmission Format	Results:	
ISO	International Organization for Standardization			F	Fail
IUT	Implementation Under Test			N	Not Supported by IUT
J2K	Joint Photographic Experts Group 2000			P	Pass
JPC	Joint Photographic Experts Group Codestream	NSIF	North Atlantic Treaty Organization Secondary Imagery Format	RLCP	Resolution-Layer-Component-Position
				RPCL	Resolution level-position-component-layer

Table C-8. Repack JPEG 2000 Codestream

JPEG 2000 FUNCTIONAL SUPPORT CAPABILITY REPACK FEATURE SUMMARY							
System:		**Date:**					
Compliance Criteria		**IUT Capability**	**R/O**	**Results**			**Comments**
				P	**F**	**N**	
8.	**Repack JPEG 2000 Codestream.** An IUT that chooses to repackage or modify an existing JPC must demonstrate the following requirements. Requirements are based on support for Repacking (Transcode), the IUT many support some or all requirements/criteria.						
8.1	**Positional Subset (Chipping).** IUT repackages JPC with a subset of the pixels contained in an original JPEG 2000 test codestream.						
	On Tile Boundaries. IUT repackages JPC using a subset of the whole tiles contained in an original JPEG 2000 test codestream.		O				
	Off Tile Boundaries. IUT repackages JPC using a subset of the whole or partial tiles contained in an original JPEG 2000 test codestream. (IUT will have to recode tiles that have lost some of their original pixels).		O				
	On Codeblock Boundaries. IUT repackages JPC using a subset of the whole codeblocks contained in an original JPEG 2000 test codestream.		O				
8.2	**Empty Tiles.** IUT repackages JPC with more empty tiles when compared to the image encoded in the original JPEG 2000 test codestream.		*O*				
8.3	**Reduced Resolution.** IUT repackages JPC with a reduced resolution when compared to the image encoded in the original JPEG 2000 test codestream.		*O*				
8.4	**Reduced Number of Components.** IUT repackages JPC with fewer components than the image encoded in the original JPEG 2000 test codestream.		*O*				
8.5	**Reduced Number of Layers.** IUT repackages JPC with fewer quality layers than the image encoded in the original JPEG 2000 test codestream		*O*				
8.6	**Region of Interest.** IUT repackages JPC with regions encoded with lower quality than the same region in the original JPEG 2000 test codestream. (E.g. On tile or precinct boundaries.)		*O*				
8.7	**Progression Order.** IUT repackages JPC with a new progression change, or different progression order, than the image encoded in the original JPEG 2000 test codestream.		*O*				
8.8	**Repackage Profile to same Profile Constrained Codestream.** IUT repacks an existing Profile codestream into a new same Profile constrained codestream.		*O*				
8.9	**Repackage One Profile to another Profile Constrained Codestream representation.** IUT repacks an existing Profile codestream into a new different Profile constrained codestream.		O				
8.10	**Repackage NBN J2K to NBN J2K files.** IUT repacks an existing NBN J2K Part 1 Profile 1 files into another NBN J2K file.		O				
8.11	**Repackage NBN J2K to associate Profiles into NBN files.** IUT repacks an existing NBN J2K Part 1 Profile 1 files into a profile constrained NBN file.		O				
8.12	**Header Correction.** IUT updates header information to reflect newly repackaged JPC.						

Table C-8. Repack JPEG 2000 Codestream (continued)

JPEG 2000 FUNCTIONAL SUPPORT CAPABILITY REPACK FEATURE SUMMARY						
System:		**Date:**				
Compliance Criteria	**IUT Capability**	**R/O**	**Results**			**Comments**
			P	**F**	**N**	
JPEG 2000 Markers. IUT updates JPC appropriate marker segment information to reflect newly repackaged JPC.		R				
NSIF Header. IUT updates NBN image sub-header information to reflect newly repackaged JPC.		R				
J2KLRA. IUT updates J2KLRA fields to reflect newly repackaged JPC.		R				
8.13 Parameter Broadening. Value broadening is permitted for Xsiz, Ysiz, XOsiz, YOsiz, XRsiz, YRsiz, Ltlm, Ztlm, N_{Levels}, and N_{Layers} parameters.		O				

LEGEND:

IUT	Implementation Under Test	NBN	North Atlantic Treaty Organization Secondary Imagery Format/Basic Image Interchange Format/National Imagery Transmission Format	R/O:	Required/Optional
J2K	Joint Photographic Experts Group 2000			Results:	
JPC	Joint Photographic Experts Group Codestream			F	Fail
JPEG	Joint Photographic Experts Group			N	Not Supported by IUT
				P	Pass

Table C-9. Decode J2K File Format

JPEG 2000 FUNCTIONAL SUPPORT CAPABILITY INTERPRET/DECODE J2K FEATURE SUMMARY						
System:		**Date:**				
Compliance Criteria	**IUT Capability**	**R/O**	**Results**			**Comments**
			P	**F**	**N**	
9. Decode J2K File Format.						
9.1 JP2 File. IUT accurately decodes JP2 files. The IUT's decoding accuracy is determined by decoding the ISO reference JP2 test files. Annex F, Table F-8 of this document lists acceptable error levels for each reference JP2 file.		R				
9.2 Multiple Images. IUT decodes and displays the first compressed image from a JP2 file containing more than one image. i.e. Multiple Contiguous Codestream Boxes in the JP2 format. (Implementation may ignore subsequent images.)		R				
9.3 Unknown JP2 Boxes. IUT skips by or ignores, without adverse effect, any box that it does not understand and as a minimum unparsed and process the codestream per Table B-4.		R				

LEGEND:

ISO	International Standards Organization	JP2	Joint Photographic File Format	Results:	
IUT	Implementation Under Test	JPEG	Joint Photographic Experts Group	F	Fail
J2K	Joint Photographic Experts Group 2000	R/O:	Required/Optional	N	Not Supported by IUT
				P	Pass

Table C-10. File Structure

JPEG 2000 FUNCTIONAL SUPPORT CAPABILITY NITFS FEATURE SUMMARY							
System:		**Date:**					
Compliance Criteria		**IUT Capability**	**R/O**	**Results**			**Comments**
				P	**F**	**N**	
10.	**File Structure.** The constraints and requirements for selected fields of NBN J2K files created the IUT for the Image Sub-header, per key fields used to describe the functions and values found in the associated JPC.						
10.1	**NROWS NCOLS.** NROWS = $\lceil Ysiz / IMAG\_New) \rceil$ - $\lceil YOsiz / IMAG\_New) \rceil$, NCOLS = $\lceil Xsiz / IMAG\_New) \rceil$ - $\lceil XOsiz / IMAG\_New) \rceil$. These fields reflect the maximal image samples in the row and column dimension over all image components of JPC.		R				
10.2	**PVTYPE.** The PVTYPE field contains a value determined by examination of values of Ssiz for all *i* components of the JPC. PVTYPE = B for $\max_i(Ssiz^i) = 0$, PVTYPE = INT for $\max_i(Ssiz^i) \in [1, 31]$, PVTYPE = SI for $\max_i(Ssiz^i) \in [128,159]$.		R				
10.3	**IREP.** IREP field contains the value appropriate for uncompressed image represented by the JPC.		R				
10.4	**ABPP.** The ABPP value is equal to the NBPP field value.		R				
10.5	**NBPP.** NBPP = $\max_i(Ssiz^i \& 0x7F) + 1$. This field reflects the maximum component bitdepth over all *i* components in the JPC.		R				
10.6	**IC.** Image Compression code at least one must be supported.						
	C8. No data masking.		O				
	M8. Pad Pixel Mask.		O				
	M8. Block Mask.		O				
10.7	**COMRAT.** Compression Rate code at least one must be supported.						
	NL. Nxyz, JPEG 2000 numerically lossless, where "xyz" indicates the expected achieved bit rate (in bits per pixel per band) for the final layer of each tile. The decimal point is implicit and assumed to be one digit from the right (i.e. xy.z).		O				
	VL. Vxyz, JPEG 2000 visually lossless, where "xyz" indicates the expected achieved bit rate (in bits per pixel per band) for the final layer of each tile. The decimal point is implicit and assumed to be one digit from the right (i.e. xy.z).		O				
	Lossy. wxyz, JPEG 2000 lossy, where "wxyz" is the target or expected bit rate (in bits per pixel per band) for the final layer of each tile. Note: When there is no decimal point, the decimal point is implicit and assumed to be in the middle (i.e. wx.yz).		O				
10.8	**NBANDS XBANDS.** These fields contain a value equal to the Csiz value in the Image and tile size marker of the associated JPC. The value indicates the number of components in the JPC.		R				
10.9	**IMODE.** This field is set to the value 'B'.		R				
10.10	**NBPR NBPC.** NBPR = $\lceil (Xsiz - XTO)/XTsiz \rceil$, NBPC = $\lceil (Ysiz - YTO)/YTsiz \rceil$. These fields contain a value determined by examination of values for tiling geometry in the image and size marker of the JPC.		R				

Table C-10. File Structure (continued)

JPEG 2000 FUNCTIONAL SUPPORT CAPABILITY NITFS FEATURE SUMMARY							
System:		**Date:**					
Compliance Criteria		**IUT Capability**	**R/O**	**Results**			**Comments**
				P	**F**	**N**	
10.11	**NPPBH NPPBV.** NPPBH = $\lfloor XTsiz/(\min_i(XRsiz^i)) \rfloor$, NPPBV = $\lfloor YTsiz/(\min_i(YRsiz^i)) \rfloor$. These fields contain a value determined by examination of values for tiling geometry and sub sampling of all *i* components in the image and size marker of the JPC.		R				
10.12	**IMAG.** This field contains the approximate image magnification (or reduction) factor of the compressed image data relative to the original source image. IMAG = /2, if source image dimension is 512x512, and compressed image dimension is 256x256.		R				

LEGEND:

IUT	Implementation Under Test	NBN	North Atlantic Treaty Organization Secondary Imagery Format/Basic Image Interchange Format/National Imagery Transmission Format	R/O:	Required/Optional
BPJ2K	Basic Image Interchange Format Profile for JPEG 2000			Results:	
JPC	Joint Photographic Experts Group Codestream			F	Fail
JPEG	Joint Photographic Experts Group	NL	Numerically Lossless	N	Not Supported by IUT
				P	Pass
				VL	Visually Lossless

Table C-11. J2KLRA TRE

JPEG 2000 FUNCTIONAL SUPPORT CAPABILITY GENERATE, REPACK (ENCODE)/INTERPRET (DECODE) J2KLRA FEATURE SUMMARY							
System:		**Date:**					
Compliance Criteria		**IUT Capability**	**R/O**	**Results**			**Comments**
				P	**F**	**N**	
11.	**J2KLRA.** The J2KLRA TRE is recommended for inclusion with any IUT implementation that follows either NPJE or EPJE encoding for generate and repack.						
11.1	**Original TRE.** All TRE fields, except the conditional Nxxxx_I fields, are populated. At the original or primary compression of image data, the included J2KLRA summarizes the original compression. The subsequent conditional fields are not present.		O				
11.2	**ORIG.** ORIG field indicates the origin or condition of the compressed image data, according to the operator selections in the user interface or system defaults.		O				
11.3	**NLEVELS_O.** NLEVELS_O field value equals the number of wavelet decomposition levels performed during the original image compression. For the original JPC wrapped in the NBN file format, the NLEVELS_O value shall be equal to the N_{levels} value found in the coding style default marker segment. In a derived or repackaged J2K compressed product the NLEVELS_O value may or may not be equal to the included N_{levels} value but must remain equal to original N_{levels} value.		O				
11.4	**NBANDS_O.** NBANDS_O field value equals the number of components in the original image compression. For the original JPC wrapped in the NBN file format, the NBANDS_O value shall be equal to the Csiz value found in the image and tile size marker segment. In a derived or repackaged J2K compressed product the NBANDS_O value may or may not be equal to the included Csiz value but must remain equal to original Csiz value.						
11.5	**NLAYERS_O.** NLAYERS_O field value equals the number of quality layers in the original image compression. For the original JPC wrapped in a the NBN file format, the NLAYERS_O value shall be equal to the N_{layers} value found in the coding style default marker segment. In a derived or repackaged J2K compressed product the NLAYERS_O value may or may not be equal to the included N_{layers} value but must remain equal to original N_{layers} value.		O				
11.6	**LAYER_ID$_n$.** LAYER_ID$_n$ field repeats for each quality layer in the original J2K compressed codestream. LAYER_ID$_n$ field value starts at zero and increases by one for each LAYER_IDn field.		O				
11.7	**BITRATE$_n$.** Field repeats for each quality layer in the original J2K compressed codestream. BITRATE$_n$ field value is approximately equal to the compressed bit rate of layer n of the original JPC.		O				
11.8	**Repackaged TRE.** Implementations supporting repack, ORIG field = “1”, “3” or “9”. In a repackaged or derived J2K compressed NBN J2K file, all TRE fields are present to include the conditional NLEVELS_I, NLAYERS_I and NBANDS_I fields.						
11.9	**NLEVELS_I.** NLEVELS_I = N_{levels}. The NLEVELS_I field value is equal to the number of wavelet decompositions in the associated JPC.		O				

Table C-11. J2KLRA TRE (continued)

JPEG 2000 FUNCTIONAL SUPPORT CAPABILITY GENERATE, REPACK (ENCODE)/INTERPRET (DECODE) J2KLRA FEATURE SUMMARY								
System:		**Date:**						
Compliance Criteria		**IUT Capability**	**R/O**	**Results**			**Comments**
				P	**F**	**N**	
11.10	**NLAYERS_I.** NLAYERS_I = N_{layers}. The NLAYERS_I field value is equal to the number of quality layers in the associated JPC.		O				
11.11	**NBANDS_I.** NBANDS_I = Csiz. The NBANDS_I field value is equal to the number of components in the associated JPC.		O				
11.12	**Decode J2KLRA TRE.** The Decoding of the J2KLRA TRE is optional for any IUT implementation, but if supported must be able to display associated fields properly formatted in the IUT interface for review by users.		O				

LEGEND:

EPJE	Exploitation Preferred J2K Encoding	NBN	North Atlantic Treaty Organization Secondary Imagery Format/Basic Image Interchange Format/National Imagery Transmission Format	R/O:	Required/Optional
IUT	Implementation Under Test			Results:	
J2K	JPEG 2000			F	Fail
JPC	JPEG Codestream			N	Not Supported by IUT
JPEG	Joint Photographic Experts Group	NPJE	North Atlantic Treaty Organization Secondary Imagery Format Preferred J2K Encoding	P	Pass
				TRE	Tagged Record Extension

Table C-12. CLEVEL Ranges

JPEG 2000 FUNCTIONAL SUPPORT CAPABILITY GENERATE (ENCODE)/INTERPRET (DECODE) CLEVEL FEATURE SUMMARY							
System:		**Date:**					
Compliance Criteria		**IUT Capability**	**R/O**	**Results**			**Comments**
				P	**F**	**N**	
12.	**CLEVEL Ranges.** An NBN system is expected to be able to correctly decode any JPEG 2000 Part 1 Profile-1 or Profile-0 codestream within the bounds of its supported CLEVEL and if an encode capable IUT assign the correct CLEVEL based on supported NBN Segments and Common Coordinate System support.						
12.1	**Interpret CLEVEL.** IUT must interpret NBN J2K files at the supported CLEVEL and all lower CLEVELs, for which compliance is sought. Required for Interpret capable IUT.		R				
12.2	**Interpret Segments.** IUT decodes NBN segments containing up to the maximum number allowed for the NBN CLEVEL for which compliance is sought as identified in Table C-27 for segment limits per each CLEVEL.						Note: Required for Interpret only IUT.
	IC. Image Segments		R				
	SY. Graphic Segments		R				
	TE. Text Segments		R				
	DE. Data Extension Segments		R				
12.3	**Interpret TREs.** The developer provides a list of supported TREs for evaluation based on NBN Specifications and the TRE Registry.		O				
12.4	**Generate CLEVEL.** IUT can generate NBN J2K files at the CLEVEL and all lower CLEVELs, for which compliance is sought. (NOTE: This may not apply to systems developed for specific limited functionality. E.g. systems designed to only J2K compress large (> 8k x 8k) image arrays into NBN files.) Required for Generate capable IUT.		R				.
12.5	**Generate Segments.** NBN Segments other than JPC image segments supported by the IUT for the NBN CLEVEL for which compliance is sought as identified in Table C-27.						
	IC. Image Segments in addition to J2K		O				
	SY. Graphic Segments		O				
	TE. Text Segments		O				
	DE. Data Extension Segments		O				
12.6	**Generate TREs.** The developer provides a list of supported TREs for evaluation based on NBN Specifications and the TRE Registry.		O				

LEGEND:

CLEVEL	Complexity Level	JPEG	Joint Photographic Experts Group	R/O:	Required/Optional
IUT	Implementation Under Test			Results:	
J2K	Joint Photographic Experts Group 2000	NBN	North Atlantic Treaty Organization Secondary Imagery Format/Basic Image Interchange Format/National Imagery Transmission Format	F	Fail
				N	Not Supported by IUT
JPC	Joint Photographic Experts Group Codestream			P	Pass
				TRE	Tagged Record Extension

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ANNEX D
JPEG 2000 Profile Limitations

The following limitations are defined for the BPJ2K01.10. The basis of Annex D is the limits that are associated with ISO/IEC 15444-1, Profile 1. All compliant BPJ2K01.10 decoders will be able to properly decode compressed data that is within the limits of this profile. All compliant encoders must produce compressed data that is within the limits of this profile.

Start of Tile-Part (SOT), 0xFF90

The JPC will contain at least one tile-part and each tile-part will have one SOT.

Table D-1. Start of Tile-Part (15444-1 Annex A.4.2)

Parameter	Size (bits)	Values	Notes
SOT	16	0xFF90	Start of tile-part marker code
Lsot	16	10	Length in bytes of marker segment
Isot	16	0 – 65,534	Tile index. Tiles are in raster order starting at index 0.
Psot	32	0, 14 – (2^{32} –1)	The length in bytes from the beginning of SOT marker segment of the tile-part to the end of the data of that tile-part. It is recommended a Psot of 0 be replaced by the actual tile length when a JPEG 2000 codestream is incorporated into NBN. If Psot = 0 is maintained in an NBN file, the current tile part will be interpreted to extend to the end of the current NSIF image segment. If Psot=0 is maintained in any JPEG 2000 format, the tile-part is interpreted to extend to the end of the file.
TPsot	8	0 – 254	Tile-Part index.
TNsot	8	0 – 255	0 = Number of tile-parts of this tile in the JPC is not defined in this header 1 – 255 number of tile-parts of this tile in the JPC.

LEGEND:

JPC	Joint PhotographiicExperts Group Codestream	NBN	NSIF/Basic Image Interchange Profile/National Imagery Transmission Format	NSIF	North Atlantic Treaty Organization Secondary Imagery Format
JPEG	Joint Photographic Experts Group				

Image and Tile Size (SIZ), 0xFF51

This marker segment includes information required to properly decode the image. There shall be a SIZ marker segment in the main header immediately after the SOC marker.

