CCSDS

The Consultative Committee for Space Data Systems

CCSDS IMPLEMENTATION CONFORMANCE STATEMENTS

CCSDS RECORD

CCSDS A20.1-Y-1

YELLOW BOOK
April 2014

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FOREWORD

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CONTENTS

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1 INTRODUCTION

1.1 PURPOSE AND SCOPE

This document defines the minimum requirements for CCSDS Implementation Conformance Statement (ICS) and Protocol ICS (PICS) proformas.

An ICS contains the necessary information required for documenting an implementation's conformance to requirements specified in CCSDS Recommended Standards and their related profiles. The ICS proforma is a check-list intended to cover all requirements, all optional and conditional functions, elements of procedure, parameters, PDUs, timers, etc., and other capabilities identified in the specification. The ICS proforma is to be completed by the supplier or the implementer.

This document adapts portions, relevant for typical CCSDS use, of the ISO specification for Implementation Conformance Statements (reference [1]). Reference [1] provides a broader treatment of ICS proformas, and CCSDS Working Groups (WGs) may use it as the basis for ICS development.

1.2 APPLICABILITY

The specifications of this document apply to the formation of ICS and PICS proformas in CCSDS Recommended Standards and to the formation of optional ICS proformas in CCSDS Recommended Practices.

NOTE – CCSDS Recommended Practices are not required to include ICS proformas.

1.3 DEFINITIONS

conditional: Dependent on support for an optional or another conditional capability.

mandatory: Required for interoperability. Mandatory capabilities are all capabilities that need to be available for use for normal operation of an implementation, regardless of whether a user can elect not to use them.

optional: Not necessary for interoperability. Optional capabilities can be excluded from an implementation (and made unavailable to users) without affecting the essential operation of the implementation.

NOTE – Implementation options should not be confused with user options; i.e., there may be any number of features which a user can elect not to use but which need to be available in an implementation. Also, whether a capability is optional may depend on whether the implementation is sending, receiving, or acting as a relay. A capability that a transmitter can do without might nevertheless be required at a receiver to accommodate transmitters that implement the capability.

not applicable: Not capable of being implemented.

not supported: Not implemented.

NOTE – An implementation in which a mandatory capability is not supported is nonconformant.

out of scope: Not relevant in the context of available options.

prohibited: Required not to be implemented.

supported: Implemented in conformance with the referenced requirement definition.

1.4   REFERENCES

The following publication is referenced in this text. All publications are subject to revision, and users of this document are encouraged to investigate the possibility of applying the most recent edition of the publication indicated below.

[1]   *Information Technology—Open Systems Interconnection—Conformance Testing Methodology and Framework—Part 7: Implementation Conformance Statements.* International Standard, ISO/IEC 9646-7:1995. Geneva: ISO, 1995.

2 OVERVIEW

2.1 ICS PROFORMAS

The ICS proforma is a normative annex that expresses the static conformance requirements of a specification in compact form. It serves as a reference to a static conformance review and as a framework for an interoperability test plan.

An ICS is defined explicitly not to be a restatement of the specification. Rather it is intended to be a compact reference to the specification that can be used, by an implementer, to verify and document compliance and identify status of optional elements.

An ICS proforma consists of a concise list of items representing major mandatory capabilities and all optional and conditional capabilities. Each item has an item number, a brief description of the capability, a reference to the capability definition, a status value specifying the support requirement, and space for an implementer to indicate support for the capability.

A minimal ICS proforma item is shown in figure 2-1. This example shows that item number 1 is Capability-A, defined in subsection 3.3.1, which, because the status value is 'o', is optional. A capability may specifically include one or more individual requirements or clauses that all define features of that capability.

Item Number	Item Description	Reference	Status	Support
1	Capability-A	3.3.1	o	

Figure 2-1: A Minimal ICS Proforma Item

2.2 PICS PROFORMAS

A PICS proforma captures the major mandatory static capabilities of a protocol, and all options that are left to the implementer or are conditionally dependent on other options supported by the implementer. It does not capture dynamic conformance requirements.

