



**Methods for Testing and Specification (MTS);  
The Testing and Test Control Notation version 3;  
Part 6: TTCN-3 Control Interface (TCI)**

*iTeh STANDARD PREVIEW  
(standards.iteh.ai)  
Full standard/standards/etsi/es/201-873-6-v4.11.1-2019-04  
https://standards.iteh.ai/catalog/standards/etsi/es/201-873-6-v4.11.1-2019-04  
4e05-a640-702a26f74424/etsi-es-201-873-6-v4.11.1-2019-04*

---

**Reference**RES/MTS-201873-6ed4.11.1

---

---

**Keywords**control, interface, methodology, TCI, testing,  
TTCN-3

---

**ETSI**650 Route des Lucioles  
F-06921 Sophia Antipolis Cedex - FRANCE

---

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C  
Association à but non lucratif enregistrée à la  
Sous-Préfecture de Grasse (06) N° 7803/88

---

**Important notice**

---

The present document can be downloaded from:

<http://www.etsi.org/standards-search>

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the prevailing version of an ETSI deliverable is the one made publicly available in PDF format at [www.etsi.org/deliver](http://www.etsi.org/deliver).

Users of the present document should be aware that the document may be subject to revision or change of status.

Information on the current status of this and other ETSI documents is available at

<https://portal.etsi.org/TB/ETSIDeliverableStatus.aspx>

If you find errors in the present document, please send your comment to one of the following services:

<https://portal.etsi.org/People/CommiteeSupportStaff.aspx>

---

**Copyright Notification**

---

No part may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm except as authorized by written permission of ETSI.

The content of the PDF version shall not be modified without the written authorization of ETSI.

The copyright and the foregoing restriction extend to reproduction in all media.

© ETSI 2019.

All rights reserved.

**DECT™**, **PLUGTESTS™**, **UMTS™** and the ETSI logo are trademarks of ETSI registered for the benefit of its Members.

**3GPP™** and **LTE™** are trademarks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners.

**oneM2M™** logo is a trademark of ETSI registered for the benefit of its Members and of the oneM2M Partners.

**GSM®** and the GSM logo are trademarks registered and owned by the GSM Association.

# Contents

Intellectual Property Rights .....	16
Foreword.....	16
Modal verbs terminology.....	16
1 Scope .....	17
2 References .....	17
2.1 Normative references .....	17
2.2 Informative references.....	18
3 Definition of terms, symbols and abbreviations.....	18
3.1 Definitions.....	18
3.2 Symbols.....	19
3.3 Abbreviations .....	19
4 Introduction .....	20
5 Compliance.....	20
6 General structure of a TTCN-3 test system.....	21
6.1 Entities in a TTCN-3 test system.....	21
6.1.0 Types of entities.....	21
6.1.1 Test Management and Control (TMC).....	22
6.1.1.0 Test Management and Control Entities.....	22
6.1.1.1 Test Management (TM) .....	22
6.1.1.2 Coding and Decoding (CD) .....	23
6.1.1.3 Component Handling (CH).....	23
6.1.1.4 Test Logging (TL).....	24
6.1.2 TTCN-3 Executable (TE).....	24
6.1.3 SUT Adaptor (SA).....	24
6.1.4 Platform Adaptor (PA).....	24
6.2 Execution requirements for a TTCN-3 test system .....	24
7 TTCN-3 control interface and operations.....	25
7.1 Overview of the TCI.....	25
7.1.0 TCI role in a TTCN-3 test system.....	25
7.1.1 Correlation between TTCN-3 and TCI operation invocations.....	25
7.1.1.0 Mapping of TTCN-3 operations to TCI operations.....	25
7.1.1.1 TTCN-3 operations with TCI operation equivalent .....	26
7.1.1.2 TTCN-3 operations with TCI operation pair equivalent .....	26
7.1.1.3 TTCN-3 operations without direct TCI operation equivalent .....	27
7.1.1.3.0 Mapping of TTCN-3 operations to series of TCI operations.....	27
7.1.1.3.1 Test case stop operation.....	27
7.2 TCI data.....	27
7.2.0 Abstract data types.....	27
7.2.1 General abstract data types .....	28
7.2.1.0 Use of general abstract data types .....	28
7.2.1.1 Management.....	28
7.2.1.2 Communication .....	29
7.2.2 Abstract TTCN-3 data types and values .....	29
7.2.2.0 Definition and scope of use.....	29
7.2.2.1 Abstract TTCN-3 data types .....	29
7.2.2.2 Abstract TTCN-3 values .....	31
7.2.2.2.0 Basic rules .....	31
7.2.2.2.1 The abstract data type Value .....	32
7.2.2.2.2 The abstract data type IntegerValue .....	35
7.2.2.2.3 The abstract data type FloatValue .....	35
7.2.2.2.4 The abstract data type BooleanValue .....	35

