
**Information technology — Open Systems
Interconnection — Conformance test suite
for the presentation layer —**

Part 2:

Test suite structure and test purposes for the
ASN.1 basic encodings

*Technologies de l'information — Interconnexion de systèmes ouverts
(OSI) — Suite d'essais de conformité pour la couche présentation —*

*Partie 2: Structure de la suite d'essais et objets des essais pour le codage
ASN.1 de base*

Contents

Foreword	vi
Introduction	vii
1 Scope.....	1
2 Normative references.....	1
3 Definitions.....	1
3.1 Reference model definitions.....	1
3.2 Presentation service definitions.....	2
3.3 Conformance testing methodology and framework definitions.....	2
4 Abbreviations.....	2
4.1 Data units.....	2
4.2 Other abbreviations.....	2
5 Compliance.....	2
6 Testing methodology.....	2
6.1 Introduction.....	2
6.2 Relationship between the TSS & TP and abstract test suites.....	2
6.3 Test selection.....	3
6.4 Verdicts.....	3
6.5 Test suite coverage.....	3
7 Test suite structure.....	3
8 Naming conventions.....	3
9 Precedence.....	4
10 Encoder tests (E).....	6
10.1 E/Type variations (TV).....	6
10.1.1 E/TV/Universal tags (UT).....	6
10.1.1.1 E/TV/UT/BOOLEAN (B).....	6
10.1.1.2 E/TV/UT/INTEGER (I).....	6
10.1.1.3 E/TV/UT/BIT STRING (BS).....	7
10.1.1.4 E/TV/UT/OCTET STRING (OS).....	7
10.1.1.5 E/TV/UT/NULL (N).....	7

© ISO/IEC 1995

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

ISO/IEC Copyright Office • Case Postale 56 • CH-1211 Genève 20 • Switzerland

Printed in Switzerland

10.1.1.6	E/TV/UT/OBJECT IDENTIFIER (OI)	7
10.1.1.7	E/TV/UT/OBJECT DESCRIPTOR (OD)	7
10.1.1.8	E/TV/UT/EXTERNAL (E)	7
10.1.1.9	E/TV/UT/SEQUENCE (SQ)	7
10.1.1.10	E/TV/UT/SEQUENCE OF (SQQ)	7
10.1.1.11	E/TV/UT/SET (ST)	7
10.1.1.12	E/TV/UT/SET OF (STO)	7
10.1.1.13	E/TV/UT/NumericString (NS)	8
10.1.1.14	E/TV/UT/PrintableString (PS)	8
10.1.1.15	E/TV/UT/TeletexString (TS)	8
10.1.1.16	E/TV/UT/VideotexString (VTS)	8
10.1.1.17	E/TV/UT/VisibleString (VIS)	8
10.1.1.18	E/TV/UT/IA5String (IS)	8
10.1.1.19	E/TV/UT/GraphicString (GRS)	8
10.1.1.20	E/TV/UT/GeneralString (GES)	8
10.1.1.21	E/TV/UT/GeneralizedTime (GT)	8
10.1.1.22	E/TV/UT/UTCTime (UT)	8
10.1.1.23	E/TV/UT/ENUMERATED (EN)	8
10.1.1.24	E/TV/UT/REAL (R)	8
10.1.2	E/TV/Application tags (AT)	8
10.1.3	E/TV/Context-specific tags (CT)	8
10.1.4	E/TV/Private tags (PT)	8
10.1.5	E/TV/Implicit tags (IT)	8
10.1.5.1	E/TV/IT/Single implicit tag (SIT)	8
10.1.5.2	E/TV/IT/Multiple implicit tags (MIT)	8
10.1.6	E/TV/Explicit tags (ET)	8
10.1.6.1	E/TV/ET/Single explicit tag (SET)	8
10.1.6.2	E/TV/ET/Multiple explicit tags (MET)	8
10.1.7	E/TV/Large tags (LT)	9
10.2	E/LV/Length variations (LV)	9
10.2.1	E/LV/INTEGER (I)	9
10.2.2	E/LV/BIT STRING (BS)	9
10.2.3	E/LV/OCTET STRING (OS)	9
10.2.4	E/LV/OBJECT IDENTIFIER (OI)	9
10.2.5	E/LV/SEQUENCE (SQ)	9
10.2.6	E/LV/SEQUENCE OF (SQQ)	9
10.2.7	E/LV/SET (ST)	9
10.2.8	E/LV/SET OF (STO)	9
10.2.9	E/TV/UT/ENUMERATED (EN)	9
10.2.10	E/TV/UT/REAL (R)	9

STANDARDSISO.COM · Click to View Full Text PDF ISO/IEC 10729-2:1995

11	Decoder Tests (D)	9
11.1	D/Encoding Variations (EV)	9
11.1.1	D/EV/Type variations (TV)	9
11.1.1.1	D/EV/TV/Universal tags (UT)	10
11.1.1.2	D/EV/TV/Application Tags (AT)	12
11.1.1.3	D/EV/TV/Context-specific Tags (CT)	12
11.1.1.4	D/EV/TV/Private Tags (PT)	12
11.1.2	D/EV/Length Encoding (LE)	12
11.1.2.1	D/EV/LE/Short Form (SF)	12
11.1.2.2	D/EV/LE/Long Form (LF)	12
11.1.2.3	D/EV/LE/Indefinite Form (IF)	14
11.1.3	D/EV/Contents Encoding (CE)	16
11.1.3.1	D/EV/CE/DEFAULT (D)	16
11.1.3.2	D/EV/CE/BOOLEAN (B)	19
11.1.3.3	D/EV/CE/BIT STRING (BS)	19
11.1.3.4	D/EV/CE/OCTET STRING (OS)	20
11.1.3.5	D/EV/CE/SET (ST)	21
11.1.3.6	D/EV/CE/SET OF (STO)	21
11.2	D/Invalid Presentation Syntax (SX)	21
11.2.1	D/SX/Invalid PDU Encoding (E)	21
11.2.1.1	D/SX/E/Invalid Tag (IT)	21
11.2.1.2	D/SX/E/Tag Field Overflow (TFO)	21
11.2.1.3	D/SX/E/Length Field Overflow (LFO)	22
11.2.1.4	D/SX/E/Contents Field Overflow (CFO)	22
11.2.1.5	D/SX/E/Contents Field Underflow (CFU)	22
11.2.1.6	D/SX/E/Missing End of Contents (ME)	23
11.2.1.7	D/SX/E/Length Rule Error (LRE)	23
11.2.2	D/SX/Invalid PDU Structure (S)	23
11.2.2.1	D/SX/S/Undefined Members (U)	23
11.2.2.2	D/SX/S/Omitted Members (O)	23
11.2.2.3	D/SX/S/Duplicated Members (D)	24
11.2.2.4	D/SX/S/Undefined ASN.1 Type (A)	24
11.2.3	D/SX/Invalid PDU Contents (C)	24
11.2.3.1	D/SX/C/NumericString (NS)	24
11.2.3.2	D/SX/C/PrintableString (PS)	24
11.2.3.3	D/SX/C/TeletexString (TS)	24
11.2.3.4	D/SX/C/VideotexString (VTS)	24
11.2.3.5	D/SX/C/VisibleString (VIS)	24
11.2.3.6	D/SX/C/IA5String (IS)	24
11.2.3.7	D/SX/C/GraphicString (GRS)	24
11.2.3.8	D/SX/C/GeneralString (GES)	24
11.2.3.9	D/SX/C/GeneralizedTime (GT)	25
11.2.3.10	D/SX/C/UTCTime (UT)	25
11.2.4	D/SX/Invalid Type Encoding (T)	25

11.2.4.1	D/SX/T/Invalid INTEGER (I)	25
11.2.4.2	D/SX/T/Invalid BIT STRING (BS)	25
11.2.4.3	D/SX/Invalid Object Identifier (IOI)	25
11.2.4.4	D/SX/T/Length 0 tagged ANY (L0ANY)	25
11.2.4.5	D/SX/TLength 0 tagged CHOICE (L0CHOICE)	25

STANDARDSISO.COM : Click to view the full PDF of ISO/IEC 10729-2:1995

Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

International Standard ISO/IEC 10729-2 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 21, *Open systems interconnection, data management and open distributed processing*.

ISO/IEC 10729 consists of the following parts, under the general title *Information technology — Open Systems Interconnection — Conformance test suite for the presentation layer*.

- Part 1: *Test suite structure and test purposes for the presentation protocol*
- Part 2: *Test suite structure and test purposes for the ASN.1 basic encodings*
- Part 3: *Common presentation abstract test suite*

Introduction

This part of ISO/IEC 10729 specifies a test suite structure and a set of test purposes for use by test suite specifiers as the basis for all standardized conformance test suites needed to evaluate conformance to the Basic Encoding Rules (BER) as defined in ISO/IEC 8825-1, for Abstract Syntax Notation One (ASN.1).