Table D-2. Image and Tile Size (15444-1 Annex A.5.1)

Parameter	Size (bits)	Values	Notes
SIZ	16	0xFF51	Image and tile size marker.
Lsiz	16	41 – 49,190	Length of this marker segment in bytes.
Rsiz	16	0000 0000 0000 0000 (no profile defined)	Rsiz = 0000 0000 0000 0000. Indicates that the full capabilities described by ISO/IEC IS15444-1 are required. (Allowed LPJE and SPJE, but non-NBN Compliant)
		0000 0000 0000 0001 (Profile 0 compliant)	Rsiz = 0000 0000 0000 0001. Indicates that the codestream is Profile 0 compliant. (Allowed NPJE, EPJE, TPJE, LPJE and SPJE)
		0000 0000 0000 0010 (Profile 1 Compliant)	Rsiz = 0000 0000 0000 0010. Indicates that the codestream is Profile-1 compliant. (Allowed NPJE, EPJE, TPJE, LPJE and SPJE)
		0000 0000 0000 0011 (Digital Cinema Initiative)	Rsiz = 0000 0000 0000 0011 and Rsiz = 0000 0000 0000 0100 see below*
		0000 0000 0000 0100 (Digital Cinema Initiative)	This profile will be compliant with 0000 00000000 0010 = ISO profile 1.
Xsiz	32	1 — (2^{31}-1)	Width of reference grid. This profile is limited to Xsiz < 2^{31}
Ysiz	32	1 — (2^{31}-1)	Height of reference grid. This profile is limited to Ysiz < 2^{31}
XOsiz	32	0 — (2^{31}-2)	Horizontal offset from the origin of the reference grid to the left side of the image area. This profile is limited to XOsiz < 2^{31}-1
YOsiz	32	0 — (2^{31}-2)	Vertical offset from the origin of the reference grid to the top of image area. This profile is limited to YOsiz < 2^{31}-1
XTsiz	32	1 — (2^{31}-1)	Width of one reference tile with respect to the reference grid. For this profile: XTsiz/min($XRsiz^i$, $YRsiz^i$) ≤ 1024 XTsiz = YTsiz or one tile for the whole image: YTsiz+YTOsiz> = Ysiz XTsiz+XTOsiz> = Xsiz
YTsiz	32	1 — (2^{31}-1)	Height of one reference tile with respect to the reference grid. For this profile: XTsiz/min($XRsiz^i$, $YRsiz^i$) ≤ 1024 XTsiz = YTsiz or one tile for the whole image: YTsiz+YTOsiz> = Ysiz XTsiz+XTOsiz> = Xsiz
XTOsiz	32	0 — (2^{31}-2)	Horizontal offset from the origin of the reference grid to the left edge of the first tile. This profile is limited to XTOsiz < 2^{31}-1
YTOsiz	32	0 — (2^{31}-2)	Vertical offset from the origin of the reference grid to the top edge of the first tile. This profile is limited to YTOsiz < 2^{31}-1
Csiz	16	1 – 16,384	The number of components in the image.
$Ssiz^i$	8	0000 0000 – 0010 0101 or 1000 0000 – 1010 0101	0xxx xxxx Unsigned data 1xxx xxxx signed data x000 0000 – x010 0101 bit depth of data = value + 1
$XRsiz^i$	8	1 - 255	Horizontal separation of a sample of the i^{th} component with respect to the reference grid.
$YRsiz^i$	8	1 - 255	Vertical separation of a sample of the i^{th} component with respect to the reference grid.

NOTE: * Two new values for the Rsiz parameter have been added in ISO/IEC 15444-1 Amendment 1, 2006. These values were assigned to the Digital Cinema Initiative to indicate which DCI profile (2K or 4K) the codestream adheres to. See the document "Digital Cinema System Specification, Version 1.1", April 12, 2007 for further details. NBN implementations are not allowed to set Rsiz = 0000 0000 0000 0011 or Rsiz = 00000000 0000 0100.

LEGEND:

EPJE	Exploitation Preferred J2K Encoding	NBN	North Atlantic Treaty Organization Secondary Imagery Format/Basic Image Interchange Format/National Imagery Transmission Format	SPJE	Standardization Agreement 7023 Preferred JPEG 2000 Encoding
IEC	International Electrotechnical Commission			TPJE	Tactical Preferred Joint Photographic Experts Group 2000 Encoding
ISO	International Organization for Standardization	NPJE	North Atlantic Treaty Organization Secondary Imagery Format Preferred J2K Encoding		
LPJE	arge Volume Streaming Data Preferred JPEG 2000 Encoding				

Code Style Default (COD), 0xFF52

The COD Marker Segment is required in the Main Header and may optionally appear in the Tile Header in which case it will supersede the COD in the Main Header, but only apply to the given tile. There will be only a single COD Marker Segment in the main header.

Table D-3. Coding Style Default (15444-1 Annex A.6.1)

Parameter	Size (bits)	Values	Notes
COD	16	0xFF52	Coding style default marker.
Lcod	16	12 – 45	Length of this marker segment in bytes.
Scod	8	0000 0000 – 0000 0111 (See D-4)	Coding style parameters.
SGcod	32	Defined below:	
Progression order	8	0000 0000 – 0000 0100 (See D-5)	Defines the progression order.
Number of layers (N_{Layers})	16	1 – 65,535	Number of layers in the image.
Multiple component transform	8	0000 0000 – 0000 0001	0000 0000 = No component transform used 0000 0001 = Component transform used
SPcod	Variable	Defined below:	
Number of decomposition levels (N_{Levels})	8	0 – 32	Number of wavelet decomposition levels.
Code-block width	8	0000 0000 – 0000 0100	Code-block width exponent offset value, xcb = value+2. For this profile this is limited to xcb $\leq$ 6
Code-block height	8	0000 0000 – 0000 0100	Code-block height exponent offset value, ycb = value+2. This profile is limited to ycb $\leq$ 6
Code-block style	8	0000 0000 – 0011 1111 (See D-6)	Arithmetic coding parameters.
Transformation	8	0000 0000 – 0000 0001	Wavelet filter 0 = 9-7 irreversible filter 1 = 5-3 reversible filter
Precinct size	Variable	0000 0000 – 1111 1111 (See Table D-7)	Precinct size (only if defined, Scod = xxxx xxx1).

Table D-4. Coding Style Parameter Values for Scod Parameter

Values (bits)	Coding style
0000 0xx0	Entropy coder, precincts with PPx = 15 and PPy = 15 (maximal precincts)
0000 0xx1	Entropy coder with user-defined precincts
0000 0x0x	No SOP marker segments used
0000 0x1x	SOP marker segments may be used
0000 00xx	No EPH marker used
0000 01xx	EPH marker shall be used

Table D-5. Progression Orders for SGcod, SPcoc, and Ppoc Parameters

Values (bits)	Progression orders
0000 0000	Layer-resolution level-component-position progression (L-R-C-P)
0000 0001	Resolution level-layer-component-position progression (R-L-C-P)
0000 0010	Resolution level-position-component-layer progression (R-P-C-L)
0000 0011	Position-component-resolution level-layer progression (P-C-R-L)
0000 0100	Component-position-resolution level-layer progression (C-P-R-L)

Table D-6. Code-block Style for the SPcod and SPcoc Parameters

Values (bits)	Code-block style
00xx xxx0 00xx xxx1	No selective arithmetic coding bypass Selective arithmetic coding bypass
00xx xx0x 00xx xx1x	No reset of context probabilities on coding pass boundaries Reset of context probabilities on coding pass boundaries
00xx x0xx 00xx x1xx	No termination on each coding pass Termination on each coding pass
00xx 0xxx 00xx 1xxx	No vertical casual context Vertical casual context
00x0 xxxx 00x1 xxxx	No predictable termination Predictable termination
000x xxxx 001x xxxx	No segmentation symbols are used Segmentation symbols are used

Table D-7. Precinct Width and Height for the SPcod and SPcoc Parameters

Values (bits)	Precinct size
xxxx 0000 xxxx 1111	4 LSBs are the precinct width exponent, PPx = Value.
0000 xxxx 1111 xxxx	4 MSBs are the precinct height exponent, PPy = Value.
LEGEND: LSB Least Significant Bit MSB Most Significant Bit	

Coding Style Component (COC), 0xFF53

The COC Marker Segment is optional for both the Main Header and the Tile Header. COC Marker(s) in the Main Header have precedence over the Main Header default COD Marker for component(s) with a Coding Style that it is different than the default Main Header COD. A COC Marker Segment appearing in the Tile Header has precedence over same component COC Marker Segment if present in the Main Header or precedence over both the Main Header and/or Tile Header COD Markers for component(s) with a Coding Style that is different from either or both the Main Header or Tile Header if default COD(s).

Table D-8. Coding Style Component (15444-1 Annex A.6.2)

Parameter	Size (bits)	Values	Notes
COC	16	0xFF53	Coding style for a component if it is different than the default (COD)
Lcoc	16	9 (max precincts & Csiz < 257) 10 (max precincts & Csiz ≥ 257) 10 + N_{Levels} (user-defined & Csiz < 257) 11 + N_{Levels} (user-defined & Csiz ≥ 257	Length of marker segment
Ccoc	8 16	0 – 255; if Csiz < 257 0 – 16,383; if Csiz ≥ 257	Component index to which this marker segment applies.
Scoc	8	0000 0000 – 0000 0001 (defined in Table D-9)	Coding style parameters.
SPcoc[i]	Variable	Defined below:	
Number of decomposition levels (N_{Levels})	8	0 – 32	Number of wavelet transform decomposition levels.
Code-block width	8	0000 0000 – 0000 0100	Code-block width exponent offset value, xcb = value+2. For this profile this is limited to xcb ≤ 6.
Code-block height	8	0000 0000 – 0000 0100	Code-block width exponent offset value, ycb = value+2. For this profile this is limited to ycb ≤ 6.
Code-block style	8	0000 0000 – 0011 1111 (Defined in Table D-6)	Arithmetic coding parameters.
SPcoc[i] (Continued)	Variable	Defined below:	
Transformation	8	0000 0000 – 0000 0001	Wavelet filter 0 = 9-7 irreversible filter 1 = 5-3 reversible filter
Precinct size	Variable	NA or 0000 0000 – 1111 1111 (Defined in Table D-7)	Precinct size (only if defined, Scoc = xxxx xxx1).

LEGEND:
NA Not Applicable

Table D-9. Coding Style Parameter Values for the Scoc Parameter

Values (bits)	Coding style
0000 0000	Entropy coder, precincts with PPx = 15 and PPy = 15 (maximal precincts)
0000 0001	Entropy coder with user-defined precincts

Region of Interest (RGN), 0xFF5E

The RGN Marker Segment may appear in the Main Header or first tile-part of the Tile Header of a given tile. When used in the Main Header it applies to one component across all tiles except those tiles with a Tile Header RGN Marker Segment that has precedence of the Main Header RGN Marker Segment component. In a tile-part header it applies to one component in that tile.

Table D-10. Region of Interest (15444-1 Annex A.6.3)

Parameter	Size (bits)	Values	Notes
RGN	16	0xFF5E	Region of interest (ROI) marker.
Lrgn	16	5 – 6	Length of this marker segment.
Crgn	8 16	0 – 255; if Csiz < 257 0 – 16,383; Csiz $\geq$ 257	Component index to which this marker segment applies
Srgn	8	0000 0000 = Implicit ROI (maximum shift)	All other values reserved.
SPrgn	8	0 - 37	Binary shifting of ROI coefficients above the background.

Quantization Default (QCD), 0xFF5C

The QCD marker is used in the main header to indicate quantization step-sizes valid for all tile-parts. The QCD marker is required in the main header – the values in this marker segment in the main header are used for components that do not override these values with a main header QCC and for all tiles that do not override these values with a tile-specific QCD or QCC in that tile's header.

Table D-11. Quantization Default (15444-1 Annex A.6.4)

Parameter	Size (bits)	Values	Notes
QCD	16	0xFF5C	Quantization default marker.
Lqcd	16	No quantization: Lqcd = 4 + 3 N_{Levels} Scalar quantization derived: Lqcd = 5 Scalar quantization expounded: Lqcd = 5 + 6 N_{Levels}	Length of this marker segment. For the 5-3R wavelet, no quantization is used. For the 9-7I wavelet, scalar derived or expounded quantization is used.
Sqcd	8	xxx0 0000 xxx0 0001 xxx0 0010 000x xxxx - 111x xxxx (See Table D-12)	With 5-3R filter: No quantization. With 9-7I filter: Scalar expounded quantization or scalar derived. Number of guard bits 0 – 7.
SPqcd[i]	8 (5-3R) 16 (9-7I)	variable	With 5-3R wavelet With 9-7I wavelet

Table D-12. Quantization default values for the Sqcd and Sqcc parameters

Values (bits)	Quantization style	SPqcdi Size (bits)	SPqcd or SPqcc usage
xxx0 0000	No quantization (5-3R wavelet)	8	Table D-13
xxx0 0001	Scalar derived (values signaled for NL_{LL} subband only)	16	Table D-14
xxx0 0010	Scalar expounded. One step size signaled for each subband.	16	Table D-14
000x xxxx - 111x xxxx	Number of guard bits 0 – 7		
LEGEND: NL Numerically Lossless			

Table D-13. Reversible Step Size (SPqcd^{i} and SPqcc^{i} Parameters)

Values (bits)	Reversible step size values
0000 0xxx - 1111 1xxx	Exponent, εb, of the reversible dynamic range signaled for each subband. See equation E.2 in ISO/IEC 15444-1 (note 15444-1 makes reference to equation E.5, this is incorrect).
LEGEND: IEC International Electrotechnical Commission ISO International Organization for Standardization	

Table D-14. Quantization Step Size (SPqcd^{i} and SPqcc$^{i)}$ Parameters)

Values (bits)	Quantization step size values
xxxx x000 0000 0000 – xxxx x111 1111 1111	Mantissa, μb, of the quantization step size value. See Equation E.3 in ISO/IEC 15444-1.
0000 0xxx xxxx xxxx – 1111 1xxx xxxx xxxx	Exponent, εb, of the quantization step size value. See Equation E.3 in ISO/IEC 15444-1.
LEGEND: IEC International Electrotechnical Commission ISO International Organization for Standardization	

Quantization Component (QCC), 0xFF5D

For the QCC Marker Segment there will be no more than one per any given component in the Main Header or first tile-part of the Tile Header of a given tile.

Table D-15. Quantization Component (15444-1 Annex A.6.5)

Parameter	Size (bits)	Values	Notes
QCC	16	0xFF5D	Quantization component parameters
Lqcc	16	For Csiz < 257 No quantization: Lqcd = 5 + 3-N_{Levels} Scalar quantization derived: Lqcd = 6 Scalar quantization expounded: Lqcd = 6 + 6-N_{Levels}	Length of marker segment.
		For Csiz ≥ 257 No quantization: Lqcd = 6 + 3-N_{Levels} Scalar quantization derived: Lqcd = 7 Scalar quantization expounded: Lqcd = 7 + 6-N_{Levels}	
Cqcc	8 16	0 – 255 (8 bits, Csiz < 257) 0 – 16 38 (16-bits, Csiz ≥ 257)	Component index to which this marker segment applies
Sqcc	8	xxx0 0000 xxx0 0001 xxx0 0010 000x xxxx - 111x xxxx (See Table D-12)	With 5-3R filter: No quantization. With 9-7I filter: Scalar expounded quantization or scalar derived. Number of guard bits 0 – 7.
SPqcc[i]	8 (5-3R) 16 (9-7I)	Variable	With 5-3R wavelet With 9-7I wavelet

Progression Order Change (POC), 0xFF5F

The POC Marker Segment is optional, but is required if there are progression order changes different from the Main Header. At most one may appear in the Main Header and one may appear in the first tile-part of a Tile Header of a given tile.

Table D-16. Progression Order Changes (15444-1 Annex A.6.6)

Parameter	Size (bits)	Values	Notes
POC	16	0xFF5F	Progression order change marker segment.
Lpoc	16	9 – 65,535	Length of marker segment.
RSpoc^i	8	0 – 32	Resolution level index (inclusive) for the start of ith progression. One value for each progression change.
CSpoc^i	8 (Csiz < 257) 16 (Csiz ≥ 257)	0 – 255 (Csiz < 257) 0 – 16,383 (Csiz ≥ 257)	Component index (inclusive) for the start of ith progression. Components are indexed 0, 1, 2, *etc.* One value for each progression change.
LYEpoc^i	16	1 – 65,535	Layer index (exclusive) for the end of ith progression. Layer index always starts at zero for every progression. Packets that have already been included in the codestream are not included again. One value for each progression change.
REpoc^i	8	(RSpoc^i + 1) - 33	Resolution Level index (exclusive) for the end of ith progression. One value for each progression change.
CEpoc^i	8 (Csiz < 257) 16 (Csiz ≥ 257)	(CSpoc^i+1) – 255, 0 (Csiz < 257) (CSpoc^i+1) - 16 384, 0 (Csiz is ≥ 257) Note: 0 is interpreted as 256	Component index (exclusive) for the end of ith progression. Components are indexed 0, 1, 2, *etc.* One value for each progression change.
Ppoc^i	8	0000 0000 – 0000 0100 (see Table D-5)	Progression order for ith progression. One value for each progression change.

Tile-part Lengths (TLM), 0xFF55

The TLM Marker Segment is optional and only allowed in the Main Header, multiple TLM Marker Segments may be used. The TLM Marker Segment is a pointer Marker Segment and is used to gain quick access to desired data for parsing, chipping, and decoding. TLM Marker Segment(s) define the length in bytes from the beginning of the SOT Marker Segment for a tile-part to end of bitstream data for that tile-part.

Table D-17. Tile-Part Lengths (15444-1 Annex A.7.1)

Parameter	Size (bits)	Values	Notes
TLM	16	0xFF55	Tile-part lengths marker.
Ltlm	16	6 – 65,535	Length of this marker segment in bytes.
Ztlm	8	0 – 255	Index of this marker segment relative to all other TLM marker segments present in the current header.
Stlm	8	0x00 0000 0x01 0000 0x10 0000 00xx 0000 01xx 0000	See Table D-18.
Ttlm^i	0 if ST = 0 8 if ST = 1 16 if ST = 2	tiles in order 0 – 254 0 – 65 534	Tile index for the ith tile-part. Either none or one value for every tile-part.
Ptlm^i	16 if SP = 0 32 if SP =1	14 – 65,535 14 – (2^{32} – 1)	The length, in bytes, from the beginning of the SOT marker of the ith tile-part to the end of the codestream data for that tile-part. There should be one Ptlm for every tile-part.

Table D-18. Size Parameters for Stlm

Values (bits)	Size parameters
0x00 0000	ST = 0; Ttlm parameter is 0 bits, only one tile-part per tile and the tiles are in index order without omission or repetition.
0x01 0000	ST = 1: Ttlm parameter 8 bits
0x10 0000	ST = 2; Ttlm parameter 16 bits
00xx 0000	SP = 0; Ptlm parameter 16 bits
01xx 0000	SP = 1; Ptlm parameter 32 bits
	All other values reserved

Packet Lengths Main Header (PLM), 0xFF57

The PLM Marker Segment is optional and only allowed in the Main Header, multiple PLM Marker Segments may be used. The PLM Marker Segment is a pointer Marker Segment and is used to gain quick access to desired data for parsing, chipping, and decoding. PLM Marker Segment(s) define the number of bytes of packet header length information for the i^{th} tile-part in order as found in the codestream.

