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Methods for Testing and Specification (MTS);
TTCN-3 Conformance Test Suite
for use of XML and JSON schema;
Test Suite Structure and Test Purposes (TSS&TP)

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Contents

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Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Methods for Testing and Specification (MTS).

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the ETSI Drafting Rules (Verbal forms for the expression of provisions).

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1 Scope

The purpose of the present document is to provide Test Suite Structure and Test Purposes (TSS&TP) for the conformance test suite for using XML and JSON Schema with TTCN-3 as defined in ETSI ES 201 873-1 [5] in compliance with the relevant guidance given in the pro forma for TTCN-3 reference test suite ETSI TS 102 995 [4]. In the present document only XML and JSON related features, specified in ETSI ES 201 873-9 [1] and ETSI ES 201 873-11 [6] have been considered, but not the core language features (see ETSI ES 201 873-1 [5]), nor tool implementation (see ETSI ES 201 873-5 [i.2] and ETSI ES 201 873-6 [i.3]), language mapping (see ETSI ES 201 873-7 [i.4] and ETSI ES 201 873-8 [i.5]) and language extension (see e.g. ETSI ES 202 781 [i.6], ETSI ES 202 784 [i.7] and ETSI ES 202 785 [i.8]) aspects.

2 References

2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at https://docbox.etsi.org/Reference/.

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The following referenced documents are necessary for the application of the present document.

[1] ETSI ES 201 873-9: "Methods for Testing and Specification (MTS); The Testing and Test Control Notation version 3; Part 9: Using XML schema with TTCN-3".

[2] ISO/IEC 9646-1 (1992): "Information Technology - Open Systems Interconnection - Conformance Testing Methodology and Framework - Part 1: General concepts".

[3] ISO/IEC 9646-7 (1995): "Information Technology - Open Systems Interconnection -Conformance testing methodology and framework - Part 7: Implementation Conformance Statements".

[4] ETSI TS 102 995: "Methods for Testing and Specification (MTS); The Testing and Test Control Notation version 3; Proforma for TTCN-3 reference test suite".

[5] ETSI ES 201 873-1: "Methods for Testing and Specification (MTS); The Testing and Test Control Notation version 3; Part 1: TTCN-3 Core Language".

[6] ETSI ES 201 873-11 (V4.7.1): "Methods for Testing and Specification (MTS); The Testing and Test Control Notation version 3; Part 11: Using JSON with TTCN-3".

2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

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The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

[i.1] Void.

[i.2] ETSI ES 201 873-5: "Methods for Testing and Specification (MTS); The Testing and Test Control Notation version 3; Part 5: TTCN-3 Runtime Interface (TRI)".

[i.3] ETSI ES 201 873-6: "Methods for Testing and Specification (MTS); The Testing and Test Control Notation version 3; Part 6: TTCN-3 Control Interface (TCI)".

[i.4] ETSI ES 201 873-7: "Methods for Testing and Specification (MTS); The Testing and Test Control Notation version 3; Part 7: Using ASN.1 with TTCN-3".

[i.5] ETSI ES 201 873-8: "Methods for Testing and Specification (MTS); The Testing and Test Control Notation version 3; Part 8: The IDL to TTCN-3 Mapping".

[i.6] ETSI ES 202 781: "Methods for Testing and Specification (MTS); The Testing and Test Control Notation version 3; TTCN-3 Language Extensions: Configuration and Deployment Support".

[i.7] ETSI ES 202 784: "Methods for Testing and Specification (MTS); The Testing and Test Control Notation version 3; TTCN-3 Language Extensions: Advanced Parameterization".

[i.8] ETSI ES 202 785: "Methods for Testing and Specification (MTS); The Testing and Test Control Notation version 3; TTCN-3 Language Extensions: Behaviour Types".