A fundamental objective of the related standardized conformance test suites is to establish uniform conformance testing and unambiguous evaluation procedures for checking the ability of the syntax transformation facility of a Presentation Layer implementation to operate according to ISO/IEC 8825-1. The standardization of these test suites should lead to comparability and wide acceptance of the test results produced by different test laboratories, and therefore minimize repeated conformance testing of the same implementation.

The conformance test suites based on this International Standard are designed for use by:

- a) test laboratories which provide a conformance testing service for the ASN.1 basic encoding rules;
- b) test realizers which provide a means of testing to be used by such test laboratories;
- c) implementors of ASN.1 BER encoding and/or decoding.

The purpose of conformance testing is to increase the probability that different implementations are able to interwork, although conformance testing alone cannot give a guarantee of interworking. Conformance testing increases the confidence that each implementation conforms to the encoding rules specification, by establishing that it has the required capabilities and that its behaviour conforms to the specification in representative instances of communication.

This page intentionally left blank

STANDARDSISO.COM : Click to view the full PDF of ISO/IEC 10729-2:1995

Information technology – Open Systems Interconnection – Conformance test suite for the presentation layer –

Part 2:

Test suite structure and test purposes for the ASN.1 basic encodings

1 Scope

This part of ISO/IEC 10729 specifies a test suite structure and test purposes for the whole of the ASN.1 basic encodings, as defined in ISO/IEC 8825-1. This part of ISO/IEC 10729 does not specify how the conformance tests are to be realized or used, nor how the test results are to be presented or used.

NOTE - The choice of test method may restrict the test purposes which can be realized.

The test suite structure and test purposes specified in this part of ISO/IEC 10729 form a generic framework for the specification of abstract test suites. Any compliant generic or abstract test suite needs to be based not only on this part of ISO/IEC 10729, but also on some identified abstract syntax which determines the specific ASN.1 types and values to be used in the abstract test cases associated with the test purposes defined in this part of ISO/IEC 10729.

NOTE - Since abstract test suites for ASN.1 encodings are based on abstract syntaxes, multiple generic or abstract test suites for ASN.1 encodings may be necessary for application contexts which contain more than one abstract syntax.

This part of ISO/IEC 10729 does not include a general assessment of performance, reliability or robustness of relevant protocol implementations, nor an assessment of the design of the ASN.1 BER encoder/decoder.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO/IEC 10729. At this time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO/IEC 10729 are encouraged to

investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO/IEC 7498-1 : 1994, *Information technology - Open Systems Interconnection - Basic Reference Model: The Basic Model.*

ISO/IEC 8822 : 1994, *Information technology - Open Systems Interconnection - Presentation service definition.*

ISO/IEC 8823-1 : 1994, *Information technology - Open Systems Interconnection - Connection-oriented presentation protocol: Protocol specification.*

ISO/IEC 8824-1 : -¹⁾, *Information technology - Open Systems Interconnection - Abstract Syntax Notation One (ASN.1) - Part 1: Specification of Basic Notation.*

ISO/IEC 8825-1 : -¹⁾, *Information technology - Open Systems Interconnection - Specification of ASN.1 Encoding Rules - Part 1: Basic Encoding Rules (BER).*

ISO/IEC 9646-1 : 1994, *Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 1: General concepts.*

ISO/IEC 9646-2 : 1994, *Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 2: Abstract Test Suite specification.*

3 Definitions

3.1 Reference model definitions

This part of ISO/IEC 10729 makes use of the following terms defined in ISO/IEC 7498-1:

- a) Presentation Layer;
- b) presentation-protocol-data-unit.

1) To be published.

3.2 Presentation service definitions

This part of ISO/IEC 10729 makes use of the following terms defined in ISO/IEC 8822:

- a) abstract syntax.

3.3 Conformance testing methodology and framework definitions

This part of ISO/IEC 10729 makes use of the following terms defined in ISO/IEC 9646-1:

- a) abstract test case;
- b) basic interconnection testing;
- c) behaviour testing;
- d) capabilities of an IUT;
- e) capability testing;
- f) conformance testing;
- g) conformance test suite;
- h) dynamic conformance requirements;
- i) implementation under test (IUT);
- j) inopportune test event;
- k) lower tester;
- l) PICS proforma;
- m) protocol implementation conformance statement (PICS);
- n) static conformance requirements;
- o) syntactically invalid test event;
- p) system under test (SUT)
- q) test group;
- r) test purpose;

4 Abbreviations

4.1 Data units

PPDU	presentation-protocol-data-unit
PSDU	presentation-service-data-unit

4.2 Other abbreviations

ASN.1	Abstract Syntax Notation One (see ISO/IEC 8824-1)
DCS	Defined Context Set
FU	Functional Unit
IUT	Implementation Under Test

LT Lower Tester

TSS & TP Test Suite Structure and Test Purposes

5 Compliance

An abstract test suite which complies with this part of ISO/IEC 10729 shall:

- a) identify which abstract syntax is used as the basis of the test suite;
- b) consist of a set of test cases corresponding to the set or a subset of the test purposes specified in clause 10;
- c) identify clearly the test purposes used;
- d) cover all the relevant test purposes specified in clause 10 as appropriate to the coverage and test method chosen for that test suite;
- e) augment the chosen test purposes by appropriate ASN.1 values selected from the identified abstract syntax;
- f) use a test suite structure which is an appropriate subset (or the whole) of the test suite structure specified in clause 7;
- g) name its test groups and test cases using the naming conventions specified in clause 8 in such a way that the test group and test case names used in clause 10 are used whenever relevant;
- h) maintain the relationships specified in clause 10 between the chosen test purposes and the entries in the PICS proforma to be used for test case selection;
- i) contain references to the PICS relevant for the identified abstract syntax;
- j) comply with ISO/IEC 9646-2.

6 Testing methodology

6.1 Introduction

The testing methodology used in this part of ISO/IEC 10729 complies with the requirements of ISO/IEC 9646-2.

6.2 Relationship between the TSS & TP and abstract test suites

The test purposes in this part of ISO/IEC 10729 have been derived from the basic encoding rules for ASN.1, ISO/IEC 8825-1. This derivation has focused on identifying test purposes to test conformance aspects of the protocol. However, no consideration

has been given to any testing method, how such test purposes may be realised, or any practical or economic constraints that may be placed on testing.

Adequate coverage of the test purposes specified in this part of ISO/IEC 10729 may, for an abstract syntax identified for the abstract test suite, require that multiple values with different types from that abstract syntax are selected for a single test purpose. Test of the encoding or decoding of these ASN.1 value may not be possible within a single test case. Therefore, this part of ISO/IEC 10729 maps all identified test purposes to leaf test groups. From any such leaf test groups representing test purposes, one or more abstract test cases may be derived.

It is intended that all abstract test suites for the basic encoding of ASN.1 shall include tests for all the test purposes in this part of ISO/IEC 10729. However, an abstract test suite specifier may subset the test purposes given in this part of ISO/IEC 10729 provided this is in compliance with ISO/IEC 9646-2, clause 10.

6.3 Test selection

Selection of the test cases appropriate for an IUT must be based on the contents of the PICS relevant for the abstract syntax used for the derivation of the abstract test suite.

Since application PICS do not clearly identify which ASN.1 types and/or values are affected by PICS entries, the specifier of the abstract test suite shall provide references to the application PICS in order to enable test case selection.

6.4 Verdicts

Verdicts assigned by each abstract test case are determined on the basis of the IUT's ability to behave in accordance with the requirements of the basic encoding rules for ASN.1 and to support the capabilities and parameter values listed in the relevant application PICS. Conformance assessment is based on the individual verdicts, the basic encoding rules for ASN.1 standard and the IUT's relevant application PICS.

6.5 Test suite coverage

Test purposes are specified and structured such that full coverage is provided for various forms of encoding of an ASN.1 type. The coverage with respect to the universe of ASN.1 values of such types as members of the identified abstract syntax is determined by the specifier of the abstract test suite through the selection of test cases for leaf test

groups, i.e. for those test groups which represent test purposes.

7 Test suite structure

The test suite for ASN.1 basic encoding rules consists of test groups and test cases. Each test case has a narrowly defined purpose. Within the test suite, nested test groups are used to provide a logical ordering of the test cases. Test groups may be nested to an arbitrary depth. They may be used to aid planning, development, understanding or execution of the test suite.

The test suite consists of two main test groups:

- a) Encoder Tests, which are used to verify that the IUT's encoding of ASN.1 values is valid with respect to the ASN.1 basic encoding rules and with respect to the relevant application PICS.
- b) Decoder Tests, which test the extend to which the IUT correctly decodes all ASN.1 encodings valid with respect to the ASN.1 basic encoding rules and with respect to the relevant application PICS, and detects as invalid such encodings which violate the ASN.1 basic encoding rules or the identified abstract syntax.