Table D-19. Packet Length, Main Header (15444-1 Annex A.7.2)

Parameter	Size (bits)	Values	Notes
PLM	16	0xFF57	Packet length marker defined in the main header.
Lplm	16	4 – 65,535	Length of marker segment in bytes.
Zplm	8	0 – 255	Index of this marker segment relative to all other PLM marker segments present in the main header.
$Nplm^{i}$	8	0 – 255	Number of bytes of Iplm information for the ith tile-part in the order found in the codestream. One value for each tile-part.
$Iplm^{ij}$	Variable	Variable*	Length of the jth packet in the ith tile-part. If packet headers are stored with the packet bodies this length includes the packet header. If packet headers are stored in a PPM or PPT marker segment this length does not include the packet header length. One range of values for each tile-part. One value for each packet in the tile.
* Packet Lengths	8 bits repeated as necessary	0xxx xxxx 1xxx xxxx x000 0000 – x111 1111	Last 7 bits of packet length, terminate number Continue reading 7 bits of packet length

Packet Lengths Tile Header (PLT), 0xFF58

The PLT Marker Segment is optional and only allowed in the Tile Header and may appear in any tile-part, multiple PLT Marker Segments may be used. The PLT Marker Segment is a pointer Marker Segment and is used to gain quick access to desired data for parsing, chipping, and decoding.

Table D-20. PLT Parameters Content (15444-1 Annex A.7.3)

Parameter	Size (bits)	Values	Notes
PLT	16	0xFF58	Packet length, tile-part header, marker.
Lplt	16	4 - 65535	Length of this marker segment in bytes.
Zplt	8	0 - 255	Index of this marker segment relative to all other PLT marker segments in the current tile-part header.
$Iplt^{i}$	Variable	Variable*	Length of the ith packet in this tile. If packet headers are stored with the packet bodies this length includes the packet header. If packet headers are stored in a PPM or PPT marker segment this length does not include the packet header length. One value for each packet in the tile.
* Packet lengths	8 bits repeated as necessary	0xxx xxxx 1xxx xxxx x000 0000 – x111 1111	Last 7 bits of packet length, terminate number Continue reading 7 bits of packet length

Packed Packet Main Header (PPM), 0xFF60

The PPM Marker Segment is optional and only allowed in the Main Header, multiple PPM Marker Segments may be used. If a PPM Marker Segment is present, all packet headers shall be found in the main header and a PPT Marker Segment is not allowed. The PPM Marker Segment is a pointer Marker Segment and is used to gain quick access to desired data for parsing, chipping, and decoding.

Table D-21. Packed Packet Headers, Main Header (15444-1 Annex A.7.4)

Parameter	Size (bits)	Values	Notes
PPM	16	0xFF60	Packed packet headers, in main header
Lppm	16	8 – 65,535	Length of this marker segment in bytes.
Zppm	8	0 – 255	Index of this marker segment relative to all other PPM marker segments in the main header.
$Nppm^{i}$	32	$0 – (2^{32} – 1)$	Number of bytes of Ippm information for the i^{th} tile-part in the order found in the codestream. One value for each tile-part.
$Ippm^{ij}$	Variable	Packet header data	The packet header data is the same as that which would appear in the bitstream (see Annex B.10 of ISO/IEC 15444-1).

LEGEND:
IEC International Electrotechnical Commission ISO International Organization for Standardization

Packed Packet Tile Header (PPT), 0xFF61

The PPT Marker Segment is optional and only allowed in the Tile Header and may appear in any tile-part, multiple PPT Marker Segments may be used. The PPT Marker Segment is a pointer Marker Segment and is used to gain quick access to desired data for parsing, chipping, and decoding.

Table D-22. Packed Packet Headers, Tile-Part Header (15444-1 Annex A.7.5)

Parameter	Size (bits)	Values	Notes
PPT	16	0xFF61	Packed packet headers, in tile-part header
Lppt	16	4 – 65,535	Length of this marker segment in bytes.
Zppt	8	0 – 255	Index of this marker segment relative to all other PPT marker segments in the current header.
Ippt[i]	Variable	Packet header data	The packet header data is the same as that which would appear in the bitstream (see Annex B.10 of ISO/IEC 15444-1).

LEGEND:
IEC International Electrotechnical Commission
ISO International Organization for Standardization

Start of Packet (SOP), 0xFF91

The SOP Marker Segment is optional and only allowed in the Bitstream and is used to support error resilience to isolate individual packets and packet headers from each other in an environment where bit errors are likely.

Table D-23. Start of Packet (15444-1 Annex A.8.1)

Parameter	Size (bits)	Values	Notes
SOP	16	0xFF91	Start of Packet marker
Lsop	16	4	Length of this marker segment in bytes.
Nsop	16	0 – 65,535	Packet sequence number

End of Packet Header (EPH), 0xFF92

The EPH Marker header is optional and only allowed in the Bitstream and is used to support error resilience to isolate individual packets and packet headers from each other in an environment where bit errors are likely.

Table D-24. End of Packet Header (15444-1 Annex A.8.2)

Parameter	Size (bits)	Values	Notes
EPH	16	0xFF92	End of Packet Header marker

Component Registration (CRG), 0xFF63

The CRG Marker Segment is optional and only used in the Main Header. The CRG Marker Segment is informational and not required for decoding but may assist in the decoding, parsing, or displaying of the data. CRG Marker Segment allows each component to be registered to each other for proper display and exploitation.

Table D-25. Component Registration (15444-1 Annex A.9.1)

Parameter	Size (bits)	Values	Notes
CRG	16	0xFF63	Component registration marker.
Lcrg	16	6 – 65,534	Length of marker segment.
$Xcrg^i$	16	0 – 65,535	Value of horizontal offset in units of 1/65536 of the horizontal separation $XRsiz^i$, for the i^{th} component
$Ycrg^i$	16	0 – 65,535	Value of vertical offset in units of 1/65536 of the vertical separation $YRsiz^i$, for the i^{th} component

Comment (COM), 0xFF64

The COM Marker Segment is optional and allowed in both the Main Header and Tile Header. The COM Marker Segment is informational and not required for decoding but allows for unstructured data to be included into the file.

Table D-26. Comment (15444-1 Annex A.9.2)

Parameter	Size (bits)	Values	Notes
COM	16	0xFF64	Component registration marker.
Lcom	16	5 – 65,535	Length of marker segment.
Rcom	16	0 = General binary 1 = General Latin (IS 8859-15:1999)	Registration values. Indicates type of data in marker segment.
$Ccom^i$	8	0 - 255	Data.

Recommended J2KLRA TRE

The J2KLRA TRE was primarily developed to allow providers and users of NPJE data to quickly access the compressed data, but is available to be used by other encodings. The TRE provides users information about number of resolution levels, number of quality layers, and number of bands in both the original data and derived products. This information may be critical in the selection and ordering of data from a library. The J2KLRA TRE is recommended to be included with any original compressed data and compliant derived compressed products (i.e., parsing and repackaging).

Table D-27. Recommended J2KLRA TRE

Field	Name/description	Size bytes and format	Req. or Con.	Value Range
CETAG	Unique Extension Type Identifier Unique TRE identifier.	6, BCS-A	R	J2KLRA
CEL	Length of User-Defined Data Length in bytes of data contained in subsequent TRE fields. (TRE length is 11 plus the value given in the CEL field)	5, BCS-N	R	Variable Calculated for each specific TRE.
ORIG	Original compressed data Indicates if the image is in the same original JPEG 2000 compression or it has been parsed to a new JPEG 2000 compression. The conditional fields (NLEVELS_I, NLAYERS_I, NBANDS_I) are present if this field indicates a parsed stream.	1, BCS-N	R	0 - Original NPJE 1 – Parsed NPJE 2 – Original EPJE 3 – Parsed EPJE 4 – Original TPJE 5– Parsed TPJE 6 – Original LPJE 7 – Parsed LPJE 8 – Original other 9 – Parsed other
Original compressed image information (the first JPEG 2000 Compression)				
NLEVELS_O	Number of Wavelet levels in original image Indicates the number of wavelet decompositions levels performed in the original image.	2, BCS-N	R	00 - 32
NBANDS_O	Number of bands in original image Indicates the number of bands in original image.	5, BCS-N	R	00000 - 16384
NLAYERS_O	Number of Layers in original image Indicates the number of layers in original image.	3, BCS-N	R	000 - 999
Layer information (This is the start of a repeating section for n = 0 to NLAYERS_O – 1)				
$LAYER\_ID_n$	Layer ID Number Indicates the number of layer being described. Layers are numbered from 0 to NLAYERS_O –1. 0 is the layer with the lowest bitrate.	3, BCS-N	R	000 - 999
$BITRATE_n$	Bitrate Indicates the accumulated bitrate target associated with this and associated lower layers. This is defined in bits per pixel per band. It may happen that the bitrate was not achieved due to data characteristics. Note for JPEG 2000 numerically lossless quality, the bitrate for the final layer is an expected value based on past performance. If there is not a target bit rate, report the achieved bit rate.	9, BCS-A	R	Value 00.000000 – 37.000000*
(This is the end of a repeating section.)				
Conditional fields if the data has been parsed				
NLEVELS_I	Number of Wavelet levels in this image Indicates the number of wavelet decompositions levels included in this image as defined in COD.	2, BCS-N	C	00 – 32
NBANDS_I	Number of bands in this image Indicates the number of bands in this image as defined in SIZ.	5, BCS-N	C	00000 - 16384
NLAYERS_I	Number of Layers in this image Indicates the number of layers in this image as defined in COD.	3, BCS-N	C	000 - 999

NOTE: * The component sample precision is limited by the number of guard bits, quantization, growth of coefficients at each decomposition level, and the number of coding passes that can be signaled. Not all combinations of coding styles will allow the coding of 37 bit samples per band

LEGEND:

BCS-A	Basic Character Set - Alphanumeric	JPEG	Joint Photographic Experts Group	R/C	Required/Condtional
BCS-N	Basic Character Set – Numeric	NPJE	North Atlantic Treaty Organization Secondary Imagery Format Preferred J2K Encoding	TPJE	Tactical Preferred Joint Photographic Experts Group 2000 Encoding
EPJE	Exploitation Preferred J2K Encoding			TRE	Tagged Record Extension

During primary compression, all TRE fields except the conditional Nxxxx_I fields are populated. When an image is repackaged, the CEL and ORIG fields are updated and NLEVELS_I, NLAYERS_I, and NBANDS_I are added or replaced (if they already exist).

Complexity Levels and Segment Limitations

The following table defines the conditions of NBN file features used to determine the CLEVEL assignment for a given NBN file. The six key NBN features which differentiate CLEVEL are: Common Coordinate System (CCS) extent, file size (bytes), image size (rows/columns), number of multi-spectral bands, number of Image Segment(s) per NBN file, and aggregate size of Graphic Segment(s). The other listed features provide the parameter, value, range conditions, and constraints for all the defined CLEVEL (03, 05, 06, and 07). Although an NBN file shall be marked at the lowest CLEVEL for which it qualifies, it shall be marked no lower than the highest CLEVEL feature condition included in the NBN file. For example, a 51 Mbyte file shall be marked at CLEVEL 05, even when all other features in the NBN file do not exceed the specified CLEVEL 03 conditions.

Table D-28. NBN Complexity Level (CLEVEL)

NBN File Features	Complexity Level (CLEVEL)*			
	3	5	6	7
Common Coordinate System Extent (Pixels)	(00000000, 00000000) to (00002047, 00002047)	(00000000, 00000000) to (00008191, 00008191)	(00000000, 00000000) to (00065535, 00065535)	(00000000, 00000000) to (99999999, 99999999)
Maximum File Size	50 Mbyte –1byte (52,428,799 bytes)	1 Gbyte –1 byte (1,073,741,823 bytes)	2 Gbyte –1 byte (2,147,483,647 bytes)	10Gbyte –1 byte (10,737,418,239 bytes)
Image Size (Image(s) placed within CCS extent)	00000001 to 00002048 Rows X 00000001 to 00002048 Columns (R and C ≤	00000001 to 00008192 Rows X 00000001 to 00008192 Columns (R or C > □204	00000001 to 00065536 Rows X 00000001 to 00065536 Columns (R or C > 8192)	00000001 to 99999999 Rows X 00000001 to 99999999 Columns (R or C > □65
Image Blocking (Rectangular Blocks allowed)	Single and Multiple Blocks 0001to 2048 Rows X 0001 to 2048 Columns	Single and Multiple Blocks 0001 to 8192 Rows X 0001 to 8192 Columns	Multiple blocking is mandatory for images that exceed 8192 Pixels per Row or Column. 0001 to 8192 Rows X 0001 to 8192 Columns	
Monochrome (MONO) No Compression	Single Band 1, 8, 12, 16, 32, and 64-Bits per Pixel (NBPP), With and without LUT IC = NC, NM, IMODE = B			
Color 1 and 8-Bit (RGB / LUT) No Compression	Single Band 1 and 8-Bits per Pixel (NBPP), With LUT IC = NC, NM, IMODE = B			
Color 24 Bit (RGB) No Compression	Three Band 8-Bits per Pixel (NBPP), No LUT IC = NC, NM, IMODE = B, P, R, S		Three Band 8, 16, 32-Bits per Pixel (NBPP), No LUT IC = NC, NM, IMODE = B, P, R, S	
Multispectral (MULTI) No Compression	2 to 9 Bands, 8, 16, 32, and 64-Bits per Pixel per Band With and without LUT in each Band IC = NC, NM IMODE = B, P, R, S	2 to 255 Bands, 8, 16, 32, and 64-Bits per Pixel per Band With and without LUT in each Band IC = NC, NM IMODE = B, P, R, S		2 to 999 Bands, 8, 16, 32, and 64-Bits per Pixel per Band With and without LUT in each Band IC = NC, NM IMODE = B, P, R, S

Table D-28. NBN Complexity Level (CLEVEL) (continued)

NBN File Features	Complexity Level (CLEVEL)*			
	3	5	6	7
JPEG 2000 Compression Monochrome (MONO)	1 Band 1-32 bits per Pixel per Band, With and without LUT IC = C8, M8, IMODE = B Note: LUTs are typically only useful when the data is compressed numerically lossless.			
JPEG 2000 Compression Mapped Color (RGB/LUT)	1 Band 1-32 bits per Pixel per Band, With LUT IC = C8, M8, IMODE = B Note: LUTs are typically only useful when the data is compressed numerically lossless.			
JPEG 2000 Compression Color (RGB)	3 Bands 1-32 bits per Pixel per Band, No LUT IC = C8, M8, IMODE = B Note: The JPEG 2000 color transform may be used as part of the compression and decompression process when IREP=RGB.			
JPEG 2000 Compression Color (YCbCr601)	3 Bands 1-32 bits per Pixel per Band, No LUT IC = C8, M8, IMODE = B Note: When IREP=YCbCr601, it signifies that the data representation was YCbCr prior to the JPEG 2000 compression process. The internal JPEG 2000 color transform shall not be used.			
JPEG 2000 Compression Multiband (MULTI)	1 to 9 Bands 1-32 bits per Pixel per Band With and without LUT IC = C8, M8 IMODE = B	1 to 255 Bands 1-32 bits per Pixel per Band With and without LUT IC = C8, M8 IMODE = B		1 to 999 Bands 1-32 bits per Pixel per Band With and without LUT IC = C8, M8 IMODE = B
JPEG DCT Compression Monochrome (MONO)	Single Band 8 and 12-Bit Sample (NBPP), No LUT IC = C3, M3, IMODE = B			
JPEG DCT Compression 24-Bit Color (RGB)	Three Bands 8-Bit Sample per Band (NBPP), No LUT IC = C3, M3, IMODE = P			
JPEG DCT Compression 24-Bit Color (YCbCr601)	Three Bands 8-Bit Sample per Band (NBPP), No LUT IC = C3, M3, IMODE = P			
Downsampled JPEG DCT Monochrome (MONO)	Single Band Single Block Only 8-Bit Sample (NBPP), No LUT IC = I1, IMODE = B (Image size may not exceed 2048 Pixels per Row or Column.)			
JPEG Lossless Compression Monochrome (MONO)	Single Band 8, 12, and 16-Bit Sample per Band, With and Without LUT IC = C5, M5, IMODE = B (This feature is optional for implementation.)			
JPEG Lossless Compression 24-Bit Color (RGB)	Three Bands 8-Bit Sample per Band (NBPP), No LUT IC = C5, M5, IMODE = P (This feature is optional for implementation.)			
Bi-Level Compression (MONO)	This feature is optional for implementations If this feature is used, the following elements are to be used: Single Band, Single Block, 1-Bit per Pixel (NBPP), With and without LUT IC = C1, M1, IMODE = B COMRAT = 1D, 2DS, 2DH (Image size may not exceed 2560 Pixels per Row by 8192 Pixels per Column.)			
Bi-Level Compression (RGB/LUT)	This feature is optional for implementations If this feature is used, the following elements are to be used: Single Band, Single Block Only, 1-Bit per Pixel (NBPP), With LUT IC = C1, M1, IMODE = B COMRAT = 1D, 2DS, 2DH (Image size may not exceed 2560 Pixels per Row by 8192 Pixels per Column.)			
VQ Monochrome (MONO)	Single Band 8-Bits per Pixel (NBPP) 4 x 4 Kernel organized in 4 Tables, With and without LUT IC = C4, M4, IMODE = B			

Table D-28. NBN Complexity Level (CLEVEL) (continued)

NBN File Features	Complexity Level (CLEVEL)*			
	3	5	6	7
VQ 8-Bit Color (RGB/LUT)	Single Band 8-Bits per Pixel (NBPP) 4 x 4 Kernel organized in 4 Tables, With LUT IC = C4, M4, IMODE = B			
Multispectral (MULTI) Individual Band JPEG Compression	2 to 9 Bands 8 and 12-Bits per Pixel per Band No LUT IC = C3, M3 IMODE = B, S	2 to 255 Bands 8 and 12-Bits per Pixel per Band No LUT IC = C3, M3 IMODE = B, S		2 to 999 Bands 8 and 12-Bits per Pixel per Band No LUT IC = C3, M3 IMODE = B, S
Multispectral (MULTI) Multi-Component Compression	2 to 9 Bands 8 and 12-Bits per Pixel per Band No LUT IC = C6, M6 IMODE = B, P, S (This feature is optional for implementation.)	2 to 255 Bands 8, and 12-Bits per Pixel per Band No LUT IC = C6, M6 IMODE = B, P, S (This feature is optional for implementation.)		2 to 999 Bands 8 and 12-Bits per Pixel per Band No LUT IC = C6, M6 IMODE = B, P, S (This feature is optional for implementation.)
Elevation Data (NODISPLY)	Single Band 8, 12, 16, 32, and 64-Bits per Pixel (NBPP), No LUT IC = NC, NM, IMODE = B ICAT = DTEM, ISUBCATn code from DIGEST, Part 3, Annex B (or BCS Spaces (0x20) Applicable TRE: Geospatial Support Data Extensions (GEOSDE), DIGEST, Part 2, Annex D (This feature is optional for implementation.)			
Location Grid (NODISPLY)	Two Bands 8, 12, 16, 32, and 64-Bits per Pixel (NBPP), No LUT IC = NC, NM, IMODE = B, P ICAT = LOCG, ISUBCATn = CGX, CGY, or GGX, GGY Applicable TRE: Geospatial Support Data Extensions (GEOSDE), DIGEST, Part 2, Annex D (This feature is optional for implementation.)			
Matrix Data (NODISPLY)	1 to 9 Bands 8, 16, 32, and 64-Bits per Pixel per Band No LUT in any Band IMODE = B, P, R, S (This feature is optional for implementation.)	1 to 255 Bands 8, 16, 32, and 64-Bits per Pixel per Band No LUT in any Band IMODE = B, P, R, S (This feature is optional for implementation.)		1 to 999 Bands 8, 16, 32, and 64-Bits per Pixel per Band No LUT in any Band IMODE = B, P, R, S (This feature is optional for implementation.)
Vectors in Polar Coordinates (POLAR)	2 Bands 8, 16, 32, 64 – bits per pixel NBPP, No LUT IC = NC, IMODE = B, P, S			
Number of Image Segments per File	0 to 20	0 to 100		
Number of CGM Graphic Segments per File	0 to 100			
Aggregate Size of Graphic Segments	1 Mbyte maximum	2 Mbyte maximum		
CGM Graphic Profile	BPCGM01.00			
Number of Text Segments per File	0 to 32 Segments			
Text Format Codes Supported	STA, MTF, UT1, U8S			
Text Data per Segment	00001 to 99999 Bytes			
Tagged Record Extensions (TRE)	TRE may appear in the UDHD, XHD, UDID, IXSHD, SXSHD, and TXSHD fields and TRE_OVERFLOW DES(s) regardless of CLEVEL.			
Number of Data Extension Segments (DES) per File	0 to 10		0 to 50	0 to 100
Currently Registered DES	TRE_OVERFLOW STREAMING_FILE_HEADER			

Table D-28. NBN Complexity Level (CLEVEL) (continued)

NBN File Features	Complexity Level (CLEVEL)*			
	3	5	6	7
Number of Reserved Extension Segments (RES) per File	None			
Currently Approved RES	None			

NOTE: CLEVEL 09 is used to designate NBN files that exceed the CLEVEL 07 constraints in Table D-28 but remain within the bounds of the standard. CLEVEL 09 designates that the file exceeds at least one of the CLEVEL 07 constraints: 1. Maximum File Size (10 Gbytes or greater), 2. Image segments with the block size exceeding 8192 pixels per row or column, 3. More than 999 Bands, 4. More than 100 image segments, 5. More than 100 graphics segments, 6. Graphic aggregate size exceeds 2 Mbytes, 7. Number of Text Segments exceeds 32, or 8. The number of DES exceeds 100.

