SLOVENSKI STANDARD
SIST ES 202 789 V1.3.1:2016

01-oktober-2016

Metode za preskušanje in specificiranje (MTS) - 3. različica zapisa preskušanja in krmilnih preskusov - Razširitveni paket: Razširjeni TRI

Methods for Testing and Specification (MTS) - The Testing and Test Control Notation version 3 - TTCN-3 Language Extensions: Extended TRI

Ta slovenski standard je istoveten z: ETSI ES 202 789 V1.3.1 (2014-06)

ICS:

33.040.01	Telekomunikacijski sistemi na splošno	Telecommunication systems in general

SIST ES 202 789 V1.3.1:2016 **en**

ETSI ES 202 789 V1.3.1 (2014-06)

Methods for Testing and Specification (MTS); The Testing and Test Control Notation version 3; TTCN-3 Language Extensions: Extended TRI

Reference
RES/MTS-202789xTRI ed131

Keywords
testing, TTCN-3

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Sous-Préfecture de Grasse (06) N° 7803/88

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Foreword

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

The use of underline (additional text) and strike through (deleted text) highlights the differences between base document and extended documents.

The present document relates to the multi-part standard covering the Testing and Test Control Notation version 3, as identified below:

ES 201 873-1 [1]: "TTCN-3 Core Language";

ES 201 873-3 [i.2]: "TTCN-3 Graphical presentation Format (GFT)";

ES 201 873-4 [2]: "TTCN-3 Operational Semantics";

ES 201 873-5 [3]: "TTCN-3 Runtime Interface (TRI)";

ES 201 873-6 [4]: "TTCN-3 Control Interface (TCI)";

ES 201 873-7 [i.3]: "Using ASN.1 with TTCN-3";

ES 201 873-8 [i.4]: "The IDL to TTCN-3 Mapping";

ES 201 873-9 [i.5]: "Using XML schema with TTCN-3";

ES 201 873-10 [i.6]: "TTCN-3 Documentation Comment Specification";

ES 202 784 [i.8]: "TTCN-3 Language Extensions: Advanced Parameterization";

ES 202 781 [i.7]: "TTCN-3 Language Extensions: Configuration and Deployment Support";

ES 202 782 [i.10]: "TTCN-3 Language Extensions: Performance and Real-Time Testing";

ES 202 785 [i.9]: "TTCN-3 Language Extensions: Behaviour Types".

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**may not**", "**need**", "**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).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

1 Scope

The present document defines the Extended TRI package of TTCN-3. TTCN-3 can be used for the specification of all types of reactive system tests over a variety of communication ports. Typical areas of application are protocol testing (including mobile and Internet protocols), service testing (including supplementary services), module testing, testing of CORBA based platforms, APIs, etc. TTCN-3 is not restricted to conformance testing and can be used for many other kinds of testing including interoperability, robustness, regression, system and integration testing. The specification of test suites for physical layer protocols is outside the scope of the present document.

TTCN-3 packages are intended to define additional TTCN-3 concepts, which are not mandatory as concepts in the TTCN-3 core language or in its interfaces TRI and TCI, but which are optional as part of a package which is suited for dedicated applications and/or usages of TTCN-3.

This package defines a more efficient handling of software values by a version of TRI, that does not use binary encoded messages for the communication with the SUT, but uses the values as they are; meaning e.g. that software objects or serialized data can be passed directly between the SUT and the TE.

While the design of TTCN-3 package has taken into account the consistency of a combined usage of the core language with a number of packages, the concrete usages of and guidelines for this package in combination with other packages is outside the scope of the present document.

2 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 reference document (including any amendments) applies.

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

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

2.1 Normative references

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

[1] 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".

[2] ETSI ES 201 873-4: "Methods for Testing and Specification (MTS); The Testing and Test Control Notation version 3; Part 4: TTCN-3 Operational Semantics".

[3] 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)".

[4] 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)".

[5] Recommendation ITU-T X.290: "OSI conformance testing methodology and framework for protocol Recommendations for ITU-T applications - General concepts".

NOTE: The corresponding ISO/IEC standard is ISO/IEC 9646-1: "Information technology -- Open Systems Interconnection -- Conformance testing methodology and framework -- Part 1: General concepts".

2.2 Informative references

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 201 873-3: "Methods for Testing and Specification (MTS); The Testing and Test Control Notation version 3; Part 3: TTCN-3 Graphical presentation Format (GFT)".

[i.3] 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.4] 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.5] 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".