Each of these groups is further divided into a number of lower level subgroups. The complete structure of the major test groups is given below in figure 1.

8 Naming conventions

This clause describes the proformas that are used for test group objectives and test purposes. Two proformas are used as described below:

- a) The first proforma is used for a test group which has other test groups below it. It describes the objectives of the group and lists the subgroups below it. The proforma takes the form:

V.W.X.Y AA/BB/FUNCTION (FN)

[Reference: ISO/IEC 8825-1...]

Test group objective:

Subgroups:

1 Function One (F1)

2 Function Two (F2)

n Function n (Fn)

The first item (V.W.X.Y) is mandatory and is the formal clause number of the test group in this part of ISO/IEC 10729.

The second item (AA/BB/FUNCTION (FN)) is mandatory and is the symbolic name of the test group. Note that the final component of the name is given in full, followed by an abbreviation.

The third item is an optional reference to the relevant clause in the base standard. If no such reference is appropriate for the test group this item is omitted.

The fourth item is a mandatory natural language statement of the test group objective.

The fifth item is mandatory and consists of references to the subgroups contained within the group at the next level down.

- b) The second proforma is used for a test group which represents a set of test cases, each with a distinct value from an identified abstract syntax. It describes the objective of the group. The proforma takes the form:

V.W.X.Y AA/BB/FUNCTION (FN)

[Reference: ISO/IEC 8825-1...]

Test group objective:

The first item (V.W.X.Y.) is mandatory and is the formal clause number of the test group in this part of ISO/IEC 10729.

The second item (AA/BB/FUNCTION (FN)) is mandatory and is the symbolic name of the test group. Note that the final component of the name is given in full, followed by an abbreviation.

The third item is an optional reference to the relevant clause in the base standard. If no such reference is appropriate for the test group this item is omitted.

The fourth item is a mandatory natural language statement of the test group purpose.

9 Precedence

This part of ISO/IEC 10729 defines test purposes for the ASN.1 basic encoding (ISO/IEC 8825-1). It is not intended that this part of ISO/IEC 10729 should contradict or provide an interpretation of ISO/IEC 8825-1. In the case that there is a contradiction between this part of ISO/IEC 10729 and ISO/IEC 8825-1, this is an error and ISO/IEC 8825-1 takes precedence.

NOTE – Any person who, when making use of an International Standard, encounters an inaccuracy or ambiguity, is requested to notify their National Member Body of ISO/IEC without delay in order that the matter may be investigated and appropriate action taken.

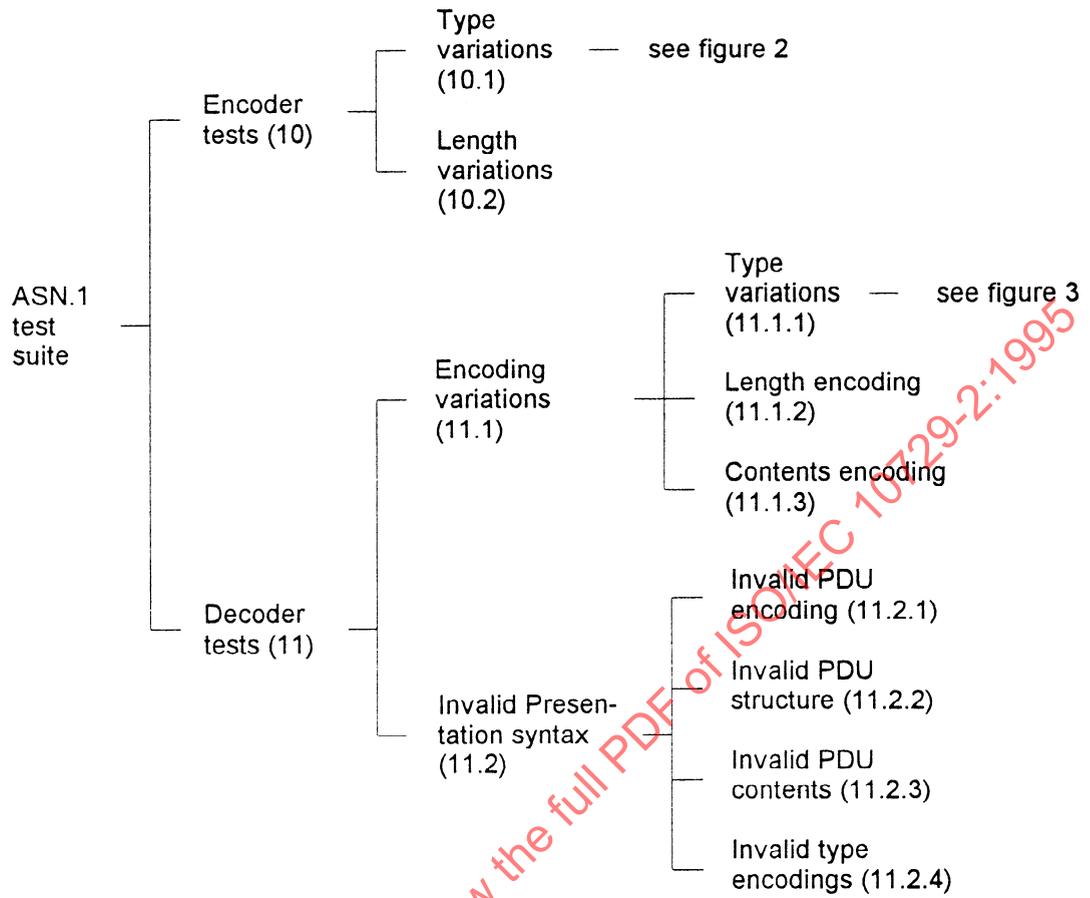


Figure 1 - ASN.1 test suite structure

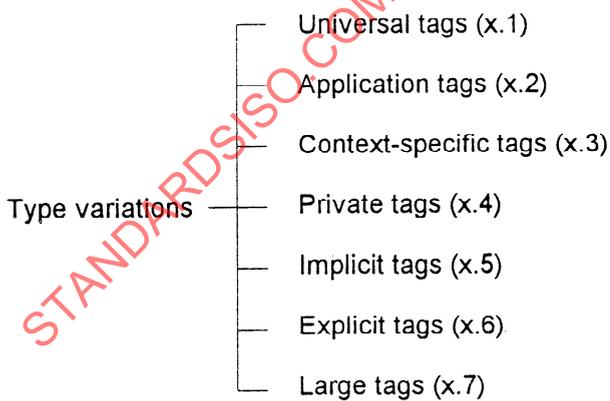


Figure 2 - Encoder Type variation tests

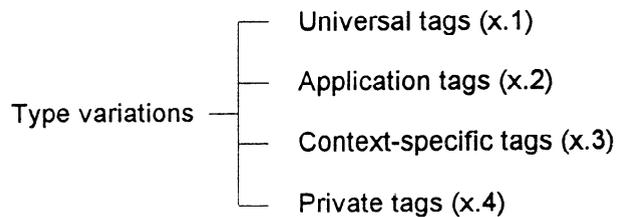


Figure 3 - Decoder Type variation tests

10 Encoder tests (E)

Test group objective: Test an implementation of an encoder of the basic encoding rules for ASN.1 as applied to PPDU user data parameters.

Tests are included to check that the implementation can encode any ASN.1 value from the identified abstract syntax.

No tests require a specific choice of encoding in the case where more than one encoding variation is valid.

Subgroups:

- 1 Type variations (TV)
- 2 Length variations (LV)

10.1 E/Type variations (TV)

Test group objective: To check values from all ASN.1 types within the identified abstract syntax. If possible at all, the values shall be chosen such that the implementation may use an encoding with short form of length octets.

NOTE - It is an option of the implementation to use the short form, the long form or (if applicable) the indefinite form of length octets.

Subgroups:

- 1 Universal tags (UT)
- 2 Application tags (AT)
- 3 Context-specific tags (CT)
- 4 Private tags (PT)
- 5 Implicit tags (IT)
- 6 Explicit tags (ET)
- 7 Large tags (LT)

10.1.1 E/TV/Universal tags (UT)

Test group objective: To check values from types with Universal tags.