LEGEND:

BCS	Basic Character Set
BPCGM	Basic Image Interchange Format Profile for Computer Graphics Metafile
CCS	Common Coordinate System
CLEVEL	Complexity Level
COMRAT	Compression Rate
1D	One-dimensional coding
2DS	Two-dimensional coding Standard
2DH	Two-dimensional coding High
DES	Data Extension Segment
DIGEST	Digital Geographic Information Exchange Standard
DTEM	Digital Terrain Elevation Model
Gbyte	Gigabyte
IC	Image Compression
C1	Bi-Level Compressed
C3	Joint Photographic Experts Group Discrete Cosine Transform Compressed
C4	Vector Quantization Compressed
C5	Masked Lossless Joint Photographic Experts Group Compressed
C6	Multi-Component Compression
C8	Joint Photographic Experts Group 2000 Compression
M1	Bi-Level Compressed with Masking
M3	Joint Photographic Experts Group Discrete Cosine Transform Compressed with Masking
M4	Vector Quantization Compressed with Masking
M5	Masked Lossless Joint Photographic Experts Group Compressed
M6	Multi-Component Compression with Masking
M8	Joint Photographic Experts Group 2000 Compression with Masking
NC	No Compression
NM	No Mask
IMODE	Image Mode
B	Band Interleaved by Block
P	Band Interleaved by Pixel
R	Band Interleaved by Row
S	Band Sequential
IREP	Image Representation
JPEG	Joint Photographic Experts Group
LUT	Look Up Table
Mbyte	Megabyte
MONO	Monochrome
MULTI	Multispectral
MTF	Message Text Format
NBN	North Atlantic Treaty Organization Secondary Imagery Format/Basic Image Interchange Format/National Imagery Transmission Format
NODISPLY	No Display
RES	Reserved Extension Segment
RGB	Red Green Blue
STA	Basic Latin Characters
UT1	Basic Latin and Latin Supplement 1 Characters, 1-byte encoded
U8S	Basic Latin and Latin Supplement 1 Characters, UTF-8 encoded

JPC Compliance Class (Cclass) Limitations

The following table defines the conditions of JPC Cclass file features.

Table D-29. Cclass Limits

	Cclass 0	Cclass 1	Cclass 2
Profile	0	0	1
Size (WxH)	Up to128 x 128	Up to 2048 x 2048	To bounds of Profile-1
Components	1	4	To bounds of Profile-1
Lbody (Total Packet Bytes)	8192	24576	32768
M (Bit-Planes of a code-block)	11	15	30
Precision Guarantees	Low enough to allow 5-3 decoding of 9-7 data	2^-1	2^-15
B Bit-depth	8	12	24
TL (Wavelet Transform)	3	6	12
L Layers	15	255	65535
Progression	Only required to decode first progression per tile.	Decode up to 30 progressions.	Decode all progressions.
Tile Parts	Only required to decode first tile-part per tile.	Decode all tile parts up to NcbQuit or Lbody.	Decode all tile parts up to NcbQuit or Lbody.
Precincts	Only required to decode 1st precinct per subband.	Decode all precincts up to Ncb or Lbody limints.	Decode all precincts up to Ncb or Lbody limints.

Cclass vs. NBN System Complexity Levels

The following table shows the NBN file CLEVEL compliance ranges as well as their mapping to JPC Cclasses.

Table D-30. Cclass versus NBN System Complexity Levels

IUT Support Requirement	IUT Complexity Level Support Requirement				
J2K Cclasses	3	5	6	7	9[4]
0	S	S	S	S	O
1	S	S	S	S	O
2	P[1]	P[2]	P[3]	P[3]	O

NOTES: IUT guarantees resources for all Cclass parameters, except Size, Components, N_{cb}, and N_{comp}. IUT guarantees resources for all Cclass parameters, except Size, N_{cb}, and N_{comp}. IUT guarantees resources for all Cclass parameters, except N_{cb}, and N_{comp}. As CLEVEL 9 defines, NBN files out of specification with other CLEVELs and there are no mandated supported requirements for decoders. Hence, there is no way to know which out of bounds requirement a CLEVEL 9 capable decoder may support.

LEGEND:

IUT	Implementation Under Test	NBN	North Atlantic Treaty Organization Secondary Imagery Format/Basic Image Interchange Format/National Imagery Transmission Format	P	Resources to partially decode, or quit while decoding J2K codestream
ISO	International Organization for Standardization			S	Guaranteed resources to fully decode the J2K ISO subcommittee's test codestreams
J2K	Joint Photographic Experts Group 2000	O	Optional		

Profile-0, Profile-1 and Profile-2 Codestream Restrictions

JPEG 2000 profiles were introduced in ISO/IEC 15444-1 in order to promote interoperability. Four profiles are defined, Profile-0 (Rsiz = 1, JPEG 2000 Profile Indicator) and Profile-1 (Rsiz = 2), Profile-3 (Rsiz=3) and Profile-4 (Rsiz=4). An implicit "No Restrictions" (Rsiz = 0) profile exists and it means that the codestream simply conforms to the JPEG 2000 Part 1 standard (or beyond the bounds of the other identified profiles). Profile-3 and Profile-4 (Rsiz = 3 and Rsiz = 4) are used within the Digital Cinema Initiative (DCI) community.

The only commercial profiles allowed for use with any BIIF JPEG 2000 preferred encoding defined in this standard are profile-0, profile-1 and the No Restrictions profile (i.e. Rsiz = 1, 2 or 0). For LPJE and SPJE when encodings are beyond the bounds of Profile-1, the file must be marked as Rsiz =0 (for No Restrictions Profile), LPJE and SPJE *shall not* set Rsiz = 0000 0000 0000 0011or Rsiz = 0000 0000 0000 0100.

Table D-31. Codestream Restrictions

Restrictions	Profile-0	Profile-1*
SIZ marker segment		
Profile Indication	Rsiz = 1	Rsiz = 2
Image Size	Xsiz, Ysiz < 2^{31}	Xsiz, Ysiz < 2^{31}
Tiles	Tiles of a dimension 128x128: YTsiz = XTsiz = 128 or one tile for the whole image: YTsiz + YTOsiz ≥ Ysiz XTsiz + XTOsiz ≥ Xsiz	XTsiz/min(XRsiz^{I},YRsiz^{I}) ≤ 1024 XTsiz=YTsiz Or one tile for the whole image: XTsiz +XTOsiz ≥ Xsiz YTsiz +YTOsiz ≥ Ysiz
Image & tile origin	XOsiz = YOsiz = 0 XTOsiz = YTOsiz = 0	XOsiz, YOsiz < 2^{31} XTOsiz, YTOsiz < 2^{31}
RGN marker segment	SPrgn ≤ 37	SPrgn ≤ 37
Sub-sampling	XRsizi = 1, 2, or 4 YRsizi = 1, 2, or 4	No restriction
Code blocks		
Code-block size	xcb = ycb = 5 or xcb = ycb = 6	xcb ≤ 6, ycb ≤ 6
Code-block style	SPcod, SPcoc = 00 sp 0t00 (where t, p, s can be 0 or 1) Note: t=1 for termination on each coding pass p=1 for predictive termination s=1 for segmentation symbols	No restriction
Marker Locations		
Packed headers	(PPM,PPT) Disallowed	No restriction
COD, COC, QCD, QCC	Main header only	No restriction
LL resolution	If one tile is used for whole image, (Xsiz – XOsiz)/D(I) ≤ 128 and (Ysiz – YOsiz)/D(I) ≤ 128 where D(I)= $2^{\text{number of decomposition levels}}$ in SPcod or SPcoc, for I = component 0 to 3	For each tile in the image, |_tx1/D(I)_| – |_tx0/D(I)_| ≤ 128 and |_ty1/D(I)_| – |_ty0/D(I)_| ≤ 128 where D(I)= $2^{\text{number of decomposition levels}}$ in SPcod or SPcoc, for I = component 0 to 3 Note: tx0, tx1, ty0, ty1 are defined in Annex B of ISO/IEC 15444-1, equations B.7 through B.10.
Parsability	If the POC marker is present, the POC marker shall have RSpoc0 = 0 and CSpoc0 = 0. (Note some compliant decoders might decode only packets associated with the first progression)	No restriction

Table D-31. Codestream Restrictions (continued)

Restrictions	Profile-0	Profile-1*
Tile-parts	Tile-parts with TPsot = 0 of every tile before any tile-parts with TPsot > 0, Tile-parts Isot = 0 to Isot = number_of_tiles – 1, in sequential order for all tile-parts with TPsot = 0	No restriction
Precinct size	"Precinct size" defined by SPcod or SPcoc (Table A-15 and Table A-21 of ISO/IEC 15444-1) must be large enough so there is only one precinct in all resolution levels with dimension less than or equal to 128 by 128. NOTE – Precinct size PPx ≥ 7 and PPy ≥ 7 is sufficient to guarantee only one precinct per subband when XOsiz = 0 and YOsiz = 0.	No restriction

NOTE: For LPJE and SPJE when encodings are beyond the bounds of Profile-1, the file must be marked as Rsiz =0 (for No Restrictions Profile), LPJE and SPJE shall not set Rsiz = 0000 0000 0000 0011or Rsiz = 0000 0000 0000 0100.

LEGEND:

IEC	International Electrotechnical Commission	LPJE	Large Volume Streaming Data Preferred JPEG 2000 Encoding	SPJE	Standardization Agreement 7023 Preferred JPEG 2000 Encoding
ISO	International Organization for Standardization				

Profile Not Recommended and Not Allowed Marker and Marker Segments

Table D-32 shows which marker and marker segments are either not recommended and or allowed in a NPJE (N), EPJE (E), TPJE (T), LPJE (L), and SPJE (S) codestream.

Table D-32. Marker and Marker Segment Requirements within Codestream

Marker[1]	Value	Main header					Tile Header					Bitstream					Notes
		N	E	T	L	S	N	E	T	L	S	N	E	T	L	S	
SOC	0xFF4F	R	R	R	R	R											Required as first marker in main header and therefore the codestream.
SOT	0xFF90						R	R	R	R	R						Required as the first marker in each tile part.
SOD	0xFF93						R	R	R	R	R						Last marker of each tile part header.
EOC	0xFFD9											R	R	R	R	R	Required as last marker in the code stream.
SIZ	0xFF51	R	R	R	R	R											Required as second marker segment in the main header.
COD	0xFF52	R	R	R	R	R	NR	NR	NR	O	O						Required in main header. Indicates the usage of SOP and EPH.
COC	0xFF53	NR	NR	NR	O	O	NR	NR	NR	O	O						If used by profile by profile no more than one COC per any given component within the main header or in the first tile-part header.
RGN	0xFF5E	O	O	NR	O	O	O	O	NR	O	O						If used by profile by profile no more than one per component in main header or first tile-part header.
QCD	0xFF5C	R	R	R	R	R	O	O	O	O	O						One and only one required in the main header. May be at most one in the first tile-part header of a given tile.
QCC	0xFF5D	O	O	O	O	O	O	O	O	O	O						No more than one per any given component in the main header or first tile-part header of a given tile.

[1] Order of markers may vary in accordance with JPEG 2000 Part 1 (ISO/IEC 15444-1)

Table D-32. Marker and Marker Segment Requirements codestream (continued)

Marker[1]	Value	Main header					Tile Header					Bitstream					Notes
POC	0xFF5F	NR	NR	NR	O	NR	NR	NR	NR	O	NR						This is required if there are progression order changes different from the main or tile header COD. At most, one may appear in any header. May appear in the first tile-part header of a given tile.
TLM	0xFF55	RC	RC	RC	RC	RC											Recommended unless encoding image in a single tile-part.
PLM	0xFF57	NR	NR	NR	RC	NR											If used by profile there may be multiple PLM marker segments in the main header.
PLT	0xFF58						RC	RC	RC	R	NR						If used by profile there may be multiple PLT marker segments per tile. Must appear in any tile-part header before the packets whose lengths they describe.
PPM	0xFF60	NR	NR	NR	NR	NR											If used by profile all packet headers shall be found in main header and a PPT marker segment is not allowed.
PPT	0xFF61						NR	NR	NR	NR	NR						If used, the PPT marker segment must appear in a tile-part header before the packets whose headers are contained in the PPT appear.
SOP	0xFF91											NR	NR	NR	NR	O	If used by profile may be used in front of each packet, shall not be used unless indicated in the proper COD marker segment. Whether or not an SOP marker segment is used for a given packet, Nsop must be incremented for each packet in the codestream. If packet headers are moved into a PPT or PPM marker segment, the SOP marker segments may appear immediately before the packet bodies in the bitstream.
EPH	0xFF92	NR	NR	NR	NR	O	NR	NR	NR	NR	O	NR	NR	NR	NR	O	If used, shall not be present unless indicated in the proper COD marker segment. If EPH marker segments are signaled, they must appear for every packet header. If the packet headers are moved into a PPM or PPT marker segment, the EPH markers shall appear after the packet headers in the PPM or PPT marker segments.
CRG	0xFF63	NR	NR	NR	NR	NR											If used, only one CRG may appear in the main header and it applies for all tiles.
COM	0xFF64	O	O	O	O	O	O	O	O	O	O						If used, repeat as many times as desired in the main or tile-part headers. This marker segment has no effect on decoding the bitstream.

LEGEND:

E	Exploitation Preferred J2K Encoding	N	North Atlantic Treaty Organization Secondary Imagery Format Preferred J2K Encoding	R	Required
J2K	Joint Photographic Experts Group 2000			RC	Recommended
L	Large Volume Streaming Data Preferred J2K Encoding	NR	Not Recommended	S	Standardization Agreement 7023 Preferred J2K Encoding
		O	Optional	T	Tactical Preferred J2K Encoding

ANNEX E
JPEG 2000 Scenarios

Table E-1. Scenario Descriptions

Scenario	Scenario Description	Comments
Encoding	– Based on support as identified in the criteria listed in the Annex B tables.	
1	Profile 1 Minimum, the IUT demonstrates all required Markers (SOC, SOD EOC) and Marker Segments (SOT, SIZ, COD and QCD), for differences in image products based on supported variations in Marker Segments, for SOT, SIZ, COD and QCD.	
1A	Profile 1 Extended, the IUT demonstrates all supported optional *Main Header* Marker and Marker Segments with supported variations, for COC, RGN, QCC, POC, TLM, PLM, PPM, EPH, CRG and COM.	
1B	Profile 1 Extended, the IUT demonstrates all supported optional *Tile Header* Marker and Marker Segments with supported variations, for COD, COC, RGN, QCD, QCC, POC, PLT, PPT, EPH and COM.	
1C	Profile 1 Extended, the IUT demonstrates all supported optional *Bitstream* Marker and Marker Segment with supported variations, for SOP and EPH.	
2	NPJE Minimum Profile, the IUT demonstrates conformance to restrictions to required Marker Segments for SOT, SIZ, COD, and QCD.	
2A	NPJE Extended Profile, the IUT demonstrates conformance to restrictions to the optional *Main Header* Marker Segment of RGN, QCC and COM and recommended Marker Segment of TLM.	
2B	NPJE Extended Profile, the IUT demonstrates conformance to restrictions to optional *Tile Header* Marker Segments for QCD, RGN, QCC and COM and recommended Marker Segment of PLT.	
3	EPJE Minimum Profile, the IUT demonstrates conformance to restrictions to required Marker Segments for SOT, SIZ, COD, and QCD.	
3A	EPJE Extended Profile, the IUT demonstrates conformance to restrictions to the optional *Main Header* Marker Segment of RGN, QCC and COM and recommended Marker Segment of TLM.	
3B	EPJE Extended Profile, the IUT demonstrates conformance to restrictions to optional *Tile Header* Marker Segments for QCD, RGN, QCC and COM and recommended Marker Segment of PLT.	
4	TPJE Minimum Profile, the IUT demonstrates conformance to restrictions to required Marker Segments for SOT, SIZ, COD, and QCD.	
4A	TPJE Extended Profile, the IUT demonstrates conformance to restrictions to the optional *Main Header* Marker Segment of QCC and COM and recommended Marker Segment of TLM.	
4B	TPJE Extended Profile, the IUT demonstrates conformance to restrictions to optional *Tile Header* Marker Segments for QCD, QCC and COM and recommended Marker Segment of PLT.	
5	LPJE Minimum Profile, the IUT demonstrates conformance to restrictions to required Marker Segments for SOT, SIZ, COD, and QCD.	
5A	LPJE Extended Profile, the IUT demonstrates conformance to restrictions to the optional *Main Header* Marker Segment of QCC, POC and COM and recommended Marker Segment of TLM and PLM.	
5B	LPJE Extended Profile, the IUT demonstrates conformance to restrictions to required *Tile Header* Marker Segments for PLT	