A PICS proforma is defined explicitly not to be a restatement of the protocol specification. Rather it is intended to be a compact reference to the specification that can be used, by an implementer, to verify and document compliance and identify status of optional elements.

2.3 PROFILE-SPECIFIC ICS PROFORMAS

2.3.1 GENERAL

A profile-specific ICS/PICS proforma captures requirements specific to an adaptation of one or more specifications. Each one represents the required tailoring of one or more ICS/PICS proformas in order to adapt them for the purpose of that profile.

2.3.2 PROFILE REQUIREMENTS LISTS

A Profile Requirements List (PRL) is provided for each profile and captures the general options of the profile as a whole, a list of the specifications selected and combined in the profile, and references to the related ICS proformas. For each of these referenced base specifications, a section of the PRL expressing the restrictions upon allowed support answers in the corresponding ICS proforma is provided. This section of the PRL is derived from the ICS proformas of the relevant base specifications, indicating the changes of status values necessary to express the profile requirements.

A minimal PRL item is shown in figure 2-2. This example shows that the profile has changed the status of Capability-A, which is item number 1 in the PICS proforma, from 'o' (optional) to 'm' (mandatory). This means that conformance to the profile requires a support answer of 'Yes' for this item in the PICS.

Item Number	Item Description	Reference	Protocol Status Value	Profile Status Value
1	Capability-A	Requirement Location	o	m

Figure 2-2: A Minimal PRL Item

A PRL restricts the acceptable support values in the ICS proformas relevant to the profile. Each PRL table needs to be put alongside the corresponding table from the relevant ICS proforma (see figure 2-3).

Item Number	Item Description	Reference	Status Value	Support	Protocol Status Value	Profile Status Value
1	Capability-A	Requirement Location	o		o	m

Figure 2-3: A PRL Item alongside the Corresponding ICS Proforma Item

3   STRUCTURE OF THE ICS PROFORMA ANNEX

3.1   GENERAL

The ICS proforma annex shall contain

 a) an Introduction subsection;

 b) an Identification of the Implementation subsection;

 c) an Identification of the Protocol, Information Object, or Profile subsection;

 d) an ICS Proforma Tables subsection.

3.2   ICS PROFORMAS

3.2.1   INTRODUCTION SUBSECTION

The Introduction subsection shall contain instructions for completion of the proforma by the implementation supplier or tester. This subsection shall

 a) explain the purpose and the structure of the annex to the potential user;

 b) explain the symbols, abbreviations, and terms being used, together with appropriate references;

 c) give explicit instructions for completing the ICS;

 d) define the places in which the user can provide additional information.

3.2.2   IDENTIFICATION OF THE IMPLEMENTATION

The Identification of the Implementation subsection shall provide space for the supplier or tester to identify

 a) the implementation and the system in which it resides;

 b) the supplier of the system and/or testing entity;

 c) the person to contact if there are any questions concerning the content of the ICS.

3.2.3   IDENTIFICATION OF THE PROTOCOL, INFORMATION OBJECT, OR PROFILE

The Identification of the Protocol, Information Object, or Profile subsection shall identify the CCSDS specification(s) to which the ICS proforma applies, including the CCSDS document number and the complete title. The issue(s) of the specification(s) to be supported shall be stated in the proforma.

3.2.4   ICS PROFORMA TABLES

3.2.4.1   General

The ICS Proforma Tables subsection shall list the capabilities of the protocol, information object, or profile in tabular form. For each item listed in the ICS proforma tables there shall be a status value that reflects the static conformance requirement of the relevant CCSDS specification.

3.2.4.2   Global Statement of Conformance

3.2.4.2.1   The ICS proforma shall include the question, "Have any exceptions been required?"

3.2.4.2.2   A note shall be added to include the sense of the following:

> A 'yes' answer means that the implementation does not conform to the Recommended Standard. Non-supported mandatory capabilities are to be identified in the ICS with an explanation of why the implementation is non-conforming.