7.2.2.2.5	The abstract data type CharstringValue .....	35
7.2.2.2.6	The abstract data type UniversalCharstringValue .....	36
7.2.2.2.7	The abstract data type BitstringValue .....	36
7.2.2.2.8	The abstract data type OctetstringValue .....	37
7.2.2.2.9	The abstract data type HexstringValue .....	38
7.2.2.2.10	The abstract data type RecordValue .....	39
7.2.2.2.11	The abstract data type RecordOfValue .....	39
7.2.2.2.12	The abstract data type UnionValue .....	41
7.2.2.2.13	The abstract data type EnumeratedValue .....	41
7.2.2.2.14	The abstract data type VerdictValue .....	41
7.2.2.2.15	The abstract data type AddressValue .....	42
7.2.2.3	Abstract TTCN-3 matching mechanisms .....	42
7.2.2.3.1	The abstract data type MatchingMechanism .....	42
7.2.2.3.2	The abstract data type MatchingList .....	42
7.2.2.3.3	The abstract data type ValueRange .....	43
7.2.2.3.4	The abstract data type CharacterPattern .....	43
7.2.2.3.5	The abstract data type MatchDecodedContent .....	44
7.2.2.4	Data types for complex TTCN-3 properties .....	44
7.2.2.4.0	Scope of use of TTCN-3 properties .....	44
7.2.2.4.1	The abstract data type LengthRestriction .....	44
7.2.2.4.2	The abstract data type Permutation .....	44
7.2.2.4.3	The abstract data type RangeBoundary .....	45
7.2.3	Abstract logging types .....	45
7.2.3.1	The abstract data type TciValueTemplate .....	45
7.2.3.2	The abstract data type TciNonValueTemplate .....	45
7.2.3.3	The Value List and Mismatch Types .....	46
7.2.3.4	The Status Types .....	46
7.3	TCI operations .....	47
7.3.0	The TCI interfaces .....	47
7.3.1	The TCI-TM interface .....	48
7.3.1.0	Scope of use .....	48
7.3.1.1	TCI-TM required .....	48
7.3.1.1.0	Scope of use .....	48
7.3.1.1.1	tciRootModule .....	48
7.3.1.1.2	tciGetImportedModules .....	49
7.3.1.1.3	tciGetModuleParameters .....	49
7.3.1.1.4	tciGetTestCases .....	49
7.3.1.1.5	tciGetTestCaseParameters .....	49
7.3.1.1.6	tciGetTestCaseTSI .....	49
7.3.1.1.7	tciStartTestCase .....	50
7.3.1.1.8	tciStopTestCase .....	50
7.3.1.1.9	tciStartControl .....	50
7.3.1.1.10	tciStopControl .....	50
7.3.1.1.11	tciGetControlParameters .....	51
7.3.1.1.12	tciStartControlWithParameters .....	51
7.3.1.2	TCI-TM provided .....	51
7.3.1.2.0	Scope of use .....	51
7.3.1.2.1	tciTestCaseStarted .....	51
7.3.1.2.2	tciTestCaseTerminated .....	51
7.3.1.2.3	tciControlTerminated .....	52
7.3.1.2.4	tciGetModulePar .....	52
7.3.1.2.5	tciLog .....	52
7.3.1.2.6	tciError .....	52
7.3.1.2.7	tciControlTerminatedWithResult .....	53
7.3.2	The TCI-CD interface .....	53
7.3.2.0	Scope of use .....	53
7.3.2.1	TCI-CD required .....	54
7.3.2.1.0	Scope of use .....	54
7.3.2.1.1	getTypeForName .....	54
7.3.2.1.2	getInteger .....	54