Table E-1. Scenario Descriptions (continued)

Scenario	Scenario Description	Comments
	and optional *Tile Header* Marker Segments for QCD, QCC, COD, COC, RGN, POC and COM.	
6	SPJE Minimum Profile, the IUT demonstrates conformance to restrictions to required Marker Segments for SOT, SIZ, COD, and QCD.	
6A	SPJE Extended Profile, the IUT demonstrates conformance to restrictions to the optional *Main Header* Marker Segment of QCC, POC and COM and recommended Marker Segment of TLM and PLM.	
6B	SPJE Extended Profile, the IUT demonstrates conformance to restrictions optional *Tile Header* Marker Segments for QCD, QCC, COD, COC, RGN, EPH and COM.	
6C	SPJE Extended Profile, the IUT demonstrates conformance to restrictions optional *Bitstream* Markers for SOP and EPH.	
Decoding – IUT must support all Scenarios, Subtests and Test Cases to the supported Cclass and CLEVEL for which registration is requested per the criteria listed in the Annex B tables.		
7	Single JPC or NBN image segment files with Basic Profile extended for JPC with only required Markers and Marker Segments	
8	Single JPC or NBN image segment files with Profile extended for JPC with both required and optional Markers and Marker Segments	
9	Multi NBN segment files with Profile extended for JPC image segment(s) with both Required and Optional Markers and Marker Segments	Not applicable to non-NBN implementations.
10	Single JPC or NBN image segment files with JP2 Minimum Support	
11	Single JPC or NBN image segment files with JP2 Extended Support	
12	Processing NBN files with discrepancies between JPC and Image Subheader or truncated JPC	Not applicable to non-NBN implementations.
Repacking – Based on support as identified in the criteria listed in the Annex B tables, to include selected Encode/Generate and Decode/Interpret Scenarios, Sub-tests and/or Test Cases will be used in testing of a repacker/transcoder.		
13	Profile 1 Full Extent	
13A	Decomposition Levels (Resolution)	
13B	Quality Layers (Reduction)	
13C	Components (Fewer Bands)	
13D	Positional Subset (Chipping)	
13E	Progression Order (Reordering)	
14	NPJE Profile Limitations	
14A	Decomposition Levels (Resolution)	
14B	Quality Layers (Reduction)	
14C	Components (Fewer Bands)	
14D	Positional Subset (Chipping)	
14E	Progression Order (Reordering)	
15	EPJE Profile Limitations	
15A	Decomposition Levels (Resolution)	
15B	Quality Layers (Reduction)	
15C	Components (Fewer Bands)	
15D	Positional Subset (Chipping)	
15E	Progression Order (Reordering)	
16	TPJE Profile Limitations	
16A	Decomposition Levels (Resolution)	
16B	Decomposition Levels (Resolution)	
16C	Quality Layers (Reduction)	
16D	Components (Fewer Bands)	
16E	Positional Subset (Chipping)	
17	LPJE Profile Limitations	

Table E-1. Scenario Descriptions (continued)

Scenario	Scenario Description	Comments
17A	Decomposition Levels (Resolution)	
17B	Quality Layers (Reduction)	
17C	Components (Fewer Bands)	
17D	Positional Subset (Chipping)	
17E	Progression Order (Reordering)	
18	SPJE Profile Limitations	
18A	Decomposition Levels (Resolution)	
18B	Quality Layers (Reduction)	
18C	Components (Fewer Bands)	
18D	Positional Subset (Chipping)	
18E	Progression Order (Reordering)	

LEGEND:

CLEVEL	Complexity Level	JPEG	Joint Photographic Experts Group	NPJE	North Atlantic Treaty Organization Secondary Imagery Format Preferred J2K Encoding
EPJE	Exploitation Preferred JPEG 2000 Encoding	LPJE	Large Volume Streaming Data Preferred JPEG 2000 Encoding	SPJE	Standardization Agreement 7023 Preferred JPEG 2000 Encoding
IUT	Implementation Under Test	NBN	North Atlantic Treaty Organization Secondary Imagery Format/Basic Image Interchange Format/National Imagery Transmission Format	TPJE	Tactical Preferred JPEG 2000 Encoding
JP2	JPEG 2000 minimal interchange format				
JPC	Joint Photographic Experts Group Codestream				

Encoding Scenarios Cross Referenced to Subtests

A set of test scenarios and associated cross references to subtests assist testers in effectively testing the ability of the IUT to generate JPC and/or NBN compliant data files. Testers use test scenarios and associated subtests to measure JPC and/or NBN compliance against criteria derived from BPJ2K01.10 and NBN Specifications. By reviewing the IUT capability column in Tables B-1, B-2, B-3, B-7, B-8, and B-9 testers can determine what subtests are applicable for the testing process based on repeating scenarios. Each subtest contains specific criteria which determine if the encoder/generator functions pass compliance to JPC and NBN. Based on this review, testers determine which associated test scenarios and sub-scenarios are used and repeated based on the bounds of J2K Cclasses and NBN CLEVELs for associated supported parameter variations, support for optional Markers and Marker Segments, and support for optional NBN non-JPC data types and TRE.

Decoding Scenarios Cross Referenced to Subtests

Test scenarios implemented through a set of reference test case files were designed to exercise required capabilities for all interpret applications. These test case files exercise the bounds of NBN CLEVELs, JPC Cclasses, combinations of required and optional JPC Markers and Marker Segments, Precedence of Marker Segments, discrepancies between JPC and NBN image subheader and JP2 extents. Testers use associated test cases files to effectively test the ability of the IUT to interpret all required variations of JPC NBN data files. Testers use test case files to measure JPC NBN compliance against criteria derived from BPJ2K01.10 and NBN Specifications. For interpret compliance, the IUT must support all required capability in Tables B-4, B-8, and B-9 based on the IUT requested CLEVEL. Each subtest contains specific criteria

which determine if the interpreter functions demonstrate compliance to JPC and NBN for associated support parameter variations, support for Markers and Marker Segments as well as support for NBN non-JPC data types and TRE.

Repackaging Scenarios Cross Referenced to Subtests

A set of test scenarios, associated subtests and associated test cases assist testers in effectively testing the ability of the IUT to repackage/transcode JPC and/ or NBN compliant data files. Testers use test scenarios, associated subtests and test cases to measure JPC and/or NBN compliance against criteria derived from BPJ2K01.10 and NBN specifications. By reviewing the IUT capability column in Tables B-1, B-2, B-3, B-4, B-5, B-7, B-8, and B-9 testers can determine what subtests are applicable for the testing process based on repeating scenarios. Each subtest contains specific criteria which determine if the generator functions demonstrate compliance to JPC and NBN. Based on this review, testers determine which associated test scenarios and sub-scenarios are used and repeated based on the bounds of repackaging options, J2K Cclasses and NBN CLEVELs for associated supported parameter variations, maintaining and updating of Markers and Marker Segments as well as maintaining NBN non-JPC data types and TRE.

Note: Given the numerous possible combinations of associated JPC parameter variations, required and optional Markers and Marker Segments allowed in J2K products, as well as NBN segment and size combinations; the time it would take to testi every combination along with the financial burden on test participants, the interpret testing process does not cover all possible implementation combinations. Most combinations are tested within CLEVEL 03 test cases with the presumption that if higher CLEVEL IUTs can process these products at lower CLEVELs they can process them at any CLEVEL. The testing, however, does attempt to cover a number of combinations at all CLEVELs and Cclasses in order to mitigate possible issues with present and future implementation; however, some limited risk may still exist for interpreters.

Table E-2. Encoding/Decoding Scenarios Cross Referenced to Subtests

Subtests	Scenarios																									
	Encoding																				Decoding					
	1	1 A	1 B	1 C	2	2 A	2 B	3	3 A	3 B	4	4 A	4 B	5	5 B	5 C	6	6 A	6 B	6 C	7	8	9	10	11	12
Encoding																										
1	X				X			X			X			X			X									
2	X				X			X			X			X			X									
3	X				X			X			X			X			X									
4	X				X			X			X			X			X									
5	X				X			X			X			X			X									
6		X	X												O	O		O	O							
7		X	X			O	O		O	O					O	O		O	O							
8	X		X		X			X			X			X			X									
9		X	X			O	O		O	O		O	O		O	O		O	O							
10	AO	AO	AO		LO	LO	LO	LO	LO	LO	LO	LO	LO	AO	AO	AO	AO	AO	AO							
11		X	X			RC	RC		RC	RC		RC	RC		RC	RC		RC	RC							
12		X													RC											
13			X			RC			RC			RC			X											
14		X																								
15			X																							
16				X																O						
17		X	X	X														O	O	O						
18		X																								
19		X	X			O	O		O	O		O	O		O	O		O	O							
20	O				O			O			O			O			O									
21	O																									
22	O				O			O			O			O			O									
23	X				X			X			X			O												
24	X				X			X			X			O												
25					X			X			X			X			X									

Table E-2. Encoding/Decoding Scenarios Cross Referenced to Subtests (continued)

Subtests	Scenarios																									
	Encoding																				Decoding					
	1	1A	1B	1C	2	2A	2B	3	3A	3B	4	4A	4B	5	5B	5C	6	6A	6B	6C	7	8	9	10	11	12
BIIFProfile Encoding Limits																										
26					X			X			X			X			X									
27					X																					
28								X																		
29											X															
30														X			X									
31					X			X																		
32											X															
33														X			X									
34					X																					
35								X																		
36											X															
37														X			X									
38					X		X	X		X																
39											X		X													
40														X		X	X		X							
41						X	X		X	X																
42												X	X													
43															X	X		X	X							
44					RC																					
45								RC																		
46											RC															
47														RC			RC									
48					RC																					
49								RC																		
50											RC															

Table E-2. Encoding/Decoding Scenarios Cross Referenced to Subtests (continued)

Subtests	Scenarios																									
	Encoding																				Decoding					
	1	1A	1B	1C	2	2A	2B	3	3A	3B	4	4A	4B	5	5B	5C	6	6A	6B	6C	7	8	9	10	11	12
51														X			RC									
52					X			X			X			X			X									
53	O				O			X			X			O												
54	O				O			O			O			O												
55	X				X			X																		
Decoding																										
56																					X	X	X	X	X	X
57																					X	X	X	X	X	X
58																					X	X	X	X	X	X
59																					X	X	X	X	X	X
60																						X	X	X	X	X
61																						X	X	X	X	X
62																					X	X	X	X	X	X
63																						X	X	X	X	X
64																						X	X	X	X	X
65																						X	X	X	X	X
66																						X	X	X	X	X
67																						X	X	X	X	X
68																						X	X	X	X	X
69																						X	X	X	X	X
70																						X	X	X	X	X
71																						X	X	X	X	X
72																						X	X	X	X	X
73																						X	X	X	X	X
74																					X	X	X	X	X	
75																					X	X	X	X	X	
76																					X	X	X	X	X	
77																					X	X	X	X	X	

Table E-2. Encoding/Decoding Scenarios Cross Referenced to Subtests (continued)

Subtests	Scenarios																									
	Encoding																				Decoding					
	1	1A	1B	1C	2	2A	2B	3	3A	3B	4	4A	4B	5	5B	5C	6	6A	6B	6C	7	8	9	10	11	12
78																					X	X	X	X	X	
79																										X
80																										X
81																							X			
82																					X	X	X	X	X	X
83																								X	X	

LEGEND:

AO	All Orders	LO	Limited Orders	RC	Recommended
BIIF	Basic Image Interchange Format Profile	O	Optional data types for encoding	X	Required

Table E-3. Repackaging Scenarios Cross Reference to Subtests

Subtests	Scenarios																																		
	Repacking																																			
	13	13 A	13 B	13 C	13 D	13 E	14	14 A	14 B	14 C	14 D	14 E	15	15 A	15 B	15 C	15 D	15 E	16	16 A	16 B	16 C	16 D	16 E	17	17 A	17 B	17 C	17 D	17 E	18	18 A	18 B	18 C	18 D	18 E
1		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X
2		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X
3		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X
4		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X
5		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X
6		X	X	X	X	X																														
7		X	X	X	X	X																														
8		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X
9		X	X	X	X	X																														
10		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X
11		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X
12		X	X	X	X	X																														
13		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X
14		X	X	X	X	X																														
15		X	X	X	X	X																														
16		X	X	X	X	X																														
17		X	X	X	X	X																														
18		X	X	X	X	X																														
19		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X
20		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X
21		X	X	X	X	X																														
22		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X
23		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X						
24		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X						
25								X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X
26								X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X

*Variation in values for the SIZ (Criteria 4.6, 4.7, 4.11, 4.12, 4.13 and 4.14) and COD (Criteria 4.1, 4.2, 4.3, 4.4, 4.5, 4.8 and 4.15) Marker Segments and SOC, SOD and EOC markers are tested across all Test Cases and files.

Table E-3. Repackaging Scenarios Cross Reference to Subtests (continued)

Subtests	Scenarios																																							
	Repacking																																								
	13	13 A	13 B	13 C	13 D	13 E	14	14 A	14 B	14 C	14 D	14 E	15	15 A	15 B	15 C	15 D	15 E	16	16 A	16 B	16 C	16 D	16 E	17	17 A	17 B	17 C	17 D	17 E	18	18 A	18 B	18 C	18 D	18 E				
27								X	X	X	X	X																												
28														X	X	X	X	X																						
29																				X	X	X	X	X																
30																										X	X	X	X	X		X	X	X	X	X				
31								X	X	X	X	X		X	X	X	X	X																						
32																				X	X	X	X	X																
33																										X	X	X	X	X		X	X	X	X	X				
34								X	X	X	X	X																												
35														X	X	X	X	X																						
36																				X	X	X	X	X																
37																										X	X	X	X	X		X	X	X	X	X				
38								X	X	X	X	X		X	X	X	X	X																						
39																				X	X	X	X	X																
40																										X	X	X	X	X		X	X	X	X	X				
41								X	X	X	X	X		X	X	X	X	X																						
42																				X	X	X	X	X																
43																										X	X	X	X	X		X	X	X	X	X				
44								X	X	X	X	X																												
45														X	X	X	X	X																						
46																				X	X	X	X	X																
47																										X	X	X	X	X		X	X	X	X	X				
48								X	X	X	X	X																												
49														X	X	X	X	X																						
50																				X	X	X	X	X																
51																										X	X	X	X	X		X	X	X	X	X				
52								X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X				
53		O	O	O	O	O		O	O	O	O	O		X	X	X	X	X		X	X	X	X	X		O	O	O	O	O										
54		X[1]	X[1]	X[1]	X[1]	X[1]		X[1]	X[1]	X[1]	X[1]	X[1]																												

Table E-3. Repackaging Scenarios Cross Reference to Subtests (continued)

Subtests	Scenarios																																					
	Repacking																																						
	13	13 A	13 B	13 C	13 D	13 E	14	14 A	14 B	14 C	14 D	14 E	15	15 A	15 B	15 C	15 D	15 E	16	16 A	16 B	16 C	16 D	16 E	17	17 A	17 B	17 C	17 D	17 E	18	18 A	18 B	18 C	18 D	18 E
55		O	O	O	O	O		O	O	O	O	O		O	O	O	O	O		O	O	O	O	O		O	O	O	O	O						
84		X						X						X						X						X						X				
85			X						X						X						X					X							X			
86				X						X						X						X					X							X		
87					X						X						X						X						X					X		
88					X						X						X						X						X					X		
89					X						X						X						X						X					X		
90						X						X						X						X						X						X

LEGEND:

O Optional for Repacking X Required

Decoding Test Cases and Cross References

Table E-4 provides a list of decoding test cases and sub-test cases to be used in the evaluation of the IUT's ability to decoding J2K files. In order to evaluate the IUT, a test case may be executed in one or more test files to fully evaluate the bounds of J2K Cclasses and Profiles, for J2K and/or NBN CLEVELs and parameter bounds of the image in order to evaluate image size, resolution, components, layers, quality and precedence.

Table E-4a. Interpret/Repackaging Test Cases and Cross References Test Case 1

Sub-Test Case	J2K Summary	Criteria*	Test Files
Minimum Marker and Marker Segments, Profile 1, NPJE, EPJE, TPJE, LPJE and SPJE Requirements			
a.	Minimum required Markers and Marker Segments, with minimum allowed values for Image and Tile Size (SIZ) and Code Style Default (COD), Numerically Lossless (NL) 5-3 Filter and Progression Orders (PO) of LRCP to meet Cclass 0 and Profile 0, Sprecision 8-bits constraints, as an NBN CLEVEL3 single image J2K file or standalone J2K file. **Descriptions:** Simple small (64x64) single tile, Profile 0, Clevel3 test case using 5-3 filter, LRCP, J2K codestream and is only 303 bytes to allow a user to step through for understanding.	1.5, 1.6, 4.2, 4.3, 4.31	file_01a1.j2c file_01a1_j2c.nsf
b.	Minimum required Markers and Marker Segments, with allowed values for SIZ and COD, Visually Lossless (VL) 9-7 Filter and PO of RLCP to meet Cclass 0 and Profile 1 constraints, as an NBN CLEVEL3 single image J2K file or standalone J2K file. **Description:** Small (128x128) single tile, Profile 1, Clevel3 test case using 9-7 filter, RLCP J2K codestream.	1.5, 1.6, 4.1, 4.3, 4.31	file_01b.j2c file_01b_j2c.nsf
c.	Minimum required Markers and Marker Segments, with allowed values for SIZ and COD, VL 9-7 Filter and PO of RPCL to meet Cclass 1 and Profile 0 constraints, as an NBN CLEVEL3 single image J2K file or standalone J2K file. **Description:** Medium (1024x1024) single tile, Profile 1, Clevel3 test case using 9-7 filter, RPCL J2K codestream.	1.5, 1.6, 4.2, 4.3, 4.31	file_01c.j2c file_01c_j2c.nsf

*Variation in values for the SIZ (Criteria 4.6, 4.7, 4.11, 4.12, 4.13 and 4.14) and COD (Criteria 4.1, 4.2, 4.3, 4.4, 4.5, 4.8 and 4.15) Marker Segments and SOC, SOD and EOC markers are tested across all Test Cases and files.