3.2.4.3   Structure of the Tables

3.2.4.3.1   One or more tables reflecting the static conformance requirements shall be presented.

3.2.4.3.2   The tables shall list major mandatory capabilities and all the optional and conditional capabilities. One item shall be presented per table row. Mandatory and optional capabilities shall be stated before dependent conditional capabilities.

3.2.4.3.3   Each table shall include the following columns:

a)   a column to the left to give the item number, for use in item referencing;

b)   a column to describe the item for each row;

c)   a column giving reference(s) to the appropriate static conformance requirement(s) in the relevant specification(s);

d)   either one 'status' column specifying the status (e.g., 'm', 'o', etc.) of the item or a set 'status' columns specifying the status per distinct context in which the support is to be specified (e.g., for sender, receiver, and relay roles);

e)   a blank 'support' column for the implementer to specify whether the item is supported.

3.2.4.3.4   In addition to the columns required in 3.2.4.3.3, the following additional columns may be included:

a) a column, if appropriate, to specify the predicate upon which a conditional status is based;

b) an 'allowed values' column, if appropriate, stating any restrictions or prescriptions on the types/lengths/ranges of values to be supported, as specified in the relevant CCSDS specification:

c) a 'supported values' column, if appropriate, in which the values or ranges of values supported can be indicated, as well as types and lengths, if relevant;

d) a 'mnemonic' column, if desired, in which mnemonic identifiers are given to each item, for use in place of item numbers in item references;

e) space on the right in which additional columns can be added if necessary to enable comments to be added by the user of the ICS proforma.

3.2.4.3.5   If within a list of values of parameters some values are mandatory while others are optional or conditional, then an extra table listing each category of parameters with its status is required. A 'support' column shall be used to indicate whether each category is supported.

3.3   PICS PROFORMAS

3.3.1   GENERAL

3.3.1.1   The Introduction shall address specific issues regarding the production of a PICS proforma for a protocol specification.

3.3.1.2   The function of the protocol may be broken down into major roles and capabilities (e.g., initiator, responder, relay, functional units, classes).

3.3.1.3   Each major capability shall have a specific item in the PICS proforma, indicating its conformance status (e.g., mandatory, optional, conditional, etc.).

3.3.1.4   One or more PICS proforma items, grouped by major capabilities, shall describe the capabilities related to each PDU of the protocol.

3.3.1.5   The PICS proforma shall also cover all other optional, conditional, and significant mandatory static conformance requirements identified in the protocol specification. These may include functions, elements of procedure, parameters, timers, protocol error handling, and multi-specification dependencies.

3.3.1.6   The dynamic conformance requirements related to these static conformance requirements shall not be reproduced in the PICS proforma.

3.3.2   ROLES

3.3.2.1   If the protocol can be implemented in different roles, there shall be PICS proforma items to identify which roles are supported.

3.3.2.2   The PICS proforma shall distinguish clearly the different status values and support answers for the different roles.

3.3.3   MAJOR CAPABILITIES

The PICS proforma shall have an item for each major capability regardless of its status.

3.3.4   PDUs

3.3.4.1   Items to identify all PDUs defined for the protocol shall be included in the PICS proforma.

3.3.4.2   The status and support of each PDU should be indicated separately for the roles of sender, receiver, and, if relevant, relay.

3.3.4.3   Support for the receipt of a particular PDU type shall be understood to imply support for parsing all valid instances of that PDU type, including all valid PDU parameters.

3.3.4.4   If the protocol includes rules for extensibility, then support for a particular PDU type shall imply the ability to parse any PDU instance that is syntactically valid within the rules for extensibility.

3.3.5   PDU PARAMETERS

3.3.5.1   PICS proforma items may be used to list, for each PDU type, the parameters for which implementation flexibility exists in regard to support for the full functionality (i.e., semantics) associated with those parameters.