3 Definition of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the terms given in ISO/IEC 9646-1 [2], ISO/IEC 9646-7 [3], ETSI ES 201 873-1 [5] (TTCN-3) and the following apply:

Abstract Test Suite (ATS): test suite composed of abstract test cases

ICS pro forma: document, in the form of a questionnaire, which when completed for an implementation or system becomes an ICS

Implementation Conformance Statement (ICS): statement made by the supplier of an implementation claimed to conform to a given specification, stating which capabilities have been implemented

Implementation eXtra Information for Testing (IXIT): statement made by a supplier or implementor of an IUT which contains or references all of the information related to the IUT and its testing environment, which will enable the test laboratory to run an appropriate test suite against the IUT

IXIT pro forma: document, in the form of a questionnaire, which when completed for the IUT becomes the IXIT

Implementation Under Test (IUT): implementation of one or more OSI protocols in an adjacent user/provider relationship, being part of a real open system which is to be studied by testing

3.2 Symbols

Void.

3.3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

ATS	Abstract Test Suite
ICS	Implementation Conformance Statement
IUT	Implementation Under Test
IXIT	Implementation eXtra Information for Testing
JSON	JavaScript Object Notation
TC	Test Case
TCI	TTCN-3 Control Interface

TP	Test Purpose
TRI	TTCN-3 Runtime Interface
TS	Test System
TSS	Test Suite Structure
TSS&TP	Test Suite Structure and Test Purposes
TTCN-3	Testing and Test Control Notation edition 3
XML	eXtensible Markup Language

4 Test Suite Structure (TSS)

The Test Suite Structure is in close alignment with ETSI ES 201 873-9 [1], containing:

a) positive tests ("Pos_" test case name prefix);

b) negative tests ("Neg_" test case name prefix).

The execution order of the TTCN-3 tool conformance test cases is specified in the dependencies section of test purpose descriptions.

Annex A (normative): Test Purposes (TP)

A.1 Introduction of Test Purposes (TP)

A.1.0 Introduction

For each test requirement a Test Purpose (TP) is defined. Test purposes shall be defined in a dedicated test purpose document as well as with TTCN-3 documentation tags in each test case of the ATS. Both documentations shall convey the same information for each test purpose.

A.1.1 Test purpose naming convention

The test purpose naming scheme corresponds to the test case identifier naming scheme and vice-versa.

A.1.2 Test purpose structure

The test purpose structure is according to the Test Suite Structure (TSS).

A.1.3 Test purpose format

In the following, examples for tabular test purpose descriptions are shown that shall be defined in the test purpose document. This representation is a direct mapping of the contents of the document tags in the ATS (such as @purpose, @remark, or @verdict). The tabular descriptions are presented along with their corresponding TTCN-3 documentation tag equivalent. The test purpose reference shall be provided in a machine-readable format.

Test Purpose Id	TP_Neg_05_top_level_001
Reference	ETSI ES 201 873-9 [1], clause 5
ICS	None
Dependencies	None
Summary	Verify that error is generated for missing XSD language tag in import clause
Expected Output	The TTCN-3 module shall be rejected by the validator or after/during execution
Notes	

A corresponding TTCN-3 module addressing TP_Neg_05_top_level_001 is the following:

```
/***********************************************
 ** @author   STF 521
 ** @version  0.0.1
 ** @purpose  9:5, Verify that error is generated for missing XSD language tag in import clause
 ** @verdict  pass reject
***********************************************/

// The following requirements are tested:
// When importing from an XSD Schema, the following language identifier string shall be used: "XSD"

module Neg_05_top_level_001 {
   import from schema_Neg_05_top_level_001 all;
   template MyType m_msg := 1;
   /**
    * @desc The timeout given in seconds after which the test case will be stopped.
    */
    modulepar float PX_TC_EXECUTION_TIMEOUT := 5.0;

    type universal charstring Raw;
    type port P message {
        inout all;
    }
    type component C {
```

```
        port P p;
    }

    testcase TC_Neg_05_top_level_001() runs on C system C {
        map(self:p, system:p);
        // encode the message
        p.send(m_msg);
        log("template should either be rejected by compiler or by runtime latest while encoding");
        setverdict(fail, "Invalid template should not be encoded");
        unmap(self:p, system:p);
    }
    control {
        execute(TC_Neg_05_top_level_001(),PX_TC_EXECUTION_TIMEOUT);
    }
}
```