Subgroups:

- 1 BOOLEAN (B)
- 2 INTEGER (I)
- 3 BIT STRING (BS)
- 4 OCTET STRING (OS)
- 5 NULL (N)
- 6 OBJECT IDENTIFIER (OI)

7 OBJECT DESCRIPTOR (OD)

8 EXTERNAL (E)

9 SEQUENCE (SQ)

10 SEQUENCE OF (SQO)

11 SET (ST)

12 SET OF (STO)

13 NumericString (NS)

14 PrintableString (PS)

15 TeletexString (TS)

16 VideotexString (VTS)

17 VisibleString (VIS)

18 IA5String (IS)

19 GraphicString (GRS)

20 GeneralString (GES)

21 GeneralizedTime (GT)

22 UTCTime (UT)

23 ENUMERATED (EN)

24 REAL (R)

10.1.1.1 E/TV/UT/BOOLEAN (B)

Test group objective: Check BOOLEAN.

Subgroups:

- 1 TRUE (T)
- 2 FALSE (F)

10.1.1.1.1 E/TV/UT/B/TRUE (T)

Test group objective: Check the value TRUE.

10.1.1.1.2 E/TV/UT/B/FALSE (F)

Test group objective: Check the value FALSE.

10.1.1.2 E/TV/UT/INTEGER (I)

Test group objective: Check INTEGER.

Subgroups:

- 1 Positive (P)
- 2 Negative (N)
- 3 Zero (Z)

10.1.1.2.1 E/TV/UT/II/Positive (P)

Test group objective: Check positive values, including at least one value that is greater than 127.

10.1.1.2.2 E/TV/UT/II/Negative (N)

Test group objective: Check negative values, including at least one value that is less than -128.

10.1.1.2.3 E/TV/UT/II/Zero (Z)

Test group objective: Check the value 0.

10.1.1.3 E/TV/UT/BIT STRING (BS)

Test group objective: Check BIT STRING.

Subgroups:

- 1 Empty (MT)
- 2 Octet-aligned (OA)
- 3 Unused Bits (UB)

10.1.1.3.1 E/TV/UT/BS/Empty (MT)

Test group objective: Check empty bitstring values.

10.1.1.3.2 E/TV/UT/BS/Octet-aligned (OA)

Test group objective: Check bitstring values where the number of bits in the value is a multiple of eight.

10.1.1.3.3 E/TV/UT/BS/Unused Bits (UB)

Test group objective: Check bitstring values where the number of bits in the value is not a multiple of eight.

10.1.1.4 E/TV/UT/OCTET STRING (OS)

Test group objective: Check OCTET STRING.

Subgroups:

- 1 Empty (MT)
- 2 Non-empty (NE)

10.1.1.4.1 E/TV/UT/OS/Empty (MT)

Test group objective: Check empty octetstring values.

10.1.1.4.2 E/TV/UT/OS/Non-empty (NE)

Test group objective: Check non-empty octetstring values.

10.1.1.5 E/TV/UT/NULL (N)

Test group objective: Check NULL

10.1.1.6 E/TV/UT/OBJECT IDENTIFIER (OI)

Test group objective: Check OBJECT IDENTIFIER

10.1.1.7 E/TV/UT/OBJECT DESCRIPTOR (OD)

Test group objective: Check OBJECT DESCRIPTOR

10.1.1.8 E/TV/UT/EXTERNAL (E)

Test group objective: Check EXTERNAL

10.1.1.9 E/TV/UT/SEQUENCE (SQ)

Test group objective: Check SEQUENCE

NOTE - Test purposes should be included within this test group in those cases where the syntax and semantic of the abstract syntax being tested allows all elements of the SEQUENCE to be omitted,

10.1.1.10 E/TV/UT/SEQUENCE OF (SQO)

Test group objective: Check SEQUENCE OF.

Subgroups:

- 1 Empty (MT)
- 2 Non-empty (NE)

10.1.1.10.1 E/TV/UT/SQO/Empty (MT)

Test group objective: Check empty sequence values.

10.1.1.10.2 E/TV/UT/SQO/Non-empty (NE)

Test group objective: Check non-empty sequence values.

10.1.1.11 E/TV/UT/SET (ST)

Test group objective: Check SET

NOTE - Test purposes should be included within this test group in those cases where the syntax and semantic of the abstract syntax being tested allows all elements of the SET to be omitted,

10.1.1.12 E/TV/UT/SET OF (STO)

Test group objective: Check SET OF

Subgroups:

- 1 Empty (MT)
- 2 Non-empty (NE)

10.1.1.12.1 E/TV/UT/STO/Empty (MT)

Test group objective: Check empty set-of values.

10.1.1.12.2 E/TV/UT/STO/Non-empty (NE)

Test group objective: Check non-empty set-of values.

10.1.1.13 E/TV/UT/NumericString (NS)

Test group objective: Check NumericString

10.1.1.14 E/TV/UT/PrintableString (PS)

Test group objective: Check PrintableString

10.1.1.15 E/TV/UT/TeletexString (TS)

Test group objective: Check TeletexString

10.1.1.16 E/TV/UT/VideotexString (VTS)

Test group objective: Check VideotexString

10.1.1.17 E/TV/UT/VisibleString (VIS)

Test group objective: Check VisibleString

10.1.1.18 E/TV/UT/IA5String (IS)

Test group objective: Check IA5String

10.1.1.19 E/TV/UT/GraphicString (GRS)

Test group objective: Check GraphicString

10.1.1.20 E/TV/UT/GeneralString (GES)

Test group objective: Check GeneralString

10.1.1.21 E/TV/UT/GeneralizedTime (GT)

Test group objective: Check GeneralizedTime

10.1.1.22 E/TV/UT/UTCTime (UT)

Test group objective: Check UTCTime

10.1.1.23 E/TV/UT/ENUMERATED (EN)

Test group objective: Check ENUMERATED

10.1.1.24 E/TV/UT/REAL (R)

Test group objective: Check REAL

10.1.2 E/TV/Application tags (AT)

Test group objective: Check any Application Tag which may be used in the identified abstract syntax. Values shall be chosen as in subgroup 10.1.1.

10.1.3 E/TV/Context-specific tags (CT)

Test group objective: Check any Context-specific Tag which may be used in the identified abstract syntax. Values shall be chosen as in subgroup 10.1.1.

10.1.4 E/TV/Private tags (PT)

Test group objective: Check any Private Tag which may be used in the identified abstract syntax. Values shall be chosen as in subgroup 10.1.1.

10.1.5 E/TV/Implicit tags (IT)

Test group objective: Ensure that implicit tags are correctly handled.

Subgroups:

1 Single implicit tag (SIT)

2 Multiple implicit tags (MIT)

10.1.5.1 E/TV/IT/Single implicit tag (SIT)

Test group objective: Test a single implicit tag.

10.1.5.2 E/TV/IT/Multiple implicit tags (MIT)

Test group objective: Test multiple implicit tags applied to a built-in ASN.1 type.

10.1.6 E/TV/Explicit tags (ET)

Test group objective: Ensure that explicit tags are correctly handled.

Subgroups:

1 Single explicit tag (SET)

2 Multiple explicit tags (MET)

10.1.6.1 E/TV/ET/Single explicit tag (SET)

Test group objective: Test a single explicit tag.

10.1.6.2 E/TV/ET/Multiple explicit tags (MET)

Test group objective: Test multiple explicit tags applied to a built-in ASN.1 type.

10.1.7 E/TV/Large tags (LT)

Test group objective: Ensure that tag numbers greater than 30 are encoded correctly, and that tags are encoded in the fewest number of octets necessary.

10.2 E/Length variations (LV)

Test group objective: Check that the implementation can generate valid length encodings for values which cannot be encoded with the short form of length octets

NOTE - It is an option of the implementation to use the long form or (if applicable) the indefinite form of length octets.

Subgroups:

- 1 INTEGER (I)
- 2 BIT STRING (BS)
- 3 OCTET STRING (OS)
- 4 OBJECT IDENTIFIER (OI)
- 5 SEQUENCE (SQ)
- 6 SEQUENCE OF (SQQ)
- 7 SET (ST)
- 8 SET OF (STO)
- 9 ENUMERATED (EN)
- 10 REAL (R)

10.2.1 E/LV/INTEGER (I)

Test group objective: Check INTEGER

NOTE - INTEGER values which cannot be encoded with short form of length octets must have at least 1016 binary digits. Most applications will probably not use such values.

10.2.2 E/LV/BIT STRING (BS)

Test group objective: Check BIT STRING

10.2.3 E/LV/OCTET STRING (OS)

Test group objective: Check OCTET STRING

10.2.4 E/LV/OBJECT IDENTIFIER (OI)

Test group objective: Check OBJECT IDENTIFIER

NOTE - Currently, no such OBJECT IDENTIFIER values have been assigned.