Table E-4a. Interpret/Repackaging Test Cases and Cross References Test Case 1 (continued)

Sub-Test Case	J2K Summary	Criteria*	Test Files
Minimum Marker and Marker Segments, Profile 1, NPJE, EPJE, TPJE, LPJE and SPJE Requirements			
d.	Minimum required Markers and Marker Segments, with allowed values for SIZ and COD, 9-7 Filter visually lossy and PO of PCRL to meet Cclass 1 and Profile 1 constraints, as an NBN CLEVEL3 single image J2K file or standalone J2K file. **File Description:** Largest (2048x2048) tiled 1024x1024, Profile 1, Clevel3 test case using 9-7 filter, PCRL J2K codestream.	1.5, 1.6, 4.1, 4.3, 4.31	file_01d.j2c file_01d_j2c.nsf
e.	Minimum required Markers and Marker Segments, with allowed values for SIZ and COD, VL 9-7 Filter and PO of CPRL to meet Cclass 2 and Profile 1 constraints, as a NBN (2049x2049) image size for a CLEVEL5 single image J2K file or standalone J2K file. **File Description:** Smallest (2049x2049), single tile, Profile 1, Clevel5 test case using 9-7 filter, CPRL J2K codestream.	1.5, 1.6, 4.2, 4.3, 4.31	file_01e.j2c file_01e_j2c.nsf
f.	Minimum required Markers and Marker Segments, with allowed values for SIZ and COD, 9-7 Filter visually lossy and PO of LRCP to meet Cclass 2 and Profile 1 constraints, as a NBN (4608x4608) image size for a CLEVEL5 single image J2K file or standalone J2K file. **File Description:** Medium (4608x4608) single tile, Profile 1, Clevel5 test case using 9-7 filter, LRCP J2K codestream.	1.5, 1.6, 4.1, 4.3, 4.31	file_01f.j2c file_01f_j2c.nsf
g.	Minimum required Markers and Marker Segments, with allowed values for SIZ and COD, NL 5-3 Filter and PO of RLCP to meet Cclass 2 and Profile 1 constraints, as a NBN maximum (8192x8129) image size for a CLEVEL5 single image J2K file or standalone J2K file. **File Description:** Largest (8192x8192) single tile, Profile 1, Clevel5 test case using 5-3 filter, RLCP J2K codestream.	1.5, 1.6, 4.2, 4.3, 4.31	file_01g.j2c file_01g_j2c.nsf
h.	Minimum required Markers and Marker Segments, with allowed values for SIZ and COD, VL 9-7 Filter and PO of LRCP to meet Cclass 2 and Profile 1 constraints, as a NBN (8193x8193) image size for a CLEVEL6 single image J2K file or standalone J2K file. **File Description:** Smallest (8193x8193), tiled 512x512, Profile 1, Clevel6 test case using 9-7 filter, LRCP J2K codestream.	1.5, 1.6, 4.1, 4.3, 4.31	file_01h.j2c file_01h_j2c.nsf

*Variation in values for the SIZ (Criteria 4.6, 4.7, 4.11, 4.12, 4.13 and 4.14) and COD (Criteria 4.1, 4.2, 4.3, 4.4, 4.5, 4.8 and 4.15) Marker Segments and SOC, SOD and EOC markers are tested across all Test Cases and files.

Table E-4a. Interpret/Repackaging Test Cases and Cross References Test Case 1 (continued)

Sub-Test Case	J2K Summary	Criteria*	Test Files
Minimum Marker and Marker Segments, Profile 1, NPJE, EPJE, TPJE, LPJE and SPJE Requirements			
i.	Minimum required Markers and Marker Segments, with allowed values for SIZ and COD, 5-3 Filter visually lossy and PO of RPCL to meet Cclass 2 and Profile 1 constraints, as a NBN byte size for image segment of 1 Gbyte for a CLEVEL6 single image J2K file or standalone J2K file. **File Description:** Smallest (52480x35420), tiled 1024x1024, Profile 1, Clevel6, 16-bit test case using 9-7 filter, RPCL J2K codestream.	1.5, 1.6, 4.2, 4.3, 4.31	file_01i.j2c file_01i_j2c.nsf
j.	Minimum required Markers and Marker Segments, with allowed values for SIZ and COD, NL 9-7 Filter and PO of LRCP to meet Cclass 2 and Profile 1 constraints, as a NBN maximum byte size for image segment of 2 Gbyte – 1 for a CLEVEL6 single image J2K file or standalone J2K file.	1.5, 1.6, 4.1, 4.3, 4.31	TBD
k.	Minimum required Markers and Marker Segments, with allowed values for SIZ and COD, VL 9-7 Filter and PO of LRCP to meet Cclass 2 and Profile 1 constraints, as a NBN byte size for image segment of 2 Gbyte for a CLEVEL7 single image J2K file or standalone J2K file. **File Description:** Minimum required Markers and Marker Segments, progression order LRCP, with allowed values for SIZ and COD, NL 9-7 Filter for a CLEVEL7 single image of size (151552x27648) J2K file.	1.5, 1.6, 4.2, 4.3, 4.31	file_01q.j2c file_01q_j2c.nsf
l.	Minimum required Markers and Marker Segments, with allowed values for SIZ and COD, 5-3 Filter numerically lossless and PO of LRCP to meet Cclass 2 and Profile 1 constraints, as a J2C image segment of about 7 Gbyte in a standalone J2K file. **File Description:** Minimum required Markers and Marker Segments, progression order LRCP, with allowed values for SIZ and COD, NL 5-3 Filter for a CLEVEL7 single image of size (361472x27648) J2K file.	1.5, 1.6, 4.1, 4.3, 4.31	file_01l.j2c
m.	Minimum required Markers and Marker Segments, with allowed values for SIZ and COD, NL 5-3 Filter and PO of LRCP to meet Cclass 2 and Profile 1 constraints, as a NBN maximum byte size for image segment of 10 Gbyte – 1 CLEVEL7 single image J2K file or standalone J2K file.	1.5, 1.6, 4.2, 4.3, 4.31	TBD

*Variation in values for the SIZ (Criteria 4.6, 4.7, 4.11, 4.12, 4.13 and 4.14) and COD (Criteria 4.1, 4.2, 4.3, 4.4, 4.5, 4.8 and 4.15) Marker Segments and SOC, SOD and EOC markers are tested across all Test Cases and files.

Table E-4a. Interpret/Repackaging Test Cases and Cross References Test Case 1 (continued)

Sub-Test Case	J2K Summary	Criteria*	Test Files
Minimum Marker and Marker Segments, Profile 1, NPJE, EPJE, TPJE, LPJE and SPJE Requirements			
n.	Minimum required NPJE Markers and Marker Segments, with allowed values for SIZ and COD, NL 5-3 Filter for a CLEVEL3 single image J2K file or standalone J2K file. **File Description:** Minimum required NPJE Markers and Marker Segments, progression order LRCP, with allowed values for SIZ and COD, NL 5-3 Filter for a CLEVEL3 single image J2K file.	4.18, 4.21, 4.23, 8.12	file_01n.j2c file_01n_j2c.nsf
o.	Minimum required NPJE Markers and Marker Segments, with allowed values for SIZ and COD, NL 9-7 Filter for a CLEVEL5 single image J2K file or standalone J2K file. **File Description:** Minimum required NPJE Markers and Marker Segments, progression order LRCP, with allowed values for SIZ and COD, NL 9-7 Filter for a CLEVEL5 single image J2K file.	4.18, 4.21, 4.23, 8.12	file_01o.j2c file_01o_j2c.nsf
p.	Minimum required NPJE Markers and Marker Segments, with allowed values for SIZ and COD, NL 5-3 Filter for a CLEVEL6 single image J2K file or standalone J2K file. **File Description:** Minimum required NPJE Markers and Marker Segments, progression order LRCP, with allowed values for SIZ and COD, NL 5-3 Filter for a CLEVEL6 single image J2K file.	4.18, 4.21, 4.23, 8.12	file_01p.j2c file_01p_j2c.nsf
q.	Minimum required NPJE Markers and Marker Segments, with allowed values for SIZ and COD, NL 9-7 Filter for a CLEVEL7 single image J2K file or standalone J2K file. **File Description:** Minimum required NPJE Markers and Marker Segments, progression order LRCP, with allowed values for SIZ and COD, NL 9-7 Filter for a CLEVEL7 single image of size (151552x27648) J2K file.	4.18, 4.21, 4.23, 8.12	file_01q.j2c file_01q_j2c.nsf
r.	Minimum required EPJE Markers and Marker Segments, with allowed values for SIZ and COD, NL 5-3 Filter for a CLEVEL3 single image J2K file or standalone J2K file. **File Description:** Minimum required EPJE Markers and Marker Segments, progression order RLCP, with allowed values for SIZ and COD, NL 5-3 Filter for a CLEVEL3 single image J2K file.	4.18, 4.21, 4.23, 8.12	file_01r.j2c file_01r_j2c.nsf

*Variation in values for the SIZ (Criteria 4.6, 4.7, 4.11, 4.12, 4.13 and 4.14) and COD (Criteria 4.1, 4.2, 4.3, 4.4, 4.5, 4.8 and 4.15) Marker Segments and SOC, SOD and EOC markers are tested across all Test Cases and files.

Table E-4a. Interpret/Repackaging Test Cases and Cross References Test Case 1 (continued)

Sub-Test Case	J2K Summary	Criteria*	Test Files
Minimum Marker and Marker Segments, Profile 1, NPJE, EPJE, TPJE, LPJE and SPJE Requirements			
s.	Minimum required EPJE Markers and Marker Segments, with allowed values for SIZ and COD, NL 9-7 Filter for a CLEVEL5 single image J2K file or standalone J2K file. **File Description:** Minimum required EPJE Markers and Marker Segments, progression order RLCP, with allowed values for SIZ and COD, NL 9-7 Filter for a CLEVEL5 single image J2K file.	4.18, 4.21, 4.23, 8.12	file_01s.j2c file_01s_j2c.nsf
t.	Minimum required EPJE Markers and Marker Segments, with allowed values for SIZ and COD, NL 5-3 Filter for a CLEVEL6 single image J2K file or standalone J2K file. **File Description:** Minimum required EPJE Markers and Marker Segments, progression order RLCP, with allowed values for SIZ and COD, NL 5-3 Filter for a CLEVEL6 single image J2K file.	4.18, 4.21, 4.23, 8.12	file_01t.j2c file_01t_j2c.nsf
u.	Minimum required EPJE Markers and Marker Segments, with allowed values for SIZ and COD, NL 9-7 Filter for a CLEVEL7 single image J2K file or standalone J2K file. **File Description:** Minimum required EPJE Markers and Marker Segments, progression order RLCP, with allowed values for SIZ and COD, NL 9-7 Filter for a CLEVEL7 single image of size (151552x27648) J2K file.	4.18, 4.21, 4.23, 8.12	file_01u.j2c file_01u_j2c.nsf
v.	Minimum required TPJE Markers and Marker Segments, with allowed values for SIZ and COD, VL 9-7 Filter for a CLEVEL3 single image J2K file or standalone J2K file. **File Descriptions:** Minimum required TPJE Markers and Marker Segments, progression order RLCP, tiling 256x256, with allowed values for SIZ and COD, NL 9-7 Filter for a CLEVEL3 single image J2K file.	4.18, 4.21, 4.23, 8.12	file_01v.j2c file_01v_j2c.nsf
w.	Minimum required TPJE Markers and Marker Segments, with allowed values for SIZ and COD, NL 5-3 Filter for a CLEVEL5 single image J2K file or standalone J2K file. **File Descriptions:** Minimum required TPJE Markers and Marker Segments, progression order LRCP, tiling 512x512, with allowed values for SIZ and COD, NL 5-3 Filter for a CLEVEL5 single image J2K file.	4.18, 4.21, 4.23, 8.12	file_01w.j2c file_01w_j2c.nsf

*Variation in values for the SIZ (Criteria 4.6, 4.7, 4.11, 4.12, 4.13 and 4.14) and COD (Criteria 4.1, 4.2, 4.3, 4.4, 4.5, 4.8 and 4.15) Marker Segments and SOC, SOD and EOC markers are tested across all Test Cases and files.

Table E-4a. Interpret/Repackaging Test Cases and Cross References Test Case 1 (continued)

Sub-Test Case	J2K Summary	Criteria*	Test Files
Minimum Marker and Marker Segments, Profile 1, NPJE, EPJE, TPJE, LPJE and SPJE Requirements			
x.	Minimum required TPJE Markers and Marker Segments, with allowed values for SIZ and COD, NL 5-3 Filter for a CLEVEL6 single image J2K file or standalone J2K file. **File Descriptions:** Minimum required TPJE Markers and Marker Segments, progression order LRCP, tiling 1024x1024, with allowed values for SIZ and COD, NL 5-3 Filter for a CLEVEL6 single image J2K file. Minimum required TPJE Markers and Marker Segments, progression order RLCP, tiling 1024x1024, with allowed values for SIZ and COD, NL 5-3 Filter for a CLEVEL6 single image J2K file.	4.18, 4.21, 4.23, 8.12	file_01p.j2c file_01p_j2c.nsf file_01t.j2c file_01t_j2c.nsf
y.	Minimum required TPJE Markers and Marker Segments, with allowed values for SIZ and COD, NL 9-7 Filter for a CLEVEL7 single image J2K file or standalone J2K file. **File Description:** Minimum required TPJE Markers and Marker Segments, progression order LRCP, tiling 1024x1024, with allowed values for SIZ and COD, NL 9-7 Filter for a CLEVEL7 (151552x27648) single image J2K file.	4.18, 4.21, 4.23, 8.12	file_01q.j2c file_01q_j2c.nsf
z.	Minimum required LPJE Markers and Marker Segments, with allowed values for SIZ and COD, NL 5-3 Filter for a CLEVEL3 single image J2K file or standalone J2K file. **File Description:** Minimum required LPJE Markers and Marker Segments, with allowed values for SIZ and COD, NL 5-3 Filter for a CLEVEL3 single image J2K file.	4.18, 4.21, 4.23, 8.12	file_01r.j2c file_01r_j2c.nsf
aa.	Minimum required LPJE Markers and Marker Segments, with allowed values for SIZ and COD, NL 9-7 Filter for a CLEVEL5 single image J2K file or standalone J2K file. **File Descriptions:** Minimum required LPJE Markers and Marker Segments, progression order PCRL, Profile 2, tiling 2048x2048, with allowed values for SIZ and COD, NL 9-7 Filter for a single image J2K file.	4.18, 4.21, 4.23, 8.12	file_01aa.j2c

*Variation in values for the SIZ (Criteria 4.6, 4.7, 4.11, 4.12, 4.13 and 4.14) and COD (Criteria 4.1, 4.2, 4.3, 4.4, 4.5, 4.8 and 4.15) Marker Segments and SOC, SOD and EOC markers are tested across all Test Cases and files.

Table E-4a. Interpret/Repackaging Test Cases and Cross References Test Case 1 (continued)

Sub-Test Case	J2K Summary	Criteria*	Test Files
Minimum Marker and Marker Segments, Profile 1, NPJE, EPJE, TPJE, LPJE and SPJE Requirements			
ab.	Minimum required LPJE Markers and Marker Segments, with allowed values for SIZ and COD, NL 5-3 Filter for a CLEVEL6 single image J2K file or standalone J2K file. **File Descriptions:** Minimum required LPJE Markers and Marker Segments, progression order CPRL, Profile 2, tiling 1536x1536, with allowed values for SIZ and COD, NL 5-3 Filter for a single image J2K file.	4.18, 4.21, 4.23, 8.12	file_01ab.j2c
ac.	Minimum required LPJE Markers and Marker Segments, with allowed values for SIZ and COD, NL 9-7 Filter for a CLEVEL7 single image J2K file or standalone J2K file. **File Description:** Minimum required LPJE Markers and Marker Segments, progression order LRCP, tiling 1024x1024, with allowed values for SIZ and COD, NL 9-7 Filter for a CLEVEL7 (151552x27648) single image J2K file.	4.18, 4.21, 4.23, 8.12	file_01q.j2c file_01q_j2c.nsf
ad.	Minimum required SPJE Markers and Marker Segments, with allowed values for SIZ and COD, NL 5-3 Filter for a standalone J2K file of no greater than 2048 x 2048. **File Description:** Minimum required SPJE Markers and Marker Segments, progression order RLCP, with allowed values for SIZ and COD, NL 5-3 Filter for a single image J2K file.	4.18, 4.21, 4.23, 8.12	file_01r.j2c
ae.	Minimum required SPJE Markers and Marker Segments, with allowed values for SIZ and COD, NL 9-7 Filter for a standalone J2K file of no greater than 8192 x 8192. **File Descriptions:** Minimum required SPJE Markers and Marker Segments, progression order PCRL, Profile 2, tiling 2048x2048, with allowed values for SIZ and COD, NL 9-7 Filter for a single image J2K file.	4.18, 4.21, 4.23, 8.12	file_01aa.j2c
af.	Minimum required SPJE Markers and Marker Segments, with allowed values for SIZ and COD, NL 9-7 Filter for a standalone J2K file of up to 2 Gbytes. **File Description:** Minimum required SPJE Markers and Marker Segments, progression order RLCP, Profile 2, tiling 8192x8192, with allowed values for SIZ and COD, NL 9-7 Filter for a (20558x20285) single image J2K file.	4.18, 4.21, 4.23, 8.12	file_01af.j2c

*Variation in values for the SIZ (Criteria 4.6, 4.7, 4.11, 4.12, 4.13 and 4.14) and COD (Criteria 4.1, 4.2, 4.3, 4.4, 4.5, 4.8 and 4.15) Marker Segments and SOC, SOD and EOC markers are tested across all Test Cases and files.

Table E-4a. Interpret/Repackaging Test Cases and Cross References Test Case 1 (continued)

Sub-Test Case	J2K Summary	Criteria*	Test Files
Minimum Marker and Marker Segments, Profile 1, NPJE, EPJE, TPJE, LPJE and SPJE Requirements			
ag.	Minimum required SPJE Markers and Marker Segments, with allowed values for SIZ and COD, NL 9-7 Filter for a standalone J2K file of up to 10 Gbytes. **File Description:** Minimum required SPJE Markers and Marker Segments, progression order LRCP, tiling 1024x1024, with allowed values for SIZ and COD, NL 9-7 Filter for a (151552x27648) single image J2K file.	4.18, 4.21, 4.23, 8.12	file_01q.j2c
ah.	Minimum required Markers and Marker Segments, with minimum allowed values for SIZ and COD, NL 5-3 Filter and PO of LRCP to meet Cclass 1 and Profile 1, Sprecision 1-bit, 23-bit and 27-bit constraints as an NBN CLEVEL3 single image J2K file or standalone J2K file. **File Descriptions:** Simple (512x512) single tile, Profile 1, CLEVEL3 test case using 5-3 filter, LRCP, J2K 1-bit codestream. Simple (512x512) single tile, Profile 1, CLEVEL3 test case using 5-3 filter, LRCP, J2K 23-bit codestream. Simple (512x512) single tile, Profile 1, CLEVEL3 test case using 5-3 filter, LRCP, J2K 27-bit codestream.	1.5, 1.6, 4.2, 4.3, 4.31	file_01ah1.j2c file_01ah2.j2c file_01ah3.j2c file_01ah1_j2c.nsf file_01ah2_j2c.nsf file_01ah3_j2c.nsf
ai.	Minimum required Markers and Marker Segments, with minimum allowed values for SIZ and COD, NL 5-3 Filter and PO of LRCP to meet Cclass 1 and Profile 1, Scomponents of 255 and 999 constraints as an NBN CLEVEL3 single image J2K file or standalone J2K file. **File Descriptions:** Simple (128x128) single tile, Profile 1, Clevel3 test case using 5-3 filter, LRCP, J2K 255 bands codestream. Simple (128x128) single tile, Profile 1, Clevel3 test case using 5-3 filter, LRCP, J2K 999 bands codestream.	1.5, 1.6, 4.2, 4.3, 4.31	file_01ai1.j2c file_01ai2.j2c file_01ai1_j2c.nsf file_01ai2_j2c.nsf

*Variation in values for the SIZ (Criteria 4.6, 4.7, 4.11, 4.12, 4.13 and 4.14) and COD (Criteria 4.1, 4.2, 4.3, 4.4, 4.5, 4.8 and 4.15) Marker Segments and SOC, SOD and EOC markers are tested across all Test Cases and files.