3.3.5.2   If no such implementation flexibility exists, then support for a PDU implies support for the full functionality of its parameters.

NOTE   –   A statement of support for a PDU parameter in the PICS does not in itself imply anything about the presence or absence of that parameter on a particular instance of the relevant PDU. Such questions of dynamic behavior should not be discussed in the PICS, but rather determined by the dynamic conformance requirements in the protocol specification.

3.3.5.3 For each documented parameter, the PICS proforma should provide

    a) its status, based on the value of a specified predicate in each role (e.g., sender, receiver, and relay);

    b) space to indicate whether it is supported in each role;

    c) the lengths, ranges of values, and/or data types permitted in each role by the relevant protocol, abstract syntax, and encoding rule specifications;

    d) space to indicate the values supported in each direction.

3.3.5.4 If there is implementation flexibility in regard to the parameter values allowed, additional items shall be included in the PICS proforma.

3.3.5.5 The PICS proforma should give a clear indication of the preferred data types to be used for specifying the supported values (e.g., number bases, string types, octets, bits, seconds, etc.).

3.3.5.6 For a protocol using a transfer syntax that does not strictly define the size of the parameters transferred (e.g., ASN.1 Basic Encoding Rules), it should be made clear whether the sizes defined include the encoding.

3.3.6 TIMERS

3.3.6.1 PICS proforma items may be used to list all timers defined in the protocol specification.

3.3.6.2 Allowed values or ranges of values shall be specified for each timer, and space shall be provided for specifying which values are supported.

3.3.7 NEGOTIATION CAPABILITIES

3.3.7.1 PICS proforma items may be used to describe the negotiation options available dynamically in the protocol and provide space to indicate which have been implemented.

3.3.7.2 A PICS should not discuss negotiation outside the protocol (e.g., agreement on the static reconfiguration).

3.3.8 PROTOCOL ERROR HANDLING

If the protocol specification allows more than one method of handling errors on receipt of non-supported PDUs or parameters, PICS proforma items may be used to list what these methods are, and provide space to indicate which are supported.

3.3.9 MULTI-SPECIFICATION DEPENDENCIES

PICS proformas shall make a distinction (by using separate tables) between items related to the static conformance requirements of the protocol itself (internal requirements) and items related to static conformance requirements on other protocols, abstract syntaxes, encoding rules, information objects, or provision for underlying service capabilities (multi-specification dependencies).

3.3.10 OTHER CONDITIONS

If complex relationships between options need to be checked in the static conformance review but cannot be associated with a specific PICS proforma item, those relationships should be documented in the form of Boolean expressions, or matrix tables in a separate section, with predicates and variables referencing the relevant PICS proforma items.

4 COMPLETE SPECIFICATION OF ICS PROFORMA AND REQUIREMENTS LIST NOTATION

4.1 INTRODUCTION SUBSECTION

The Introduction subsection shall define the notation used in the ICS. It shall define the semantics associated with

    a) the status values that are assigned to questions in the ICS proforma; and

    b) the support answers that are expected to be filled in an ICS.

NOTE – The status values are also used in PRLs, showing the changes in status values required by the profile. There are, however, no support answers to be provided in a PRL.

4.2 STATUS COLUMN VALUES

4.2.1 GENERAL NOTATIONS

4.2.1.1 Each ICS proforma question shall specify the status value applicable to the capability. The common notations for the status values are:

- m, M   mandatory;
- o, O   optional;
- c, C   conditional;
- x, X   prohibited;
- i, I   out of scope;
- n/a, N/A, -   not applicable.

4.2.1.2 The meanings of these common status values shall be as defined in 1.3.

4.2.1.3 Additional status values may be defined for use in particular ICS proformas if necessary, but should be avoided if possible.