10.2.5 E/LV/SEQUENCE (SQ)

Test group objective: Check SEQUENCE

10.2.6 E/LV/SEQUENCE OF (SQQ)

Test group objective: Check SEQUENCE OF

10.2.7 E/LV/SET (ST)

Test group objective: Check SET

10.2.8 E/LV/SET OF (STO)

Test group objective: Check SET OF

10.2.9 E/TV/UT/ENUMERATED (EN)

Test group objective: Check ENUMERATED

10.2.10 E/TV/UT/REAL (R)

Test group objective: Check REAL

11 Decoder Tests (D)

Test group objective: Test an implementation of a decoder of the basic encoding rules for ASN.1 as applied to PPDU user data parameters.

Tests are included to check that the implementation can decode any ASN.1 value from the identified abstract syntax, irrespective of the choice of encoding in the case that more than one encoding variation is valid.

Tests are also included which check that the implementation reacts correctly on violations of the encoding rules.

Subgroups:

- 1 Encoding variations
- 2 Invalid ASN.1 Syntax

11.1 D/Encoding Variations (EV)

Test group objective: Check that the IUT accepts valid ASN.1 encoding variations

Subgroups:

- 1 Type variations (TV)
- 2 Length Encoding (LE)
- 3 Contents Encoding (CE)

11.1.1 D/EV/Type variations (TV)

Test group objective: To check values from all ASN.1 types within the identified abstract syntax. If possible at all, the values shall be encoded with short form of length octets.

Subgroups:

- 1 Universal tags (UT)
- 2 Application tags (AT)
- 3 Context-specific tags (CT)
- 4 Private Tags (PT)

11.1.1.1 D/EV/TV/Universal tags (UT)

Test group objective: To check values from types with Universal tags.

Subgroups:

- 1 BOOLEAN (B)
- 2 INTEGER (I)
- 3 BIT STRING (BS)
- 4 OCTET STRING (OS)
- 5 NULL (N)
- 6 OBJECT IDENTIFIER (OI)
- 7 OBJECT DESCRIPTOR (OD)
- 8 EXTERNAL (E)
- 9 SEQUENCE (SQ)
- 10 SEQUENCE OF (SQO)
- 11 SET (ST)
- 12 SET OF (STO)
- 13 NumericString (NS)
- 14 PrintableString (PS)
- 15 TeletexString (TS)
- 16 VideotexString (VTS)
- 17 VisibleString (VIS)
- 18 IA5String (IS)
- 19 GraphicString (GRS)
- 20 GeneralString (GES)
- 21 GeneralizedTime (GT)
- 22 UTCTime (UT)
- 23 ENUMERATED (EN)
- 24 REAL (R)

11.1.1.1.1 D/EV/TV/UT/BOOLEAN (B)

Test group objective: Check BOOLEAN.

Subgroups:

- 1 TRUE (T)

2 FALSE (F)

11.1.1.1.1.1 D/EV/TV/UT/B/TRUE (T)

Test group objective: Check some possible values for TRUE.

11.1.1.1.1.2 D/EV/TV/UT/B/FALSE (F)

Test group objective: Check the value FALSE.

11.1.1.1.2 D/EV/TV/UT/INTEGER (I)

Test group objective: Check INTEGER.

Subgroups:

- 1 Positive (P)
- 2 Negative (N)
- 3 Zero (Z)

11.1.1.1.2.1 D/EV/TV/UT/I/Positive (P)

Test group objective: Check positive values.

11.1.1.1.2.2 D/EV/TV/UT/I/Negative (N)

Test group objective: Check negative values.

11.1.1.1.2.3 D/EV/TV/UT/I/Zero (Z)

Test group objective: Check the value 0.

11.1.1.1.3 D/EV/TV/UT/BIT STRING (BS)

Test group objective: Check BIT STRING.

Subgroups:

- 1 Empty (MT)
- 2 Octet-aligned (OA)
- 3 Unused Bits (UB)

11.1.1.1.3.1 D/EV/TV/UT/BS/Empty (MT)

Test group objective: Check empty bitstring values.

11.1.1.1.3.2 D/EV/TV/UT/BS/Octet-aligned (OA)

Test group objective: Check bitstring values where the number of bits in the value is a multiple of eight.

11.1.1.1.3.3 D/EV/TV/UT/BS/Unused Bits (UB)

Test group objective: Check bitstring values where the number of bits in the value is not a multiple of eight.

11.1.1.1.4 D/EV/TV/UT/OCTET STRING (OS)**Test group objective:** Check OCTET STRING.**Subgroups:**

1 Empty (MT)

2 Non-empty (NE)

11.1.1.1.4.1 D/EV/TV/UT/OS/Empty (MT)**Test group objective:** Check empty octetstring values.**11.1.1.1.4.2 D/EV/TV/UT/OS/Non-empty (NE)****Test group objective:** Check non-empty octetstring values.**11.1.1.1.5 D/EV/TV/UT/NULL (N)****Test group objective:** Check NULL**11.1.1.1.6 D/EV/TV/UT/OBJECT IDENTIFIER (OI)****Test group objective:** Check OBJECT IDENTIFIER**11.1.1.1.7 D/EV/TV/UT/OBJECT DESCRIPTOR (OD)****Test group objective:** Check OBJECT DESCRIPTOR**11.1.1.1.8 D/EV/TV/UT/EXTERNAL (E)****Test group objective:** Check EXTERNAL**11.1.1.1.9 D/EV/TV/UT/SEQUENCE (SQ)****Test group objective:** Check SEQUENCE**11.1.1.1.10 D/EV/TV/UT/SEQUENCE OF (SQO)****Test group objective:** Check SEQUENCE OF**Subgroups:**

1 Empty (MT)

2 Non-empty (NE)

11.1.1.1.10.1 D/EV/TV/UT/SQO/Empty (MT)**Test group objective:** Check empty sequence values.**11.1.1.1.10.2 D/EV/TV/UT/SQO/Non-empty (NE)****Test group objective:** Check non-empty sequence values.**11.1.1.1.11 D/EV/TV/UT/SET (ST)****Test group objective:** Check SET**11.1.1.1.12 D/EV/TV/UT/SET OF (STO)****Test group objective:** Check SET OF**Subgroups:**

1 Empty (MT)

2 Non-empty (NE)

11.1.1.1.12.1 D/EV/TV/UT/STO/Empty (MT)**Test group objective:** Check empty set values.**11.1.1.1.12.2 D/EV/TV/UT/STO/Non-empty (NE)****Test group objective:** Check non-empty set values.**11.1.1.1.13 D/EV/TV/UT/NumericString (NS)****Test group objective:** Check NumericString**11.1.1.1.14 D/EV/TV/UT/PrintableString (PS)****Test group objective:** Check PrintableString**11.1.1.1.15 D/EV/TV/UT/TeletexString (TS)****Test group objective:** Check TeletexString**11.1.1.1.16 D/EV/TV/UT/VideotexString (VTS)****Test group objective:** Check VideotexString**11.1.1.1.17 D/EV/TV/UT/VisibleString (VIS)****Test group objective:** Check VisibleString**11.1.1.1.18 D/EV/TV/UT/IA5String (IS)****Test group objective:** Check IA5String**11.1.1.1.19 D/EV/TV/UT/GraphicString (GRS)****Test group objective:** Check GraphicString**11.1.1.1.20 D/EV/TV/UT/GeneralString (GES)****Test group objective:** Check GeneralString**11.1.1.1.21 D/EV/TV/UT/GeneralizedTime (GT)****Test group objective:** Check GeneralizedTime**11.1.1.1.22 D/EV/TV/UT/UTCTime (UT)****Test group objective:** Check UTCTime

11.1.1.1.23 E/TV/UT/ENUMERATED (EN)

10 ENUMERATED (EN)

Test group objective: Check ENUMERATED

11 REAL (R)

11.1.1.1.24 E/TV/UT/REAL (R)**Test group objective:** Check REAL**11.1.2.1.1 D/EV/LE/SF/BOOLEAN (B)****Test group objective:** Check BOOLEAN**11.1.1.2 D/EV/TV/Application Tags (AT)****Test group objective:** Check any Application Tag which may be used in the identified abstract syntax. Values shall be chosen as in subgroup 11.1.1.1.**11.1.2.1.2 D/EV/LE/SF/INTEGER (I)****Test group objective:** Check INTEGER**11.1.2.1.3 D/EV/LE/SF/BIT STRING (BS)****Test group objective:** Check BIT STRING**11.1.1.3 D/EV/TV/Context-specific Tags (CT)****Test group objective:** Check any Context-specific Tag which may be used in the identified abstract syntax. Values shall be chosen as in subgroup 11.1.1.1.**11.1.2.1.4 D/EV/LE/SF/OCTET STRING (OS)****Test group objective:** Check OCTET STRING**11.1.2.1.5 D/EV/LE/SF/OBJECT IDENTIFIER (OI)****Test group objective:** Check OBJECT IDENTIFIER**11.1.1.4 D/EV/TV/Private Tags (PT)****Test group objective:** Check any Private Tag which may be used in the identified abstract syntax. Values shall be chosen as in subgroup 11.1.1.1.**11.1.2.1.6 D/EV/LE/SF/SEQUENCE (SQ)****Test group objective:** Check SEQUENCE**11.1.2 D/EV/Length Encoding (LE)****Test group objective:** Check variations in the length octets.**11.1.2.1.7 D/EV/LE/SF/SEQUENCE OF (SQU)****Test group objective:** Check SEQUENCE OF**Subgroups:**