Table E-4a. Interpret/Repackaging Test Cases and Cross References Test Case 1 (continued)

Sub-Test Case	J2K Summary	Criteria*	Test Files
Minimum Marker and Marker Segments, Profile 1, NPJE, EPJE, TPJE, LPJE and SPJE Requirements			
aj.	Minimum required Markers and Marker Segments, with minimum allowed values for SIZ and COD, NL 5-3 Filter and PO of LRCP to meet Cclass 1 and Profile 1, Ssigned=yes for Signed Integer (SI) constraints as an NBN CLEVEL3 single image J2K file or standalone J2K file. **File Descriptions:** Simple single tile, Profile 1, Clevel3 test case using 5-3 filter, LRCP, J2K SI codestream. Simple single tile, Profile 1, Clevel5 test case using 5-3 filter, LRCP, J2K SI codestream.	1.5, 1.6, 4.2, 4.3, 4.31	file_01aj1.j2c file_01aj2.j2c file_01aj1_j2c.nsf file_01aj2_j2c.nsf

LEGEND:

CLEVEL	Complexity Level	LRCP	Layer – Resolution level – Component - Position	PCRL	Position – Component – Resolution level - Layer
CPRL	Component - Position - Resolution Level - Layer	NBN	North Atlantic Treaty Organization Secondary Imagery Format/Basic Image Interchange Format/National Imagery Transmission Format	PO	Progression Order
EPJE	Exploitation Preferred JPEG 2000 Encoding			RLCP	Resolution level – Layer – Component – Position
Gbyte	Gigabyte			RPCL	Resolution level – Position – Component – Layer
J2K	JPEG 2000			SI	Signed Integer
JPEG	Joint Photographic Experts Group	NL	Numerically Lossless	SPJE	Standardization Agreement 7023 Preferred JPEG 2000 Encoding
LPJE	Large Volume Streaming Data Preferred JPEG 2000 Encoding	NPJE	North Atlantic Treaty Organization Secondary Imagery Format Preferred JPEG 2000	TPJE	Tactical Preferred JPEG 2000 Encoding

*Variation in values for the SIZ (Criteria 4.6, 4.7, 4.11, 4.12, 4.13 and 4.14) and COD (Criteria 4.1, 4.2, 4.3, 4.4, 4.5, 4.8 and 4.15) Marker Segments and SOC, SOD and EOC markers are tested across all Test Cases and files.

Table E-4b. Interpret/Repackaging Test Cases and Cross References Test Case 2

Sub-Test Case	J2K Summary	Criteria*	Test Files
Other Marker and Marker Segments Requirements			
a.	Evaluated if the IUT supports the required SOT Marker Segment in the Tile Header. **File Description:** Evaluated if the IUT supports the required SOT Marker Segment in the Tile Header.	1.2	All FIles
b.	Evaluates if the IUT is giving precedence to an optional COD Marker Segment in the Tile Header over the Required COD Marker Segment in the Main Header. **File Description:** Evaluates if the IUT is giving precedence to an optional COD Marker Segment in the Tile Header over the Required COD Marker Segment in the Main Header.	4.30	file_02b.j2c file_02b_j2c.nsf
c.	Evaluates if the IUT supports a COC Marker Segment in the Main Header. **File Description:** Evaluates if the IUT supports a COC Marker Segment in the Main Header.	4.16	file_02c.j2c file_02c_j2c.nsf
d.	Evaluates if the IUT is giving precedence to an optional COC Marker Segment in the Tile Header over the optional COC Marker Segment in the Main Header. **File Description:** Evaluates if the IUT is giving precedence to an optional COC Marker Segment in the Tile Header over the optional COC and/or required COD Marker Segments in the Main Header.	4.16	file_02d.j2c file_02d_j2c.nsf
e.	Evaluates if the IUT supports an optional RGN Marker Segment in the Main Header. **File Description:** Evaluates if the IUT supports an optional RGN Marker Segment in the Main Header. Image quality will drop off at the 15th layer, but Region of Interest (ROI) maintains a higher quality.	4.17	file_02e.j2c file_02e_j2c.nsf

*Variation in values for the SIZ (Criteria 4.6, 4.7, 4.11, 4.12, 4.13 and 4.14) and COD (Criteria 4.1, 4.2, 4.3, 4.4, 4.5, 4.8 and 4.15) Marker Segments and SOC, SOD and EOC markers are tested across all Test Cases and files.

Table E-4b. Interpret/Repackaging Test Cases and Cross References Test Case 2 (continued)

Sub-Test Case	J2K Summary	Criteria*	Test Files
Other Marker and Marker Segments Requirements			
f.	Evaluates if the IUT is giving precedence to an optional RGN Marker Segment in the Tile Header over the optional RGN Marker Segment in the Main Header. **File Description:** Evaluates if the IUT is giving precedence to an optional RGN Marker Segment in the Tile Header over the optional RGN Marker Segment in the Main Header. Image quality will drop off at the 15th layer for Tiles 2, 3 and 4, but maintains a better quality until layer 7 for Tile 1. Additionally, but for the first Tile the ROI is much smaller than other Tiles once it falls apart.	4.17	file_02f.j2c file_02f _j2c.nsf
g.	Evaluates if the IUT supports the required QCD Marker Segment in the Main Header. **File Description:** Evaluates if the IUT supports the required QCD Marker Segment in the Main Header.	4.18	All Files
h.	Evaluates if the IUT is giving precedence to an optional QCD Marker Segment in the Tile Header over the required QCD Marker Segment in the Main Header. **File Description:** Evaluates if the IUT is giving precedence to an optional QCD Marker Segment in the Tile Header over the required QCD Marker Segment in the Main Header.	4.18	file_02h.j2c file_02h_j2c.nsf
i.	Evaluates if the IUT supports an optional QCC Marker Segment in the Main Header. **File Description:** Evaluates if the IUT supports an optional QCC Marker Segment in the Main Header. Second Component different than first and third and reflected in the Main Header QCC Marker Segment.	4.19	file_02i.j2c file_02i_j2c.nsf
j.	Evaluates if the IUT is giving precedence to an optional QCC Marker Segment in the Tile Header over the optional QCC Marker Segment in the Main Header. **File Description:** Evaluates if the IUT is giving precedence to an optional QCC Marker Segment in the Tile Header over the optional QCC Marker Segment in the Main Header. Second and Third Components different than first and reflected in Main Header QCC Marker Segment. Additionally, second component in second Tile is different than second component in other Tiles as reflected in the Tile Header QCC Marker Segment.	4.19	file_02j.j2c file_02j_j2c.nsf

Table E-4b. Interpret/Repackaging Test Cases and Cross References Test Case 2 (continued)

Sub-Test Case	J2K Summary	Criteria*	Test Files
Other Marker and Marker Segments Requirements			
k.	Evaluates if the IUT supports an optional POC Marker Segment in the Main Header. **File Description:** Evaluates if the IUT supports an optional POC Marker Segment in the Main Header.	4.20	file_02k.j2c file_02k_j2c.nsf
l.	Evaluates if the IUT is giving precedence to an optional POC Marker Segment in the Tile Header over the optional POC Marker Segment in the Main Header. **File Description:** Evaluates if the IUT is giving precedence to an optional POC Marker Segment in the Tile Header over the optional POC Marker Segment in the Main Header.	4.20	file_02l.j2c file_02l_j2c.nsf
m.	Evaluates if the IUT supports an optional TLM Marker Segment in the Main Header. **File Description:** Evaluates if the IUT supports an optional TLM Marker Segment in the Main Header.	4.21	file_02m.j2c file_02m_j2c.nsf
n.	Evaluates if the IUT supports an optional PLM Marker Segment in the Main Header. **File Description:** Evaluates if the IUT supports an optional PLM Marker Segment in the Main Header.	4.22	file_02n.j2c file_02n_j2c.nsf
o.	Evaluates if the IUT supports an optional PLT Marker Segment in the Tile Header. **File Description:** Evaluates if the IUT supports an optional PLT Marker Segment in the Tile Header.	4.23	file_02o.j2c file_02o_j2c.nsf
p.	Evaluates if the IUT supports an optional PPM Marker Segment in the Main Header. **File Description:** Evaluates if the IUT supports an optional PPM Marker Segment in the Main Header.	4.24	file_02p.j2c file_02p_j2c.nsf
q.	Evaluates if the IUT supports an optional PPT Marker Segment in the Tile Header. **File Description:** Evaluates if the IUT supports an optional PPT Marker Segment in the Tile Header.	4.25	file_02q.j2c file_02q_j2c.nsf

Table E-4b. Interpret/Repackaging Test Cases and Cross References Test Case 2 (continued)

Sub-Test Case	J2K Summary	Criteria*	Test Files
Other Marker and Marker Segments Requirements			
r.	Evaluates if the IUT supports an optional SOP Marker in the bit-stream. **File Description:** Evaluates if the IUT supports an optional SOP Marker in the bit-stream.	4.26	file_02r.j2c file_02r_j2c.nsf
s.	Evaluates if the IUT supports an optional EPH Marker in the Main Header. **File Description:** Evaluates if the IUT supports an optional EPH Marker in the Main Header.	4.27	file_02s.j2c file_02s_j2c.nsf
t.	Evaluates if the IUT supports an optional EPH Marker in the Tile Header. **File Description:** Evaluates if the IUT supports an optional EPH Marker in the Tile Header.	4.27	file_02t.j2c file_02t_j2c.nsf
u.	Evaluates if the IUT supports an optional EPH Marker in the bit-stream. **File Description:** Evaluates if the IUT supports an optional EPH Marker in the bit-stream, 8 examples are tested. 1. file_02ua (No Mode Set), 2. file_02ub (RESTART), 3. file_02uc (BYPASS), 4. file_02ud (ERTERM), 5. file_02ue (RESET), 6. file_02uf (SEGMARK), 7. file_02ug (RESTART, ERTERM), 8. file_02uh (BYPASS, RESTART, ERTERM, SEGMARK) Evaluates if the IUT supports both the optional SOP Marker and EPH Marker in the bit-stream (ur files).	4.27	file_02ua.j2c file_02ub.j2c file_02uc.j2c file_02ud.j2c file_02ue.j2c file_02uf.j2c file_02ug.j2c file_02uh.j2c file_02ua _j2c.nsf file_02ub _j2c.nsf file_02uc _j2c.nsf file_02ud _j2c.nsf file_02ue _j2c.nsf file_02uf _j2c.nsf file_02ug _j2c.nsf file_02uh _j2c.nsf file_02ur.j2c file_02ur _j2c.nsf

Table E-4b. Interpret/Repackaging Test Cases and Cross References Test Case 2 (continued)

Sub-Test Case	J2K Summary	Criteria*	Test Files
Other Marker and Marker Segments Requirements			
v.	Evaluates the degree the IUT supports an optional CRG Marker Segment in the Main Header. **File Description:** Evaluates the degree the IUT supports an optional CRG Marker Segment in the Main Header. 1. file_02va (1 Band), 2. file_02vb (3 Band)	4.28	file_02va.j2c file_02vb.j2c file_02va _j2c.nsf file_02vb _j2c.nsf
w.	Evaluates the degree the IUT supports an optional COM Marker Segment in the Main Header. **File Description:** Evaluates the degree the IUT supports an optional COM Marker Segment in the Main Header. 1. file_02wa (ASCII Comment), 2. file_02wb (Binary Comment)	4.29	file_02wa.j2c file_02wb.j2c file_02wa _j2c.nsf file_02wb _j2c.nsf
x.	Evaluates the degree the IUT supports an optional COM Marker Segment in the Tile Header. **File Description:** Evaluates the degree the IUT supports an optional COM Marker Segment in the Tile Header. 1. file_02xa (ASCII Comment), 2. file_02xb (Binary Comment)	4.29	file_02xa.j2c file_02xb.j2c file_02xa _j2c.nsf file_02xb _j2c.nsf
y.	Evaluates the ability to decode empty tiles. **File Description:** Product contains an empty tile.	4.9	file_02y.j2c file_02y _j2c.nsf
z.	Evaluates the ability to decode missing tiles. **File Description:** Product contains a missing tile.	4.10	file_02z.j2c file_02z _j2c.nsf
aa.	Evaluates the ability of the IUT to decode the JPC at any user-selected reduced resolution encoded within the JPC. **File Description:** Evaluates the ability of the IUT to decode the JPC at any user-selected reduced resolution encoded within the JPC. (Zooming in or out.)	4.33	file_02aa.j2c file_02aa_j2c.nsf

Table E-4b. Interpret/Repackaging Test Cases and Cross References Test Case 2 (continued)

Sub-Test Case	J2K Summary	Criteria*	Test Files
Other Marker and Marker Segments Requirements			
ab.	Evaluates the ability of the IUT to decode the JPC at any user-selected component encoded within the JPC. **File Description:** Evaluates the ability of the IUT to decode the JPC at any user-selected component encoded within the JPC. (NBN file should display band 3.)	4.34	file_02ab.j2c file_02ab_j2c.nsf
ac.	Evaluates the ability of the IUT to decode the JPC at any user-selected quality layer encoded within the JPC. **File Description:** Evaluates the ability of the IUT to decode the JPC at any user-selected quality layer encoded within the JPC.	4.35	file_02ac.j2c file_02ac_j2c.nsf
ad.	Evaluates the ability of the IUT to decode the JPC at any user-selected tile encoded within the JPC. **File Description:** Evaluates the ability of the IUT to decode the JPC at any user-selected tile encoded within the JPC.	4.36	All multi-tiled Test Files
ae.	Evaluates that the IUT displays NBN J2K image segments correctly, not applicable for SPJE decodes. **File Description:** Evaluates that the IUT displays NBN J2K image segments correctly.	4.37	All NBN Test Files
af.	Evaluates the ability of the IUT to parse and present a source J2KLRA TRE, not applicable for SPJE decodes. **File Description:** Evaluates the ability of the IUT to parse and present a source J2KLRA TRE.	8.1 – 8.7	file_02af_j2c.nsf
ag.	Evaluates the ability of the IUT to parse and present a parsed J2KLRA TRE, not applicable for SPJE decodes. **File Description:** Evaluates the ability of the IUT to parse and present a parsed J2KLRA TRE.	8.1 – 8.11	file_02ag_j2c.nsf

Table E-4b. Interpret/Repackaging Test Cases and Cross References Test Case 2 (continued)

Sub-Test Case	J2K Summary	Criteria*	Test Files
Other Marker and Marker Segments Requirements			
ah.	Evaluates the ability of the IUT to decode NBN segments containing up to the maximum number allowed for the NBN CLEVEL, not applicable for SPJE decodes. **File Description:** Evaluates the ability of the IUT to decode NBN segments containing up to the maximum number allowed for the NBN CLEVEL.	9.2	All NBN Test Files
ai.	Evaluates the ability of the IUT to decode TREs as identified for support, not applicable for SPJE decodes. **File Description:** Evaluates the ability of the IUT to decode TREs as identified for support.	9.4	All NBN Test files with TREs

LEGEND:

CLEVEL	Complexity Level	NBN	North Atlantic Treaty Organization Secondary Imagery Format/Basic Image Interchange Format/National Imagery Transmission Format	ROI	Region of Interest
IUT	Implementation Under Test			SPJE	Standardization Agreement 7023 Preferred Joint Photographic Experts Group 2000 Encoding
J2K	Joint Photographic Experts Group 2000				
JPC	Joint Photographic Experts Group Codestream			TRE	Tagged Record Extension

Table E-4c. Interpret/Repackaging Test Cases and Cross References Test Case 3

Sub-Test Case	J2K Summary	Criteria*	Test Files
NBN Requirements, not applicable to SJPE and non-NBN LPJE Decoders			
a..	Evaluates the ability of the IUT to decode NBN segments containing up to the maximum number allowed for the NBN CLEVEL.	9.2	TBD
b.	Evaluates that the IUT is capable of decoding from 1 to 100 image segment files.	9.4	TBD
c.	Evaluates that the IUT is capable of decoding from 1 to 100 graphic segment files.	9.4	TBD
d.	Evaluates that the IUT is capable of decoding from 1 to 32 text segment files.	9.4	TBD
e.	Evaluates that the IUT is capable of decoding from 1 to 100 DES segment files.	9.4	TBD
f..	Evaluates that the IUT displays NBN J2K image segments correctly	4.37	TBD
g..	Evaluates the ability of the IUT to decode TREs as identified for support.	9.3	TBD
h.	Evaluates that the IUT gives precedence to NBN Data Length.	9.3	TBD
i.	Evaluates support for M8 for data masking. **File Description:** Evaluates capable for decoding and displaying an NSIF monochrome J2K M8 file.	7.6	TBD

LEGEND:

CLEVEL	Complexity Level	LPJE	Large Volume Streaming Data Joint Photographic Experts Group 2000 Encoding	NSIF	North Atlantic Treaty Organization Secondary Imagery Format
DES	Data Extension Segment	M8		SPJE	Standardization Agreement 7023 Joint Photographic Experts Group 2000 Encoding
IUT	Implementation Under Profile	NBN	North Atlantic Treaty Organization Secondary Imagery Format/Basic Image Interchange Profile/National Imagery Transmission Format	TBD	To Be Determined
J2K	Joint Photographic Experts Group 2000			TRE	Tagged Record Extension

Table E-4d. Interpret/Repackaging Test Cases and Cross References Test Case 4

Sub-Test Case	J2K Summary	Criteria*	Test Files
JP2 Requirements Minimum Support			
a.	Evaluates the ability of the IUT to decode a JP2 product with a single image with minimum required boxes support.	6.1	TBD
b.	Evaluates the ability of the IUT to decode a JP2 product with multi-images with minimum required boxes support.	6.2	TBD
c.	Evaluates the ability of the IUT to decode a JP2 product with a single image with minimum required boxes and unknown boxes.	6.3	TBD

LEGEND:

IUT	Implementation under Test	JP2	Joint Photographic Experts Group 2000 minimal interchange format	TBD	To Be Determined
J2K	Joint Photographic Experts Group 2000				

Table E-4e. Interpret/Repackaging Test Cases and Cross References Test Case 5

Sub-Test Case	J2K Summary	Criteria*	Test Files
JP2 Requirements Extended Support			
a.	Evaluates the ability of the IUT to decode a JP2 product with a single image with extended box support.	6.1	TBD
b.	Evaluates the ability of the IUT to decode a JP2 product with multi-images with extended boxes.	6.2	TBD
c.	Evaluates the ability of the IUT to decode a JP2 product with a single image with extended boxes and unknown boxes.	6.3	TBD

LEGEND:

IUT	Implementation under Test	JP2	Joint Photographic Experts Group 2000 minimal interchange format	TBD	To Be Determined
J2K	Joint Photographic Experts Group 2000				

Table E-4f. Interpret/Repackaging Test Cases and Cross References Test Case 6

Sub-Test Case	J2K Summary	Criteria*	Test Files
Codestream Truncation and Precedence			
a.	Evaluates the ability to decode truncated files	4.38, 4.39	TBD
b.	Evaluated the IUT to ensure the JPC portions of the bitstream are given precedence the image sub-header for files that contain discrepancies.	4.40	TBD

LEGEND:

IUT	Implementation under Test	JPC	Joint Photographic Experts Group 2000 Codestream	TBD	To Be Determined
J2K	Joint Photographic Experts Group 2000				

Executable Test Suites (ETS) Evaluation

See Annex G defining Profile-0, Profile-1 and JP2 file format ETS evaluation.