4.2.1.4 Status column notations are not case sensitive, but case shall be consistent throughout an ICS proforma.

4.2.1.5 Mutually exclusive or selectable options among a set may be indicated by placing a period followed by an integer after the 'o':

        o.<integer>   for mutually exclusive or selectable options among a set.

4.2.1.5.1 Each new integer shall identify a new group.

4.2.1.5.2   A footnote to the relevant table shall explicitly state what the requirement is for each numbered group. For example:

–   'It is mandatory to support at least one of these options' (selection of one option makes selection of any others optional);

–   'It is mandatory to support exactly one of these options' (selection of one option prohibits selection of any others).

4.2.1.5.3   Alternatively, if all uses of o.<integer> in the ICS proforma have the same meaning for each group, then the requirement may be stated in a conventions subsection at the beginning of the ICS proforma.

4.2.1.5.4   Separate footnotes should be used if there are few uses of this convention in the ICS proforma.

NOTE   –   Figure 4-1 shows an example of a group of three related options.

Item	Description	Reference	Status	Support
1	Option A	N.1	o.4	
2	Option B	N.2	o.4	
3	Option V	N.n	o.4	

o.4   It is mandatory to support at least one of these options.

Figure 4-1: A Group of Related Options

4.2.1.5.5   If extensive use of footnotes is made, then an index of cross-references should also be produced to make them easier to find.

4.2.2   PREDICATES

4.2.2.1   A predicate in an ICS proforma shall be either

a)   an explicit reference to an optional or conditional ICS proforma item; or

b)   an expression involving a reference to an optional or conditional ICS proforma item.

4.2.2.2   If extensive use of predicates is made, then an index of cross-references should also be produced to make them easier to find.

4.2.3 LOGICAL NEGATION SYMBOL

4.2.3.1 Logical negation may be expressed with

– the negation symbol, '−';

– The carat symbol, '^';

– the word 'NOT'.

4.2.3.2 Whatever convention is used shall be used consistently throughout.

4.2.4 FLAGGING OF REFERENCES USED IN PREDICATES

An asterisk may be used to prefix the item number or mnemonic reference in the item reference column for any item that is referenced by a predicate or conditional expression elsewhere in the ICS proforma.

4.2.5 NOTATION FOR CONDITIONAL REQUIREMENTS

4.2.5.1 General

Conditional requirements, utilizing predicates if desired, may be specified in one of the following ways:

a) separate status and predicate columns;

b) merged status and predicate columns;

c) conditional expressions referenced from the status column;

d) conditions implied by nested item numbers;

e) predicates applying to a whole table.

4.2.5.2 Condition Referencing an Item

4.2.5.2.1 Condition with Predicate Column

With a predicate column, a conditional item referencing an optional or conditional item shall have in the status column a 'c' followed by a colon followed by the status dependent on support for the referenced optional or conditional item. The predicate column shall contain the reference to the optional or conditional item, for which support is indicated by unqualified reference, and lack of support is indicated by logical negation.

NOTE – Figure 4-2 shows an example of a conditional expression referring to an optional item.

Item	Description	Reference	Status	Predicate	Support
*101	Item A	N.1	o		
102	Item B	N.2	c:m x	101 −101	

Figure 4-2: Optional Predicate Column

4.2.5.2.2   Condition without Predicate Column

Without a predicate column, a condition may be expressed in the status column by indicating the referenced optional or conditional item followed by a colon followed by the conditional status value(s), as shown in figure 4-3.

Item	Description	Reference	Status	Support
*101	Item A	N.1	o	
102	Item B	N.2	101:m −101:x	

Figure 4-3: Predicate in Status Column

NOTE   –   In both figures 4-2 and 4-3, the status of item 102 is, if item 101 is supported, then item 102 is mandatory, but if item 101 is not supported, then item 102 is prohibited.

4.2.5.3   Conditional Expressions

4.2.5.3.1   A 'c' followed by an integer in the status column may be used to reference a conditional IF-THEN-ELSE status expression defined elsewhere in the ICS proforma, as shown in figure 4-4.