- 1 Short Form (SF)
- 2 Long Form (LF)
- 3 Indefinite Form (IF)

11.1.2.1.8 D/EV/LE/SF/SET (ST)**Test group objective:** Check SET**11.1.2.1 D/EV/LE/Short Form (SF)****Test group objective:** Check short form length encoding**11.1.2.1.9 D/EV/LE/SF/SET OF (STO)****Test group objective:** Check SET OF**Subgroups:**

- 1 BOOLEAN (B)
- 2 INTEGER (I)
- 3 BIT STRING (BS)
- 4 OCTET STRING (OS)
- 5 OBJECT IDENTIFIER (OI)
- 6 SEQUENCE (SQ)
- 7 SEQUENCE OF (SQU)
- 8 SET (ST)
- 9 SET OF (STO)

11.1.2.1.10 E/TV/UT/ENUMERATED (EN)**Test group objective:** Check ENUMERATED**11.1.2.1.11 E/TV/UT/REAL (R)****Test group objective:** Check REAL**11.1.2.2 D/EV/LE/Long Form (LF)****Test group objective:** Check long form length encoding.

Redundant length octets are length octets whose first eight bits are all 0'

Subgroups:

- 1 containing redundant length octets (WRO)
- 2 containing no redundant length octets (NRO)

11.1.2.2.1 D/EV/LE/LF/With Redundant Length Octets (WRO)

Test group objective: Check long form length encoding containing redundant length octets.

Subgroups:

- 1 BOOLEAN (B)
- 2 INTEGER (I)
- 3 BIT STRING (BS)
- 4 OCTET STRING (OS)
- 5 OBJECT IDENTIFIER (OI)
- 6 SEQUENCE (SQ)
- 7 SEQUENCE OF (SQO)
- 8 SET (ST)
- 9 SET OF (STO)
- 10 ENUMERATED (EN)
- 11 REAL (R)

11.1.2.2.1.1 D/EV/LE/LF/WRO/BOOLEAN (B)

Test group objective: Check BOOLEAN

11.1.2.2.1.2 D/EV/LE/LF/WRO/INTEGER (I)

Test group objective: Check INTEGER

11.1.2.2.1.3 D/EV/LE/LF/WRO/BIT STRING (BS)

Test group objective: Check BIT STRING

11.1.2.2.1.4 D/EV/LE/LF/WRO/OCTET STRING (OS)

Test group objective: Check OCTET STRING

11.1.2.2.1.5 D/EV/LE/LF/WRO/OBJECT IDENTIFIER (OI)

Test group objective: Check OBJECT IDENTIFIER

11.1.2.2.1.6 D/EV/LE/LF/WRO/SEQUENCE (SQ)

Test group objective: Check SEQUENCE

11.1.2.2.1.7 D/EV/LE/LF/WRO/SEQUENCE OF (SQO)

Test group objective: Check SEQUENCE OF

11.1.2.2.1.8 D/EV/LE/LF/WRO/SET (ST)

Test group objective: Check SET

11.1.2.2.1.9 D/EV/LE/LF/WRO/SET OF (STO)

Test group objective: Check SET OF

11.1.2.2.1.10 E/TV/UT/ENUMERATED (EN)

Test group objective: Check ENUMERATED

11.1.2.2.1.11 E/TV/UT/REAL (R)

Test group objective: Check REAL

11.1.2.2.2 D/EV/LE/LF/No Redundant Length Octets (NRO)

Test group objective: Check long form length encoding containing no redundant length octets.

Subgroups:

- 1 BOOLEAN (B)
- 2 INTEGER (I)
- 3 BIT STRING (BS)
- 4 OCTET STRING (OS)
- 5 OBJECT IDENTIFIER (OI)
- 6 SEQUENCE (SQ)
- 7 SEQUENCE OF (SQO)
- 8 SET (ST)
- 9 SET OF (STO)
- 10 ENUMERATED (EN)
- 11 REAL (R)

11.1.2.2.2.1 D/EV/LE/LF/NRO/BOOLEAN (B)

Test group objective: Check BOOLEAN

11.1.2.2.2.2 D/EV/LE/LF/NRO/INTEGER (I)

Test group objective: Check INTEGER

11.1.2.2.2.3 D/EV/LE/LF/NRO/BIT STRING (BS)

Test group objective: Check BIT STRING

11.1.2.2.2.4 D/EV/LE/LF/NRO/OCTET STRING (OS)

Test group objective: Check OCTET STRING

11.1.2.2.2.5 D/EV/LE/LF/NRO/OBJECT IDENTIFIER (OI)	11.1.2.3.1.1 D/EV/LE/IF/SQ/Non Embedded (ENO)
Test group objective: Check OBJECT IDENTIFIER	Test group objective: Check a SEQUENCE not embedded, with a length field encoded in indefinite form (i.e. the first length field in a PDU, if PDU is of type SEQUENCE)
11.1.2.2.2.6 D/EV/LE/LF/NRO/SEQUENCE (SQ)	11.1.2.3.1.2 D/EV/LE/IF/SQ/Embedded in Definite Form (EDF)
Test group objective: Check SEQUENCE	Test group objective: Check a SEQUENCE embedded in a structured type with a length field encoded in definite form.
11.1.2.2.2.7 D/EV/LE/LF/NRO/SEQUENCE OF (SQO)	11.1.2.3.1.3 D/EV/LE/IF/SQ/Embedded in Indefinite Form (EIF)
Test group objective: Check SEQUENCE OF	Test group objective: Check a SEQUENCE embedded in a structured type with a length field encoded in indefinite form
11.1.2.2.2.8 D/EV/LE/LF/NRO/SET (ST)	11.1.2.3.2 D/EV/LE/IF/SEQUENCE OF (SQO)
Test group objective: Check SET	Test group objective: Check SEQUENCE OF
11.1.2.2.2.9 D/EV/LE/LF/NRO/SET OF (STO)	Subgroups:
Test group objective: Check SET OF	1 Non Embedded (ENO)
11.1.2.2.2.10 E/TV/UT/ENUMERATED (EN)	2 Embedded in Definite Form (EDF)
Test group objective: Check ENUMERATED	3 Embedded in Indefinite Form (EIF)
11.1.2.2.2.11 E/TV/UT/REAL (R)	11.1.2.3.2.1 D/EV/LE/IF/SQO/Non Embedded (ENO)
Test group objective: Check REAL	Test group objective: Check a SEQUENCE OF not embedded, with a length field encoded in indefinite form (i.e. the first length field of a PDU, if PDU is of type SEQUENCE OF)
11.1.2.3 D/EV/LE/Indefinite Form (IF)	11.1.2.3.2.2 D/EV/LE/IF/SQO/Embedded in Definite Form (EDF)
Test group objective: Check indefinite form of length encoding	Test group objective: Check a SEQUENCE OF embedded in a structured type with a length field encoded in definite form.
Subgroups:	11.1.2.3.2.3 D/EV/LE/IF/SQO/Embedded in Indefinite Form (EIF)
1 SEQUENCE (SQ)	Test group objective: Check a SEQUENCE OF embedded in a structured type with a length field encoded in indefinite form
2 SEQUENCE OF (SQO)	
3 SET (ST)	
4 SET OF (STO)	
5 BIT STRING (BS)	
6 OCTET STRING (OS)	
7 Explicitly tagged types (ET)	
11.1.2.3.1 D/EV/LE/IF/SEQUENCE (SQ)	
Test group objective: Check SEQUENCE	
Subgroups:	
1 Non Embedded (ENO)	
2 Embedded in Definite Form (EDF)	
3 Embedded in Indefinite Form (EIF)	

11.1.2.3.3 D/EV/LE/IF/SET (ST)**Test group objective:** Check SET**Subgroups:**

- 1 Non Embedded (ENO)
- 2 Embedded in Definite Form (EDF)
- 3 Embedded in Indefinite Form (EIF)

11.1.2.3.3.1 D/EV/LE/IF/ST/Non Embedded (ENO)**Test group objective:** Check a SET not embedded, with a length field encoded in indefinite form (i.e. the first length field in a PDU, if PDU is of type SET)**11.1.2.3.3.2 D/EV/LE/IF/ST/Embedded in Definite Form (EDF)****Test group objective:** Check a SET embedded in a structured type with a length field encoded in definite form.**11.1.2.3.3.3 D/EV/LE/IF/ST/Embedded in Indefinite Form (EIF)****Test group objective:** Check a SET embedded in a structured type with a length field encoded in indefinite form**11.1.2.3.4 D/EV/LE/IF/SET OF (STO)****Test group objective:** Check SET OF**Subgroups:**