7.3.2.1.3	getFloat .....	54
7.3.2.1.4	getBoolean .....	54
7.3.2.1.5	Void .....	55
7.3.2.1.6	getCharstring .....	55
7.3.2.1.7	getUniversalCharstring .....	55
7.3.2.1.8	getHexstring .....	55
7.3.2.1.9	getBitstring .....	55
7.3.2.1.10	getOctetstring .....	55
7.3.2.1.11	getVerdict .....	55
7.3.2.1.12	tciErrorReq .....	55
7.3.2.2	TCI-CD provided .....	56
7.3.2.2.0	Scope of use .....	56
7.3.2.2.1	decode .....	56
7.3.2.2.2	encode .....	56
7.3.2.2.3	decodeValue .....	56
7.3.2.2.4	encodeValue .....	57
7.3.3	The TCI-CH interface .....	57
7.3.3.0	Scope of use .....	57
7.3.3.1	TCI-CH required .....	58
7.3.3.1.0	Scope of use .....	58
7.3.3.1.1	tciEnqueueMsgConnected .....	58
7.3.3.1.2	tciEnqueueCallConnected .....	58
7.3.3.1.3	tciEnqueueReplyConnected .....	59
7.3.3.1.4	tciEnqueueRaiseConnected .....	59
7.3.3.1.5	tciCreateTestComponent .....	59
7.3.3.1.6	tciStartTestComponent .....	60
7.3.3.1.7	tciStopTestComponent .....	60
7.3.3.1.8	tciConnect .....	60
7.3.3.1.9	tciDisconnect .....	60
7.3.3.1.10	tciMap .....	61
7.3.3.1.11	tciMapParam .....	61
7.3.3.1.12	tciUnmap .....	61
7.3.3.1.13	tciUnmapParam .....	61
7.3.3.1.14	tciTestComponentTerminated .....	62
7.3.3.1.15	tciTestComponentRunning .....	62
7.3.3.1.16	tciTestComponentDone .....	62
7.3.3.1.17	tciGetMTC .....	62
7.3.3.1.18	tciExecuteTestCase .....	63
7.3.3.1.19	tciReset .....	63
7.3.3.1.20	tciKillTestComponent .....	63
7.3.3.1.21	tciTestComponentAlive .....	63
7.3.3.1.22	tciTestComponentKilled .....	64
7.3.3.1.23	tciCallTestComponent .....	64
7.3.3.1.24	tciTestComponentCallTerminated .....	64
7.3.3.2	TCI-CH provided .....	65
7.3.3.2.0	Scope of use .....	65
7.3.3.2.1	tciSendConnected .....	65
7.3.3.2.2	tciSendConnectedBC .....	65
7.3.3.2.3	tciSendConnectedMC .....	65
7.3.3.2.4	tciCallConnected .....	66
7.3.3.2.5	tciCallConnectedBC .....	66
7.3.3.2.6	tciCallConnectedMC .....	67
7.3.3.2.7	tciReplyConnected .....	67
7.3.3.2.8	tciReplyConnectedBC .....	68
7.3.3.2.9	tciReplyConnectedMC .....	68
7.3.3.2.10	tciRaiseConnected .....	69
7.3.3.2.11	tciRaiseConnectedBC .....	69
7.3.3.2.12	tciRaiseConnectedMC .....	69
7.3.3.2.13	tciCreateTestComponentReq .....	70
7.3.3.2.14	tciStartTestComponentReq .....	70
7.3.3.2.15	tciStopTestComponentReq .....	70
7.3.3.2.16	tciConnectReq .....	70

7.3.3.2.17	tciDisconnectReq.....	71
7.3.3.2.18	tciMapReq .....	71
7.3.3.2.19	tciMapParamReq .....	71
7.3.3.2.20	tciUnmapReq.....	71
7.3.3.2.21	tciUnmapParamReq.....	72
7.3.3.2.22	tciTestComponentTerminatedReq.....	72
7.3.3.2.23	tciTestComponentRunningReq .....	72
7.3.3.2.24	tciTestComponentDoneReq.....	72
7.3.3.2.25	tciGetMTCReq .....	72
7.3.3.2.26	tciExecuteTestCaseReq .....	73
7.3.3.2.27	tciResetReq.....	73
7.3.3.2.28	tciKillTestComponentReq .....	73
7.3.3.2.29	tciTestComponentAliveReq .....	73
7.3.3.2.30	tciTestComponentKilledReq .....	74
7.3.3.2.31	tciCallTestComponentReq.....	74
7.3.3.2.32	tciTestComponentCallTerminatedReq .....	74
7.3.4	The TCI-TL interface.....	75
7.3.4.0	Scope of use .....	75
7.3.4.1	TCI-TL provided.....	75
7.3.4.1.0	Scope of use.....	75
7.3.4.1.1	tliTcExecute.....	75
7.3.4.1.2	tliTcStart .....	76
7.3.4.1.3	tliTcStop .....	76
7.3.4.1.4	tliTcStarted .....	76
7.3.4.1.5	tliTcTerminated .....	77
7.3.4.1.6	tliCtrlStart .....	77
7.3.4.1.7	tliCtrlStop .....	77
7.3.4.1.8	tliCtrlTerminated .....	78
7.3.4.1.9	tliMSend_m.....	78
7.3.4.1.10	tliMSend_m_BC.....	79
7.3.4.1.11	tliMSend_m_MC.....	79
7.3.4.1.12	tliMSend_c .....	80
7.3.4.1.13	tliMSend_c_BC .....	80
7.3.4.1.14	tliMSend_c_MC.....	80
7.3.4.1.15	tliMDetected_m.....	81
7.3.4.1.16	tliMDetected_c .....	81
7.3.4.1.17	tliMMismatch_m.....	81
7.3.4.1.18	tliMMismatch_c .....	82
7.3.4.1.19	tliMReceive_m.....	82
7.3.4.1.20	tliMReceive_c .....	83
7.3.4.1.21	tliPrCall_m .....	83
7.3.4.1.22	tliPrCall_m_BC .....	84
7.3.4.1.23	tliPrCall_m_MC .....	84
7.3.4.1.24	tliPrCall_c.....	85
7.3.4.1.25	tliPrCall_c_BC .....	85
7.3.4.1.26	tliPrCall_c_MC.....	85
7.3.4.1.27	tliPrGetCallDetected_m.....	86
7.3.4.1.28	tliPrGetCallDetected_c.....	86
7.3.4.1.29	tliPrGetCallMismatch_m.....	87
7.3.4.1.30	tliPrGetCallMismatch_c .....	87
7.3.4.1.31	tliPrGetCall_m.....	88
7.3.4.1.32	tliPrGetCall_c .....	88
7.3.4.1.33	tliPrReply_m .....	89
7.3.4.1.34	tliPrReply_m_BC .....	89
7.3.4.1.35	tliPrReply_m_MC .....	90
7.3.4.1.36	tliPrReply_c.....	90
7.3.4.1.37	tliPrReply_c_BC.....	91
7.3.4.1.38	tliPrReply_c_MC.....	91
7.3.4.1.39	tliPrGetReplyDetected_m.....	92
7.3.4.1.40	tliPrGetReplyDetected_c.....	92
7.3.4.1.41	tliPrGetReplyMismatch_m.....	93
7.3.4.1.42	tliPrGetReplyMismatch_c .....	93