[i.6] ETSI ES 201 873-10: "Methods for Testing and Specification (MTS); The Testing and Test Control Notation version 3; Part 10: TTCN-3 Documentation Comment Specification".

[i.7] 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.8] 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.9] ETSI ES 202 785: "Methods for Testing and Specification (MTS); The Testing and Test Control Notation version 3; TTCN-3 Language Extensions: Behaviour Types".

[i.10] ETSI ES 202 782: "Methods for Testing and Specification (MTS); The Testing and Test Control Notation version 3; TTCN-3 Language Extensions: TTCN-3 Performance and Real Time Testing".

[i.11] ETSI ES 202 786: "Methods for Testing and Specification (MTS); The Testing and Test Control Notation version 3; TTCN-3 Language Extensions: Support of interfaces with continuous signals".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in ES 201 873-1 [1], ES 201 873-4 [2], ES 201 873-5 [3], ES 201 873-6 [4] and Recommendation ITU-T X.290 [5] apply.

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in ES 201 873-1 [1], ES 201 873-4 [2], ES 201 873-5 [3], ES 201 873-6 [4], Recommendation ITU-T X.290 [5] and the following apply:

XTRI Extended TRI

4 Package conformance and compatibility

The package has no package tag as the choice to use TRI and/or XTRI affects the test adaptor only, but not the test specifications in TTCN-3.

For an implementation claiming to conform to this package version, all features specified in the present document shall be implemented consistently with the requirements given in the present document, ES 201 873-1 [1] and ES 201 873-4 [2].

The package presented in the present document is compatible to:

ES 201 873-1 [1] (V4.5.1)

ES 201 873-4 [2] (V4.4.1)

ES 201 873-6 [4] (V4.5.1)

ES 201 873-7 [i.3] (V4.5.1)

ES 201 873-8 [i.4] (V4.5.1)

ES 201 873-9 [i.5] (V4.5.1)

ES 201 873-10 [i.6] (V4.5.1)

If later versions of those parts are available and should be used instead, the compatibility of the package defined in the present document has to be checked individually.

The package defined in the present document is also compatible to:

ES 202 784 [i.8] (V1.3.1)

ES 202 781 [i.7] (V1.2.1)

ES 202 782 [i.10] (V1.2.1)

ES 202 785 [i.9] (V1.3.1)

ES 202 786 [i.11] (V1.2.1)

and can be used together with those packages.

If later versions of those packages are available and should be used instead, the compatibility to the package defined in the present document has to be checked individually.

5 Package concepts for the core language

Not applicable.

6 Package semantics

Not applicable.

7 TRI extensions for the package

Historically, TTCN has been used to test communication protocols which typically use encoded messages. This has been reflected in the TRI SA and TCI CD design of TTCN-3 by encoding and decoding messages to and from bitstrings. However, TTCN-3 also supports signature-based communication for which the transformation of objects into bitstrings and vice versa is cumbersome. Furthermore, some protocols use also structured messages for which the bitstring encoding is not helpful.

Therefore, an alternative API is being defined in this extension package of TTCN-3 along which TTCN-3 values can be directly passed to/from the SUT. It is defined by redefining the operations in TRI SA and PA as follows.

7.1 Changes to clause 5.2 of ES 201 873-5, Error handling

The SA or PA can in addition provide notifications about unrecoverable error situations by use of the operations xtriSAErrorReq and xtriPAErrorReq, respectively.

5.2.1 triSAErrorReq → xtriSAErrorReq

Signature	`void xtriSAErrorReq(in string message, in any cause)`
In Parameters	`message` A string value, i.e. the error phrase describing the problem. `cause` (Optional) cause of the problem.
Return Value	`void`
Constraint	Shall be called whenever an error situation has occurred in the SA with the exception of errors occurring when processing SA calls initiated by the TE. These errors are reported in the operation return. The optional cause parameter can be used to provide information in addition to the error phrase in message.
Effect	The TE will be notified about an unrecoverable error situation within the SA and may forward the error indication to the test management.

5.2.2 triPAErrorReq → xtriPAErrorReq

Signature	`void xtriPAErrorReq(in string message, in any cause)`
In Parameters	`message` A string value, i.e. the error phrase describing the problem. `cause` (Optional) cause of the problem.
Return Value	`Void`
Constraint	Shall be called whenever an error situation has occurred in the PA with the exception of errors occurring when processing PA calls initiated by the TE. These errors are reported in the operation return. The optional cause parameter can be used to provide information in addition to the error phrase in message.
Effect	The TE will be notified about an unrecoverable error situation within the PA and may forward the error indication to the test management.