- 1 Non Embedded (ENO)
- 2 Embedded in Definite Form (EDF)
- 3 Embedded in Indefinite Form (EIF)

11.1.2.3.4.1 D/EV/LE/IF/STO/Non Embedded (ENO)**Test group objective:** Check a SET OF not embedded, with a length field encoded in indefinite form (i.e. the first length field in a PDU, if PDU is of type SET OF)**11.1.2.3.4.2 D/EV/LE/IF/STO/Embedded in Definite Form (EDF)****Test group objective:** Check a SET OF embedded in a structured type with a length field encoded in definite form.**11.1.2.3.4.3 D/EV/LE/IF/STO/Embedded in Indefinite Form (EIF)****Test group objective:** Check a SET OF embedded in a structured type with a length field encoded in indefinite form**11.1.2.3.5 D/EV/LE/IF/BIT STRING (BS)****Test group objective:** Check BIT String**Subgroups:**

- 1 Non Embedded (ENO)
- 2 Embedded in Definite Form (EDF)
- 3 Embedded in Indefinite Form (EIF)

11.1.2.3.5.1 D/EV/LE/IF/BS/Non Embedded (ENO)**Test group objective:** Check a BIT STRING that is not embedded, with the length field of the outermost level of nesting of the segmented BIT STRING encoded in indefinite form (i.e. the first length field in the PDU which is of type BIT STRING).**11.1.2.3.5.2 D/EV/LE/IF/BS/Embedded in Definite Form (EDF)****Test group objective:** Check a BIT STRING that is embedded within a structured type, with the length field of the outermost level of nesting of the segmented BIT STRING encoded in the indefinite form and the length field of the enclosing structured type encoded using the definite length form.**11.1.2.3.5.3 D/EV/LE/IF/BS/Embedded in Indefinite Form (EIF)****Test group objective:** Check a BIT STRING that is embedded within a structured type, with the length field of the outermost level of nesting of the segmented BIT STRING encoded in the indefinite form and the length field of the enclosing structured type encoded using the indefinite length form.**11.1.2.3.6 D/EV/LE/IF/OCTET STRING (OS)****Test group objective:** Check OCTET STRING**Subgroups:**

- 1 Non Embedded (ENO)
- 2 Embedded in Definite Form (EDF)
- 3 Embedded in Indefinite Form (EIF)

11.1.2.3.6.1 D/EV/LE/IF/OS/Non Embedded (ENO)

Test group objective: Check an OCTET STRING that is not embedded, with the length field of the outermost level of nesting of the segmented OCTET STRING encoded in indefinite form (i.e. the first length field in the PDU which is of type OCTET STRING).

11.1.2.3.6.2 D/EV/LE/IF/OS/Embedded in Definite Form (EDF)

Test group objective: Check an OCTET STRING that is embedded within a structured type, with the length field of the outermost level of nesting of the segmented OCTET STRING encoded in the indefinite form and the length field of the enclosing structured type encoded using the definite length form.

11.1.2.3.6.3 D/EV/LE/IF/OS/Embedded in Indefinite Form (EIF)

Test group objective: Check an OCTET STRING that is embedded within a structured type, with the length field of the outermost level of nesting of the segmented OCTET STRING encoded in the indefinite form and the length field of the enclosing structured type encoded using the indefinite length form.

11.1.2.3.7 D/EV/LE/IF/Explicitly tagged type (ET)

Test group objective: Check explicitly tagged type

Subgroups:

- 1 Non Embedded (ENO)
- 2 Embedded in Definite Form (EDF)
- 3 Embedded in Indefinite Form (EIF)

11.1.2.3.7.1 D/EV/LE/IF/ET/Non Embedded (ENO)

Test group objective: Check an explicitly tagged type that is not embedded, with the length field of the outermost tag encoded in indefinite form.

11.1.2.3.7.2 D/EV/LE/IF/ET/Embedded in Definite Form (EDF)

Test group objective: Check an explicitly tagged type that is embedded within a structured type, with the length field of the outermost level of explicitly tagged type encoded in the indefinite form and the length field of the enclosing structured type encoded using the definite length form.

11.1.2.3.7.3 D/EV/LE/IF/ET/Embedded in Indefinite Form (EIF)

Test group objective: Check an explicitly tagged type that is embedded within a structured type, with the length field of the outermost level of explicitly tagged type encoded in the indefinite form and the length field of the enclosing structured type encoded using the indefinite length form.

11.1.3 D/EV/Contents Encoding (CE)

Test group objective: Check valid encoding variations in the contents octets

Subgroups:

- 1 DEFAULT (D)
- 2 BOOLEAN (B)
- 3 BIT STRING (BS)
- 4 OCTET STRING (OS)
- 5 SET (ST)
- 6 SET OF (STO)

11.1.3.1 D/EV/CE/DEFAULT (D)

Test group objective: Check DEFAULT encoding variations

Subgroups:

- 1 BOOLEAN (B)
- 2 INTEGER (I)
- 3 BIT STRING (BS)
- 4 OCTET STRING (OS)
- 5 OBJECT IDENTIFIER (OI)
- 6 SEQUENCE (SQ)
- 7 SEQUENCE OF (SQO)
- 8 SET (ST)
- 9 SET OF (STO)

11.1.3.1.1 D/EV/CE/D/BOOLEAN (B)**Test group objective:** Check BOOLEAN**Subgroups:**

- 1 Different from DEFAULT (DIF)
- 2 Include (INC)
- 3 Omit (OM)

11.1.3.1.1.1 D/EV/CE/D/B/Different from DEFAULT (DIF)**Test group objective:** Check that IUT accepts a value different from the default value included in the encoding.**11.1.3.1.1.2 D/EV/CE/D/B/Include (INC)****Test group objective:** Check that IUT accepts the default value included in the encoding.**11.1.3.1.1.3 D/EV/CE/D/B/Omit (OM)****Test group objective:** Check that IUT accepts the absence of the value for a type that has a DEFAULT value.**11.1.3.1.2 D/EV/CE/D/INTEGER (I)****Test group objective:** Check INTEGER**Subgroups:**

- 1 Different from DEFAULT (DIF)
- 2 Include (INC)
- 3 Omit (OM)

11.1.3.1.2.1 D/EV/CE/D/I/Different from DEFAULT (DIF)**Test group objective:** Check that IUT accepts a value different from the default value included in the encoding.**11.1.3.1.2.2 D/EV/CE/D/I/Include (INC)****Test group objective:** Check that IUT accepts the default value included in the encoding.**11.1.3.1.2.3 D/EV/CE/D/I/Omit (OM)****Test group objective:** Check that IUT accepts the absence of the value for a type that has a DEFAULT value.**11.1.3.1.3 D/EV/CE/D/BIT STRING (BS)****Test group objective:** Check BIT STRING**Subgroups:**

- 1 Different from DEFAULT (DIF)
- 2 Include (INC)
- 3 Omit (OM)

11.1.3.1.3.1 D/EV/CE/D/BS/Different from DEFAULT (DIF)**Test group objective:** Check that IUT accepts a value different from the default value included in the encoding.**11.1.3.1.3.2 D/EV/CE/D/BS/Include (INC)****Test group objective:** Check that IUT accepts the default value included in the encoding.**11.1.3.1.3.3 D/EV/CE/D/BS/Omit (OM)****Test group objective:** Check that IUT accepts the absence of the value for a type that has a DEFAULT value.**11.1.3.1.4 D/EV/CE/D/OBJECT IDENTIFIER (OI)****Test group objective:** Check OBJECT IDENTIFIER**Subgroups:**

- 1 Different from DEFAULT (DIF)
- 2 Include (INC)
- 3 Omit (OM)

11.1.3.1.4.1 D/EV/CE/D/OI/Different from DEFAULT (DIF)**Test group objective:** Check that IUT accepts a value different from the default value included in the encoding.**11.1.3.1.4.2 D/EV/CE/D/OI/Include (INC)****Test group objective:** Check that IUT accepts the default value included in the encoding.**11.1.3.1.4.3 D/EV/CE/D/OI/Omit (OM)****Test group objective:** Check that IUT accepts the absence of the value for a type that has a DEFAULT value.