Item	Description	Reference	Status	Support
*101	Item A	N.1	o	
*102	Item B	N.2	o	
*103	Item C	N.3	o	
104	Item D	N.4	c1	
105	Item E	N.5	c2	

   cl: IF 101 THEN m ELSE x
   c2: IF 103 THEN (IF (102 AND NOT 101) THEN m ELSE o) ELSE n/a

Figure 4-4: Use of Conditional Status

4.2.5.3.2   The syntax 'IF... THEN (IF... THEN... ELSE...) ELSE...' should be used to indicate nested conditional status expressions.

4.2.5.3.3   In all cases, 'ELSE N/A' shall be understood if an ELSE clause is omitted.

4.2.5.3.4   If extensive use of conditional expressions is made, then an index of cross-references should also be produced to make them easier to find.

4.2.5.4   Conditions Implied by Subordination

4.2.5.4.1   The relationship among the items within a single table may be shown through subordination in item numbering, where conditional items are numbered at a level subordinate to the level of respective optional or conditional items. Subordination in item numbering shall use the same notation as subsection numbering.

4.2.5.4.2   All the items that are conditional upon others within the table shall have 'c:' as a prefix to the status value that is to apply if the implied condition is true.

4.2.5.4.3   If this notation is used, there shall be an implied 'ELSE N/A' with every conditional expressed in this way.

NOTES

1   This technique is equivalent to omitting the predicate column from the separate status and predicate column notation, when the predicate can be implied from the item number column.

2   Figure 4-5 shows an example of this notation.

Item	Description	Reference	Status	Support
1	Item A	N.1	o	
1.1	Item B	N.1.1	c:m	
1.2	Item C	N.1.2	c:o	
1.2.1	Item D	N.1.2.1	c:m	
1.3	Item E	N.1.3	c:c9	
2	Item F	N.2	m	
2.1	Item G	N.2.1	o	

c9: IF 2.1 THEN m ELSE i

Figure 4-5: Conditions Implied by Item Subordination

NOTE –   In figure 4-5, items numbered 1.1, 1.2, and 1.3 are conditional upon whether item 1 is supported. Item number 1.2.1 is conditional on whether both item number 1 and item number 1.2 are supported. Item number 1.3 is conditional both on whether item number 1 is supported and on a conditional expression, c9, defined below the table. Item number 2.1, although nested under item number 2, has an unconditional status value (and hence no 'c:') because item number 2 is mandatory.

4.2.5.5   Predicates Applying to a Whole ICS Proforma or PRL Table

4.2.5.5.1   If a predicate applies to a whole ICS proforma table, a prerequisite line may be specified just before the table to which it applies. A prerequisite line shall takes the form:

Prerequisite: <predicate>

4.2.5.5.2   The meaning of such a line shall be that if <predicate> evaluates to 'true', then the table applies, but otherwise it is not applicable.

NOTE –   This may be used, for example, with a PDU table that is conditional upon a particular functional unit's being supported, or with a PDU parameter table that is conditional upon the relevant PDU's being supported.

4.2.5.5.3   In the same way, a prerequisite line may be used in a PRL with the meaning that if <predicate> evaluates to 'true' then the table applies, but otherwise it is out of scope.

4.3   SUPPORT COLUMN

4.3.1   GENERAL NOTATIONS

4.3.1.1   The notation for common entries in the support column of ICS tables shall be

– Y, y, YES, or yes   supported;

– N, n, NO, no   not supported;

– N/A, n/a, -   not applicable.

4.3.1.2   The meanings of these common support indications shall be as defined in 1.3.

4.3.1.3   Other support answers may be defined for use with particular ICS proformas.

4.3.2   CONDITIONAL SUPPORT ANSWERS

The instructions for completing the Requirements List shall specify the permitted notation for conditional support values, if allowed.