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Annex F
NBN* Registration Forms

Form		Page
NCTR-1	NBN Conformance Registration Test Request	F-2
NCTR-2	NBN Registration Data	F-3
NCTR-3	Alternate Test Site Request	F-4

* North Atlantic Treaty Organization (NATO) Secondary Imagery Format (NSIF), Basic Image Interchange Format (BIIF) and/or National Imagery Transmission File (NITF) Format (NBN)

NBN CONFORMANCE REGISTRATION TEST REQUEST

FROM *Sponsoring Organization:	Date:		
*Mailing Address:			
*Primary Point of Contact:			
*Phone:		Fax:	
*E-mail:			
*Alternate Point of Contact:			
*Phone:		Fax:	
*E-mail:			
TO: **NBN J2K Testing Agency**			
*Implementation Name & Version:			
*Security Classification:	_ Unclassified _ Confidential _ Secret _ Top Secret		
*Type of Testing Requested:	_ Initial Test _ Re-Test _ Derived Registration		
*Desired Location of Testing:	_ NBN Test Agency Facility _ Other Location (Include NBN Form NRF-3)		
Desired Test Dates:			
*Number of Disparate System Configurations: ____ NOTE: Complete NRF-2 for EACH configuration.	Hardware	OS/Software	
Software Developer	(if different from the Sponsor)		
Mailing Address			
Point of Contact			
Phone:		Fax:	
E-mail:			

NBN REGISTRATION DATA

*Implementation Name	
*Implementation Configuration, (i.e., SunSPARC Ultra xx, Solaris vx)	
*Complexity Level Supported:	_ 3 _ 5 _ 6 _ 7 _ Other
Cclass Supported	_ 0 _ 1 _ 2
*Implementation Language(s):	
*Compiler(s)/Assembler(s) used for NBN Software:	
*Minimum Hardware Requirements	
*Processor(s):	
*RAM:	
*File Storage:	
*Display Adapter(s):	
Network Interface(s):	
Other:	
*Minimum Software Requirements	
*Operating System:	
*Network Software:	
*Drivers:	
Other:	
Other Required Hardware	
*Tagged Record Extensions Supported, Generate/Interpret:	
*Data Extension Segments Supported, Generate/Interpret:	
*Required NBN Functions Not Supported:	
Optional Functions and/or Data Types Supported:	
Miscellaneous:	
Enclosures _____ NRF-3, Alternate Test Site Request _____ Technical Manual(s) _____ Operator Manual(s) _____ Other (e.g., additional testing desired)	
NAME & TITLE:	SIGNATURE (Sponsor)

NBN REGISTRATION FORM NRF-2 (June 2010)

ALTERNATE TEST SITE REQUEST

Application Name		Date
Proposed Test Site		
Address		
Point of Contact		
Phone		FAX
Email		
Personnel Clearances Required	_ Yes _ No	
Security POC		
Address		
Phone		FAX
Special Security Needs	_ Yes _ No	
If yes describe needs:		
Diagram of Test Space(s)		
Available Work Space		
Network connectivity Available		
Interface Cables Available		
Power Available (Include number and type of sockets, and distance from work space.)		
Miscellaneous		

Annex G
Joint Photographic Experts Group (JPEG 2000) Profile 0, Profile 1, and Part 4 Conformance

These files identified in the Profile-0, Profile-1 and Joint Photographic Experts Group (JPEG) 2000 (J2K) minimal interchange format (JP2) file format Executable Test Suites (ETS) were originally developed by Algo Vision Technology GmbH, Aware Inc., Kodak Inc., and Ricoh Innovations Inc., in the course of development of International Telecommunication Union Telecommunication Standardization Sector (ITU-T) 803 | International Organization for Standardization (ISO)/International Electrotechnical Commission (IEC) 15444-4. The files help test parts of implementations of a part of ITU-T 800 | ISO/IEC 15444-1. Copyright holders agree not to assert against ITU, ISO/IEC, and users of the J2K Standards (Users) any of their rights under the copyright, not including other intellectual property rights, for these files with respect to the usage by ITU, ISO/IEC, and Users of these files or modifications thereof for use in hardware or software products claiming conformance to or testing conformance to the J2K Standard. The original developers of these files, ITU and ISO/IEC, assume no liability for use of these files or modifications thereof. No right to these files is granted for non-J2K Standard uses. Copyright holders have full right to use these files for his/her own purpose, assign or donate these files to any third party, and to inhibit third parties from using this software module for non-J2K Standard conforming products. This copyright notice must be included in all copies or derivative works of these files.

The associated North Atlantic Treaty Organization (NATO) Secondary Imagery Format (NSIF), Basic Image Interchange Format (BIIF) and/or National Imagery Transmission File (NITF) Format (NBN) files were developed by the Joint Interoperability Test Command in the course of developing a J2K Test Program. These NBN files were derived products, based on Profile-0 and Profile-1 codestreams and Part 4 JP2 products, and are used and distributed with this copyright notice.

See ISO/IEC 15444-4:2002 Annex G JP2 File Format Reader Compliance Testing Procedure.

Profile 0 and Profile 1 ETS

This Annex defines four ETS (Tables G-1 thru G-4), namely Cclass 0 and Cclass 1 decoders for Profile 0 and Profile 1 codestreams.

Table G-1. ETS Mapping

ETS	Cclass	Profile	Number of test codestreams
1	Cclass 0	Profile 0	16
2	Cclass 0	Profile 1	7
3	Cclass 1	Profile 0	16
4	Cclass 1	Profile 1	7

LEGEND:
ETS Executable Test Suites

There are 16 test codestreams defined for Profile 0 and 7 test codestreams defined for Profile 1. Tables B-5 and B-6 describe the features being tested by each of the test codestreams. Each ETS consists of codestreams, reference decoded images, and maximum values for MSE and peak error. The error values are defined as a function of Cclass for each image and may be more difficult to achieve as Cclass increases for each image.

Table G-2. Class 0 Profile 0 Reference Images and Allowable Errors

Test Case	Reference File	Resolution Reduction	Signed	Depth (bits)	Width (pixels)	Height (pixels)	Peak	MSE
p0_01.j2k	c0p0_01.pgx	0	+	8	128	128	0	0
p0_02.j2k	c0p0_02.pgx	0	+	8	64	126	0	0
p0_03.j2k	c0p0_03r0.pgx	0	+	4	128	128	0	0
p0_03.j2k	c0p0_03r1.pgx	1	+	4	128	128	0	0
p0_04.j2k	c0p0_04.pgx	3	+	8	80	60	33	55.8
p0_05.j2k	c0p0_05.pgx	3	+	8	128	128	54	68
p0_06.j2k	c0p0_06.pgx	3	+	8	65	17	109	743
p0_07.j2k	c0p0_07.pgx	0	+	8	128	128	10	0.34
p0_08.j2k	c0p0_08.pgx	5	+	8	17	96	0	6.72
p0_09.j2k	c0p0_09.pgx	2	+	8	5	10	0	1.47
p0_10.j2k	c0p0_10.pgx	0	+	8	64	64	0	2.84
p0_11.j2k	c0p0_11.pgx	0	+	8	128	1	0	0
p0_12.j2k	c0p0_12.pgx	0	+	8	3	5	0	0
p0_13.j2k	c0p0_13.pgx	0	+	8	1	1	0	0
p0_14.j2k	c0p0_14.pgx	2	+	8	13	13	0	0
p0_15.j2k	c0p0_15r0.pgx	0	+	4	128	128	0	0
p0_15.j2k	c0p0_15r1pgx	1	+	4	128	128	0	0
p0_16.j2k	c0p0_16.pgx	0	+	8	128	128	0	0

LEGEND:
MSE Mean Squared Error

Table G-3. Class 0 Profile 1 Reference Images and Allowable Errors

Test Case	Reference File	Resolution Reduction	Depth (bits)	Width (pixels)	Height (pixels)	Peak	MSE
p1_01.j2k	c0p1_01.pgx	0	8	61	99	0	0
p1_02.j2k	c0p1_02.pgx	3	8	80	60	35	74.0
p1_03.j2k	c0p1_03.pgx	3	4	128	128	28	18.8
p1_04.j2k	c0p1_04r0.pgx	0	4	128	128	2	0.550
p1_04.j2k	c0p1_04r3.pgx	3	8	128	128	128	2042
p1_05.j2k	c0p1_05.pgx	4	8	32	32	128	16384
p1_06.j2k	c0p1_06.pgx	1	8	6	6	128	16384
p1_07.j2k	c0p1_07.pgx	0	8	2	12	0	0

LEGEND:
MSE Mean Squared Error

Table G-4. Class 1 Profile 0 Reference Images and Allowable Errors

Test Case	Reference File	Resolution Reduction	Signed	Depth (bits)	Width (pixels)	Height (pixels)	Peak	MSE
p0_01.j2k	c1p0_01-0.pgx	0	+	8	128	128	0	0
p0_02.j2k	c1p0_02-0.pgx	0	+	8	64	126	0	0
p0_03.j2k	c1p0_03-0.pgx	0	-	4	256	256	0	0
p0_04.j2k	c1p0_04-0.pgx	0	+	8	640	480	5	0.776
p0_04.j2k	c1p0_04-1.pgx	0	+	8	640	480	4	0.626
p0_04.j2k	c1p0_04-2.pgx	0	+	8	640	480	6	1.070
p0_05.j2k	c1p0_05-0.pgx	0	+	8	1024	1024	2	0.302
p0_05.j2k	c1p0_05-1.pgx	0	+	8	1024	1024	2	0.307
p0_05.j2k	c1p0_05-2.pgx	0	+	8	512	512	2	0.269
p0_05.j2k	c1p0_05-3.pgx	0	+	8	512	512	0	0
p0_06.j2k	c1p0_06-0.pgx	0	+	12	513	129	635	11287
p0_06.j2k	c1p0_06-1.pgx	0	+	12	257	129	403	6124
p0_06.j2k	c1p0_06-2.pgx	0	+	12	513	65	378	3968
p0_06.j2k	c1p0_06-3.pgx	0	+	12	257	65	0	0
p0_07.j2k	c1p0_07-0.pgx	0	-	12	2048	2048	0	0
p0_07.j2k	c1p0_07-1.pgx	0	-	12	2048	2048	0	0
p0_07.j2k	c1p0_07-2.pgx	0	-	12	2048	2048	0	0
p0_08.j2k	c1p0_08-0.pgx	1	-	12	257	1536	0	0
p0_08.j2k	c1p0_08-1.pgx	1	-	12	257	1536	0	0
p0_08.j2k	c1p0_08-2.pgx	1	-	12	257	1536	0	0
p0_09.j2k	c1p0_09-0.pgx	0	+	8	17	37	0	0
p0_10.j2k	c1p0_10-0.pgx	0	+	8	64	64	0	0
p0_10.j2k	c1p0_10-1.pgx	0	+	8	64	64	0	0
p0_10.j2k	c1p0_10-2.pgx	0	+	8	64	64	0	0

Table G-4. Class 1 Profile 0 Reference Images and Allowable Errors (continued)

Test Case	Reference File	Resolution Reduction	Signed	Depth (bits)	Width (pixels)	Height (pixels)	Peak	MSE
p0_11.j2k	c1p0_11-0.pgx	0	+	8	128	1	0	0
p0_12.j2k	c1p0_12-0.pgx	0	+	8	3	5	0	0
p0_13.j2k	c1p0_13-0.pgx	0	+	8	1	1	0	0
p0_13.j2k	c1p0_13-1.pgx	0	+	8	1	1	0	0
p0_13.j2k	c1p0_13-2.pgx	0	+	8	1	1	0	0
p0_13.j2k	c1p0_13-3.pgx	0	+	8	1	1	0	0
p0_14.j2k	c1p0_14-0.pgx	2	+	8	49	49	0	0
p0_14.j2k	c1p0_14-1.pgx	2	+	8	49	49	0	0
p0_14.j2k	c1p0_14-2.pgx	2	+	8	49	49	0	0
p0_15.j2k	c1p0_15-0.pgx	0	-	4	256	256	0	0
p0_16.j2k	c1p0_16-0.pgx	0	+	8	128	128	0	0

LEGEND:
MSE Mean Squared Error

Table G-5. Class 1 Profile 1 Reference Images and Allowable Errors

Test Case	Reference File	Resolution Reduction	Depth (bits)	Width (pixels)	Height (pixels)	Peak	MSE
p1_01.j2k	c1p1_01-0.pgx	0	8	61	99	0	0
p1_02.j2k	c1p1_02-0.pgx	0	8	640	480	5	0.765
p1_02.j2k	c1p1_02-1.pgx	0	8	640	480	4	0.616
p1_02.j2k	c1p1_02-2.pgx	0	8	640	480	6	1.051
p1_03.j2k	c1p1_03-0.pgx	0	8	1024	1024	2	0.300
p1_03.j2k	c1p1_03-1.pgx	0	8	1024	1024	2	0.210
p1_03.j2k	c1p1_03-2.pgx	0	8	512	512	1	0.200
p1_03.j2k	c1p1_03-3.pgx	0	8	512	512	0	0
p1_04.j2k	c1p1_04-0.pgx	0	12	1024	1024	627	3080
p1_05.j2k	c1p1_05-0.pgx	0	8	512	512	40	8.458
p1_05.j2k	c1p1_05-1.pgx	0	8	512	512	40	9.716
p1_05.j2k	c1p1_05-2.pgx	0	8	512	512	40	10.154
p1_06.j2k	c1p1_06-0.pgx	0	8	12	512	2	0.600
p1_06.j2k	c1p1_06-1.pgx	0	8	12	12	2	0.600
p1_06.j2k	c1p1_06-2.pgx	0	8	12	12	2	0.600
p1_07.j2k	c1p1_07-0.pgx	0	8	2	12	0	0
p1_07.j2k	c1p1_07-1.pgx	0	8	8	12	0	0

LEGEND:
MSE Mean Squared Error

Table G-6. Items Tested by Profile 0 Codestreams

Codestream	Tests
p0_01.j2k	5x3 wavelet, 64x64 code-blocks, MQ-coder, context model
p0_02.j2k	component subsampling, multiple layers, termination every coding pass, predictable termination, segmentation symbols, COD, QCD, EPH, SOP, and 0xFF30 marker segments, 32x32 code-blocks
p0_03.j2k	multiples tiles, signed data, 4 bit component data, QCC, POC, CRG, TLM, and RGN marker segments
p0_04.j2k	multiple components, termination every coding pass, 9x7 wavelet, precinct sizes in COD, irreversible component transform, scalar quantization
p0_05.j2k	different subsampling for different components, different wavelet filters and parameters for different components
p0_06.j2k	12-bit component samples, RGN in main and tile
p0_07.j2k	large number of tiles, (256 tiles)
p0_08.j2k	large image (Grid size 513x 3072)
p0_09.j2k	9x7 wavelet transform overflow
p0_10.j2k	image source is pseudo-random, subsampling by 4, 0 guard bits, reversible color transform, tile parts
p0_11.j2k	1 sample high image, 0 decomposition level test, segmentation symbols
p0_12.j2k	Special wavelet transform cases
p0_13.j2k	large number of components
p0_14.j2k	5-3 wavelet transform saturation
p0_15.j2k	RGN, POC, Signed, QCC, COM
p0_16.j2k	Empty packet header bit

Table G-7. Items Tested by Profile 1 Codestreams

Codestream	Tests
p1_01.j2k	Image and tile offsets, (Image Offset 5x128, Tile Offset 1x101)
p1_02.j2k	reset context probabilities, vertically casual contexts, precincts sizes, PPT marker segment
p1_03.j2k	PPM marker segment
p1_04.j2k	QCD marker segment in tile header
p1_05.j2k	Odd size tile (37x37), non-square code block size (8x64), multiple PPM marker segments
p1_06.j2k	small tile size (3x3)
p1_07.j2k	small precincts (2x2,1x1, and 4x4, 2x2) , packet inclusion

JP2 file format ETS

This Annex defines the ETS for decoding JP2 file format. Table G-8 lists the decoded and up-sampled size of test JP2 test files as well as allowable error.

Table G-8. JP2 Reference Images and Allowable Error

Test file	Reference File	Components	Depth (bits)	Width (pixels)	Height (pixels)	Peak
file1.jp2	jp2_1.tif	3	8	768	512	4
file2.jp2	jp2_2.tif	3	8	480	640	4
file3.jp2	jp2_3.tif	3	8	480	640	4
file4.jp2	jp2_4.tif	1	8	768	512	4
file5.jp2	jp2_5.tif	3	8	768	512	4
file6.jp2	jp2_6.tif	1	12	768	512	4
file7.jp2	jp2_7.tif	3	16	480	640	4
file8.jp2	jp2_8.tif	1	8	700	400	4
file9.jp2	jp2_9.tif	1	8	768	512	4

Table G-9 provides additional information about each of JP2 test files.

Table G-9. JP2 File Description

Test Files	Summary Information
file1.jp2	Three 8-bit components in the sRGB colourspace. This file also includes XML metadata.
file2.jp2	Three 8-bit components in the sRGB-YCC colourspace. All components are at full resolution, but stored in reverse order in the codestream. File contains a Channel Definition box that correctly associates each physical component with the correct color in the sRGB-YCC definition.
file3.jp2	Three 8-bit components in the sRGB-YCC colourspace, with the Cb and Cr components being subsampled 2x in both the horizontal and vertical directions. The components are stored in standard order.
file4.jp2	One 8-bit component in the sRGB-grey colourspace.
file5.jp2	Three 8-bit components in the ROMM-RGB colourspace, encapsulated in a JP2 compatible JPX file. The colourspace is specified using both a Restricted ICC profile and using the JPX-defined enumerated code for the ROMM-RGB colourspace.
file6.jp2	One 12-bit component in the sRGB-grey colourspace.
file7.jp2	Three 16-bit components in the e-sRGB colourspace, encapsulated in a JP2 compatible JPX file. The colourspace is specified using both a Restricted ICC profile and using the JPX-defined enumerated code for the e-sRGB colourspace.
file8.jp2	One 8-bit component in a gamma 1.8 space. The colourspace is specified using a Restricted ICC profile.
file9.jp2	One 8-bit component, which is used as input to a 256-entry palette that maps the single component to three 8-bit components. The depaletized components are in the sRGB colourspace.

LEGEND:

Cb	Chrominance (blue)	JPX	Joint Photographic Experts Group 2000 minimal interchange format files may also contain additional metadata	sRGB	standard red, green, blue color space
Cr	Chrominance (red)			XML	eXtensible Mark-up Language
ICC	International Color Consortium			YCC	Y=Brightness of signal, CC=Cb (Chrominance (blue)), Cr (Chrominance (red))
JP2	Joint Photographic Experts Group 2000 minimal interchange format	ROMM -RGB	Reference Output Medium Metric red, green, blue		