11.1.3.1.5 D/EV/CE/D/OCTET STRING (OS)**Test group objective:** Check OCTET STRING**Subgroups:**

- 1 Different from DEFAULT (DIF)
- 2 Include (INC)
- 3 Omit (OM)

11.1.3.1.5.1 D/EV/CE/D/OS/Different from DEFAULT (DIF)**Test group objective:** Check that IUT accepts a value different from the default value included in the encoding.**11.1.3.1.5.2 D/EV/CE/D/OS/Include (INC)****Test group objective:** Check that IUT accepts the default value included in the encoding.**11.1.3.1.5.3 D/EV/CE/D/OS/Omit (OM)****Test group objective:** Check that IUT accepts the absence of the value for a type that has a DEFAULT value.**11.1.3.1.6 D/EV/CE/D/SEQUENCE (SQ)****Test group objective:** Check SEQUENCE**Subgroups:**

- 1 Different from DEFAULT (DIF)
- 2 Include (INC)
- 3 Omit (OM)

11.1.3.1.6.1 D/EV/CE/D/SQ/Different from DEFAULT (DIF)**Test group objective:** Check that IUT accepts a value different from the default value included in the encoding.**11.1.3.1.6.2 D/EV/CE/D/SQ/Include (INC)****Test group objective:** Check that IUT accepts the default value included in the encoding.**11.1.3.1.6.3 D/EV/CE/D/SQ/Omit (OM)****Test group objective:** Check that IUT accepts the absence of the value for a type that has a DEFAULT value.**11.1.3.1.7 D/EV/CE/D/SEQUENCE OF (SQO)****Test group objective:** Check SEQUENCE OF**Subgroups:**

- 1 Different from DEFAULT (DIF)
- 2 Include (INC)
- 3 Omit (OM)

11.1.3.1.7.1 D/EV/CE/D/SQO/Different from DEFAULT (DIF)**Test group objective:** Check that IUT accepts a value different from the default value included in the encoding.**11.1.3.1.7.2 D/EV/CE/D/SQO/Include (INC)****Test group objective:** Check that IUT accepts the default value included in the encoding.**11.1.3.1.7.3 D/EV/CE/D/SQO/Omit (OM)****Test group objective:** Check that IUT accepts the absence of the value for a type that has a DEFAULT value.**11.1.3.1.8 D/EV/CE/D/SET (ST)****Test group objective:** Check SET**Subgroups:**

- 1 Different from DEFAULT (DIF)
- 2 Include (INC)
- 3 Omit (OM)

11.1.3.1.8.1 D/EV/CE/D/ST/Different from DEFAULT (DIF)**Test group objective:** Check that IUT accepts a value different from the default value included in the encoding.**11.1.3.1.8.2 D/EV/CE/D/ST/Include (INC)****Test group objective:** Check that IUT accepts the default value included in the encoding.**11.1.3.1.8.3 D/EV/CE/D/ST/Omit (OM)****Test group objective:** Check that IUT accepts the absence of the value for a type that has a DEFAULT value.

11.1.3.1.9 D/EV/CE/D/SET OF (STO)**Test group objective:** Check SET OF**Subgroups:**

- 1 Different from DEFAULT (DIF)
- 2 Include (INC)
- 3 Omit (OM)

11.1.3.1.9.1 D/EV/CE/D/STO/Different from DEFAULT (DIF)**Test group objective:** Check that IUT accepts a value different from the default value included in the encoding.**11.1.3.1.9.2 D/EV/CE/D/STO/Include (INC)****Test group objective:** Check that IUT accepts the default value included in the encoding.**11.1.3.1.9.3 D/EV/CE/D/STO/Omit (OM)****Test group objective:** Check that IUT accepts the absence of the value for a type that has a DEFAULT value.**11.1.3.2 D/EV/CE/BOOLEAN (B)****Test group objective:** Check variations on the encoding of the BOOLEAN value TRUE.

NOTE - Test group 11.1.1.1 does already contain tests for the value FALSE and for some encoding of the value TRUE.

11.1.3.3 D/EV/CE/BIT STRING (BS)**Test group objective:** Check variations on the encoding of BIT STRINGS.**Subgroups:**

- 1 Constructed (CS)
- 2 Redundant Trailing Bits (TB)

11.1.3.3.1 D/EV/CE/BS/Constructed (CS)**Test group objective:** Check variations on the nesting level and the segmentation of constructed BIT STRING encodings.**Subgroups:**

- 1 Nesting Level 1 (N1)
- 2 Nesting Level 2 (N2)
- 3 Arbitrary Nesting Level (NA)

11.1.3.3.1.1 D/EV/CE/BS/CS/Nesting Level 1 (N1)**Test group objective:** Check a constructed BIT STRING which has only components with primitive encoding.**Subgroups:**

- 1 Single Data Value (SV)
- 2 Multiple Data Values (MV)

11.1.3.3.1.1.1 D/EV/CE/BS/CS/N1/Single Data Value (SV)**Test group objective:** Check the case where the whole BIT STRING value is encoded in a single data value encoding.**Subgroups:**

- 1 Single Component (SC)
- 2 Empty Start (ES)
- 3 Empty End (EE)

11.1.3.3.1.1.1.1 D/EV/CE/BS/CS/N1/SV/Single Component (SC)**Test group objective:** Check the case where the constructed BIT STRING has only a single component.**11.1.3.3.1.1.1.2 D/EV/CE/BS/CS/N1/SV/Empty Start (ES)****Test group objective:** Check the case where the first component is a zero-length bitstring.**11.1.3.3.1.1.1.3 D/EV/CE/BS/CS/N1/SV/Empty End (EE)****Test group objective:** Check the case where the last component is a zero-length bitstring.**11.1.3.3.1.1.2 D/EV/CE/BS/CS/N1/Multiple Data Values (MV)****Test group objective:** Check the case where the bits of the BIT STRING value are split across multiple data values.**Subgroups:**

- 1 No Empty (NE)
- 2 Empty Start (ES)
- 3 Empty End (EE)
- 4 Empty Middle (EM)

11.1.3.3.1.1.2.1 D/EV/CE/BS/CS/N1/MV/No Empty (NE)

Test group objective: Check the case where no zero-length bitstrings are included.

11.1.3.3.1.1.2.2 D/EV/CE/BS/CS/N1/MV/Empty Start (ES)

Test group objective: Check the case where the first component is a zero-length bitstring.

11.1.3.3.1.1.2.3 D/EV/CE/BS/CS/N1/MV/Empty End (EE)

Test group objective: Check the case where the last component is a zero-length bitstring.

11.1.3.3.1.1.2.4 D/EV/CE/BS/CS/N1/MV/Empty Middle (M)

Test group objective: Check the case where some middle component is a zero-length bitstring.

11.1.3.3.1.2 D/EV/CE/BS/CS/Nesting Level 2 (N2)

Test group objective: Check a constructed BIT STRING which has at least one constructed component which in turn has only primitive components.

11.1.3.3.1.3 D/EV/CE/BS/CS/Arbitrary Nesting Level (NA)

Test group objective: Check a constructed BIT STRING which has at least one constructed component which in turn has at least one constructed component.

11.1.3.3.2 D/EV/CE/BS/Redundant Trailing Bits (TB)

Test group objective: Check Bit Strings containing redundant trailing bits, i.e. Bit Strings containing 0 trailing bits of a Bit String whose definition includes a NamedBitList.

11.1.3.4 D/EV/CE/OCTET STRING (OS)

Test group objective: Check variation on the nesting level and the segmentation of constructed OCTET STRING encodings.

Subgroups:

- 1 Nesting Level 1 (N1)
- 2 Nesting Level 2 (N2)
- 3 Arbitrary Nesting Level (NA)

11.1.3.4.1 D/EV/CE/OS/Nesting Level 1 (N1)

Test group objective: Check a constructed OCTET STRING which has only components with primitive encoding.

Subgroups:

- 1 Single Data Value (SV)
- 2 Multiple Data Values (MV)

11.1.3.4.1.1 D/EV/CE/OS/N1/Single Data Value (SV)

Test group objective: Check the case where the whole OCTET STRING value is encoded in a single data value encoding.

Subgroups:

- 1 Single Component (SC)
- 2 Empty Start (ES)
- 3 Empty End (EE)

11.1.3.4.1.1.1 D/EV/CE/OS/N1/SV/Single Component (SC)

Test group objective: Check the case where the constructed OCTET STRING has only a single component.

11.1.3.4.1.1.2 D/EV/CE/OS/N1/SV/Empty Start (ES)

Test group objective: Check the case where the first component is a zero-length octet string.

11.1.3.4.1.1.3 D/EV/CE/OS/N1/SV/Empty End (EE)

Test group objective: Check the case where the last component is a zero-length octet string.

11.1.3.4.1.2 D/EV/CE/OS/N1/Multiple Data Values (MV)

Test group objective: Check the case where the octets of the OCTET STRING value are split across multiple data values.

Subgroups:

- 1 No Empty (NE)
- 2 Empty Start (ES)
- 3 Empty End (EE)
- 4 Empty Middle (EM)