4.3.3 CHECK BOXES FOR SUPPORT ANSWERS

4.3.3.1   Instead of white space, check boxes may be provided in the support column (see figures 4-6 and 4-7).

Item	Description	Reference	Status	Support N/A	Yes	No
1	Item A	N.1	o	[ ]	[ ]	[ ]
2	Item B	N.2	o	[ ]	[ ]	[ ]
3	Item C	N.1	o	[ ]	[ ]	[ ]

Figure 4-6: Check Box Column Labeling

Item	Description	Reference	Status	Support		
1	Item A	N.1	o	N/A[ ]	Yes[ ]	No[ ]
2	Item B	N.2	o	N/A[ ]	Yes[ ]	No[ ]
3	Item C	N.1	o	N/A[ ]	Yes[ ]	No[ ]

Figure 4-7: Individual Check Box Labeling

4.3.3.2   Indication of conditional support with check boxes may be accomplished by adding predicates next to the appropriate check boxes or by referencing conditional expressions in notes.

4.3.3.3   Irrelevant check boxes may be excluded from the support column.

4.4   COLUMN HEADINGS

Column headings may be abbreviated to save space in tables with a large number of columns. Abbreviations shall be readily understandable; for example:

   – Sts   Status;

   – Spt   Support;

   – Init   Initiator;

   – Resp   Responder;

   – Sdr   Sender;

   – Rcv   Receiver.

4.5   SPECIFIC REQUIREMENTS FOR PRL NOTATION

4.5.1   When a PRL modifies the requirements of a base specification capability, it shall not change any mandatory capabilities.

4.5.2   With base specifications that restrict choices allowed within a set of options (i.e., the use of o.n), the profile may designate one or more options as mandatory for the profile or limit the set of selectable options.

4.5.3   With base specifications that use the 'o.n' notation to indicate mutually exclusive options, the profile may retain all the options or only a subset of those options.

ANNEX A

EXAMPLES OF IMPLEMENTATION
CONFORMANCE STATEMENT PROFORMAS

Some published CCSDS Blue Books that provide examples of ICS proformas are

- CCSDS 123.0-B-1, Lossless Multispectral & Hyperspectral Image Compression (Blue Book, Issue 1, May 2012)

- CCSDS 508.0-B-1, Conjunction Data Message (Blue Book, Issue 1, June 2013)

NOTE – Annex A of CCSDS 123.0-B-1 is nominally a PICS but is a good example of an ICS.

The following example PICS proforma, annex XYZ, provides a model for the introductory sections required for ICS/PICS proformas and demonstrates various table layouts and status values for an abbreviated requirements list for protocol XYZ.

ANNEX XYZ

PROTOCOL IMPLEMENTATION
CONFORMANCE STATEMENT PROFORMA

(NORMATIVE)

XYZ1 INTRODUCTION

XYZ1.1 OVERVIEW

This annex provides the Protocol Implementation Conformance Statement (PICS) Requirements List (RL) for an implementation of *XYZ Protocol* (CCSDS 000.0-B-0). The PICS for an implementation is generated by completing the RL in accordance with the instructions below. An implementation claiming conformance must satisfy the mandatory requirements referenced in the RL.

The RL support column in this annex is blank. An implementation's completed RL is called the PICS. The PICS states which capabilities and options have been implemented. The following can use the PICS:

− the implementer, as a checklist to reduce the risk of failure to conform to the standard through oversight;

− a supplier or potential acquirer of the implementation, as a detailed indication of the capabilities of the implementation, stated relative to the common basis for understanding provided by the standard PICS proforma;

− a user or potential user of the implementation, as a basis for initially checking the possibility of interworking with another implementation (it should be noted that, while interworking can never be guaranteed, failure to interwork can often be predicted from incompatible PICSes);

− a tester, as the basis for selecting appropriate tests against which to assess the claim for conformance of the implementation.

XYZ1.2 ABBREVIATIONS AND CONVENTIONS

The RL consists of information in tabular form. The status of features is indicated using the abbreviations and conventions described below.