7.2 Changes to clause 5.5.2 Connection handling operations

5.5.2.3 triMapParam → xtriMapParam

Signature	`TriStatusType xtriMap(in TriPortIdType compPortId,`
	`in TriPortIdType tsiPortId,`
	`in TciParameterListType paramList)`

In Parameters	`compPortId` identifier of the test component port to be mapped `tsiPortId` identifier of the test system interface port to be mapped `paramList` parameters of the parameterized map
Out Parameters	n.a.
Return Value	The return status of the `triMap` operation. The return status indicates the local success (***TRI_OK***) or failure (***TRI_Error***) of the operation.
Constraints	This operation is called by the TE when it executes a TTCN-3 map operation.
Effect	The SA can establish a dynamic connection to the SUT for the referenced TSI port. The `triMap` operation returns ***TRI_Error*** in case a connection could not be established successfully, ***TRI_OK*** otherwise. The operation should return ***TRI_OK*** in case no dynamic connection needs to be established by the test system.

5.5.2.5 triUnmapParam → xtriUnmapParam

Signature	`TriStatusType xtriUnmap(in TriPortIdType compPortId,`
	`in TriPortIdType tsiPortId,`
	`in TciParameterListType paramList)`

In Parameters	`compPortId` identifier of the test component port to be unmapped `tsiPortId` identifier of the test system interface port to be unmapped `paramList` parameters of the parameterized map
Out Parameters	n.a.
Return Value	The return status of the `triUnmap` operation. The return status indicates the local success (***TRI_OK***) or failure (***TRI_Error***) of the operation.
Constraints	This operation is called by the TE when it executes any TTCN-3 unmap operation.
Effect	The SA shall close a dynamic connection to the SUT for the referenced TSI port. The `triUnmap` operation returns ***TRI_Error*** in case a connection could not be closed successfully or no such connection has been established previously, ***TRI_OK*** otherwise. The operation should return ***TRI_OK*** in case no dynamic connections have to be closed by the test system.

7.3 Changes to clause 5.5.3 Message based communication operations

5.5.3.1 triSend → xtriSend

Signature	`TriStatusType xtriSend(in TriComponentIdType componentId,`
	`in TriPortIdType tsiPortId,`
	`in Value SUTaddress,`
	`in Value sendMessage)`

In Parameters	`componentId` identifier of the sending test component `tsiPortId` identifier of the test system interface port via which the message is sent to the SUT Adaptor `SUTaddress` (optional) destination address value within the SUT `sendMessage` the value to be sent
Out Parameters	n.a.
Return Value	The return status of the `triSend` operation. The return status indicates the local success (***TRI_OK***) or failure (***TRI_Error***) of the operation.
Constraints	This operation is called by the TE when it executes a TTCN-3 unicast send operation on a component port, which has been mapped to a TSI port. This operation is called by the TE for all TTCN-3 send operations if no system component has been specified for a test case, i.e. only a MTC test component is created for a test case. ~~The encoding of `sendMessage` has to be done in the TE prior to this TRI operation call.~~
Effect	The SA can send the message to the SUT. The `triSend` operation returns ***TRI_OK*** in case it has been completed successfully. Otherwise ***TRI_Error*** shall be returned. Notice that the return value ***TRI_OK*** does not imply that the SUT has received `sendMessage`.

5.5.3.2 triSendBC → xtriSendBC

Signature	`TriStatusType xtriSendBC(in TriComponentIdType componentId,`
	`in TriPortIdType tsiPortId,`
	`in Value sendMessage)`

In Parameters	`componentId` identifier of the sending test component `tsiPortId` identifier of the test system interface port via which the message is sent to the SUT Adaptor `sendMessage` the value to be sent
Out Parameters	n.a.
Return Value	The return status of the `triSendBC` operation. The return status indicates the local success (***TRI_OK***) or failure (***TRI_Error***) of the operation.
Constraints	This operation is called by the TE when it executes a TTCN-3 broadcast send operation on a component port, which has been mapped to a TSI port. This operation is called by the TE for all TTCN-3 send operations if no system component has been specified for a test case, i.e. only a MTC test component is created for a test case. ~~The encoding of `sendMessage` has to be done in the TE prior to this TRI operation call.~~
Effect	The SA can broadcast the message to the SUT. The `triSendBC` operation returns ***TRI_OK*** in case it has been completed successfully. Otherwise ***TRI_Error*** shall be returned. Notice that the return value ***TRI_OK*** does not imply that the SUT has received `sendMessage`.