Test Purpose Id	TP_Pos_050101_namespaces_001
Reference	ETSI ES 201 873-9 [1], clause 5.1.1
ICS	None
Dependencies	None
Summary	Verify that schema with target namespace is correctly translated into single module
Expected Output	The TTCN-3 module shall be accepted by the tool and all test cases have to produce the verdict **pass** after execution
Notes	

A corresponding TTCN-3 module for TP_Pos_050101_namespaces_001 is the following:

```
/***********************************************
 ** @author   STF 521
 ** @version  0.0.1
 ** @purpose  9:5.1.1, Verify that schema with target namespace is correctly translated into single
module
 ** @verdict  pass accept, ttcn3verdict:pass
***********************************************/
// The following requirements are tested:
// A single XML Schema may be composed of a single or several schema element information
// items, and shall be translated to one or more TTCN-3 modules, corresponding to schema
// components that have the same target namespace. For XSD schemas with the same target
// namespace (including absence of the target namespace) exactly one TTCN-3 module shall
// be generated.

module Pos_050101_namespaces_001 {
    import from schema_Pos_050101_namespaces_001 language "XSD" all;
    template MyType m_msg := 1;
   /**
    * @desc The timeout given in seconds after which the test case will be stopped.
    */
    modulepar float PX_TC_EXECUTION_TIMEOUT := 5.0;
    type universal charstring Raw;
    type universal charstring File;
    type record of File FileList;
    type port P message {
        inout all;
    }
    type component C {
        port P p;
    }

    /**
     * @desc lexical compare the charstring p_textToMatch with the contents of the reference XML
file and returns true if they represent the same XML structure
     * @param p_textToMatch text to be compared with the UTF-8 contents of the XML file
     * @param p_referenceXmlFile the XML file
     * @param p_xsdFileList the list of XSD files
     * @param p_matchError the error result in case it did not match
     * @param p_referenceTTCN3File the file of the TTCN-3 test module. This path is used to find the
reference XML file relative to this path, by keeping the TTCN-3 code file system independent.
     * @return true if p_textToMatch and the contents of p_referenceXmlFile represent the same XML
structure
     */
    external function matchFile(Raw p_textToMatch, File p_referenceXmlFile, FileList p_xsdFileList,
out universal charstring p_matchError, File p_referenceTTCN3File := __FILE__) return boolean;

    testcase TC_Pos_050101_namespaces_001() runs on C system C {
```

```
        var Raw v_rcv;
        var universal charstring v_matchError;
        map(self:p, system:p);
        // encode the message
        p.send(m_msg);
        alt {
    // compare the encoded message with the reference XML file
            []  p.check(receive(Raw:?) -> value v_rcv) {
    log("XML message ", v_rcv);
                if (matchFile(v_rcv, "Pos_050101_namespaces_001.xml", {
"Pos_050101_namespaces_001.xsd" }, v_matchError)) {
                    alt {
    // match decoded value to pass test
                        [] p.receive(m_msg) {
    setverdict(pass, "Decoded value matches encoded template and reference XML");
                        }
                        [] p.receive {
                            setverdict(fail, "XML decoding failure");
                        }
                    }
                } else {
                    setverdict(fail, v_matchError);
                }
            }
            [] p.receive {
                setverdict(fail, "Raw decoding failure");
            }
        }
    }
    control {
        execute(TC_Pos_050101_namespaces_001(), 5.0);
    }
}
```

A.2 Test purposes for the TTCN-3 Part 9 conformance test suite

The TTCN-3 library modules are contained in archive ts_103254v010501p0.zip which accompanies the present document.

This ATS has been produced using the Testing and Test Control Notation (TTCN) according to ETSI ES 201 873-9 [1], ETSI ES 201 873-1 [5] and ETSI ES 201 873-11 [6].

History

Document history		
V1.1.1	March 2015	Publication
V1.2.1	March 2016	Publication
V1.3.1	September 2017	Publication
V1.4.1	November 2018	Publication
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