Item Column

The item column contains sequential numbers for items in the table.

Feature Column

The feature column contains a brief descriptive name for a feature. It implicitly means "Is this feature supported by the implementation?"

Status Column

The status column uses the following notations:

M	mandatory.
O	optional.
O.\<n\>	optional, but support of at least one of the group of options labeled by the same numeral \<n\> is required.
– C\<n\>	conditional as defined in corresponding expression below table.
– X	prohibited.
– N/A	not applicable.

Support Column Symbols

The support column is to be used by the implementer to state whether a feature is supported by entering Y, N, or N/A, indicating:

Y	Yes, supported by the implementation.
N	No, not supported by the implementation.
N/A	Not applicable.

The support column should also be used, when appropriate, to enter values supported for a given capability.

XYZ1.3 INSTRUCTIONS FOR COMPLETING THE RL

An implementer shows the extent of compliance to the Recommended Standard by completing the RL; that is, the state of compliance with all mandatory requirements and the options supported are shown. The resulting completed RL is called a PICS. The implementer shall complete the RL by entering appropriate responses in the support or values supported column, using the notation described in XYZ1.2. If a conditional requirement is inapplicable, N/A should be used. If a mandatory requirement is not satisfied, exception information must be supplied by entering a reference Xi, where i is a unique identifier, to an accompanying rationale for the noncompliance.

XYZ2 PICS PROFORMA FOR *XYZ PROTOCOL* (CCSDS 000.0-B-0)

XYZ2.1 GENERAL INFORMATION

XYZ2.1.1 Identification of PICS

Date of Statement (DD/MM/YYYY)	
PICS serial number	
System Conformance statement cross-reference	

XYZ2.1.2 Identification of Implementation Under Test

Implementation name	
Implementation version	
Special Configuration	
Other Information	

XYZ2.1.3 Identification of Supplier

Supplier	
Contact Point for Queries	
Implementation Name(s) and Versions	
Other information necessary for full identification, e.g., name(s) and version(s) for machines and/or operating systems; System Name(s)	

XYZ2.1.4 Identification of Specification

CCSDS 000.0-B-0	
Have any exceptions been required? NOTE – A YES answer means that the implementation does not conform to the Recommended Standard. Non-supported mandatory capabilities are to be identified in the PICS, with an explanation of why the implementation is non-conforming.	Yes [ ] No [ ]

XYZ2.2 REQUIREMENTS LIST

Classes				
Item	Description	Reference	Status	Support
xyz-0	Class 0	5.1	O.1	
xyz-1	Class 1	5.2	C1	
xyz-2	Class 2	5.3	O.1	
xyz-3	Class 3	5.4	C2	
xyz-4	Class 4	5.5	C2	

O.1: Support for at least one of these classes is mandatory.

Cl: IF XYZ-0 THEN O ELSE N/A

C2: IF XYZ-2 THEN O ELSE X

PDUs								
Item	PDU	Ref.	Sender End-System		Receiver End-System		Relay	
			Status	Support	Status	Support	Status	Support
xyz-5	AA	6.1	O		M		M	
xyz-6	BB	6.1	M		C3		M	
xyz-7	CC	6.2	M		M		M	
xyz-...	...	...	...		...		...	

C3: IF send xyz-5 THEN M ELSE N/A

Parameters of DD-PDU						
Item	Parameter	Ref.	Status	Support	Values	
					Allowed	Supported
xyz-20	Frame Length	6.6	M		4–2047	
xyz-21	Port Identifier	6.7	O		0-7	
xyz-22	QoS Indicator	6.8	M		0-3	
xyz-...	...	...	...		...	

ANNEX B

ABBREVIATIONS

ASN.1 Abstract Syntax Notation One

ICS   implementation conformance statement

ISO   International Organization for Standardization

PDU   protocol data unit

PICS   protocol implementation conformance statement

PRL   profile requirements list

QoS   quality of service

RL   requirements list

WG   working group