7.3.4.1.43	tliPrGetReply_m	94
7.3.4.1.44	tliPrGetReply_c	94
7.3.4.1.45	tliPrRaise_m	95
7.3.4.1.46	tliPrRaise_m_BC	95
7.3.4.1.47	tliPrRaise_m_MC	96
7.3.4.1.48	tliPrRaise_c	96
7.3.4.1.49	tliPrRaise_c_BC	97
7.3.4.1.50	tliPrRaise_c_MC	97
7.3.4.1.51	tliPrCatchDetected_m	98
7.3.4.1.52	tliPrCatchDetected_c	98
7.3.4.1.53	tliPrCatchMismatch_m	99
7.3.4.1.54	tliPrCatchMismatch_c	99
7.3.4.1.55	tliPrCatch_m	100
7.3.4.1.56	tliPrCatch_c	100
7.3.4.1.57	tliPrCatchTimeoutDetected	101
7.3.4.1.58	tliPrCatchTimeout	101
7.3.4.1.59	tliCCreate	101
7.3.4.1.60	tliCStart	102
7.3.4.1.61	tliCRunning	102
7.3.4.1.62	tliCAlive	102
7.3.4.1.63	tliCStop	103
7.3.4.1.64	tliCKill	103
7.3.4.1.65	tliCDoneMismatch	103
7.3.4.1.66	tliCDone	104
7.3.4.1.67	tliCKilledMismatch	104
7.3.4.1.68	tliCKilled	104
7.3.4.1.69	tliCTerminated	105
7.3.4.1.70	tliPConnect	105
7.3.4.1.71	tliPDisconnect	105
7.3.4.1.72	tliPMap	106
7.3.4.1.73	tliPMapParam	106
7.3.4.1.74	tliPUnmap	106
7.3.4.1.75	tliPUnmapParam	107
7.3.4.1.76	tliPClear	107
7.3.4.1.77	tliPStart	107
7.3.4.1.78	tliPStop	108
7.3.4.1.79	tliPHalt	108
7.3.4.1.80	tliEncode	108
7.3.4.1.81	tliDecode	109
7.3.4.1.82	tliTTimeoutDetected	109
7.3.4.1.83	tliTTimeoutMismatch	109
7.3.4.1.84	tliTTimeout	110
7.3.4.1.85	tliTStart	110
7.3.4.1.86	tliTStop	110
7.3.4.1.87	tliTRead	111
7.3.4.1.88	tliTRunning	111
7.3.4.1.89	tliSEnter	111
7.3.4.1.90	tliSLeave	112
7.3.4.1.91	tliVar	112
7.3.4.1.92	tliModulePar	112
7.3.4.1.93	tliGetVerdict	113
7.3.4.1.94	tliSetVerdict	113
7.3.4.1.95	tliLog	113
7.3.4.1.96	tliAEnter	114
7.3.4.1.97	tliALeave	114
7.3.4.1.98	tliANomatch	114
7.3.4.1.99	tliARepeat	114
7.3.4.1.100	tliADefaults	115
7.3.4.1.101	tliAActivate	115
7.3.4.1.102	tliADeactivate	115
7.3.4.1.103	tliAWait	116
7.3.4.1.104	tliAction	116

7.3.4.1.105	tliMatch .....	116
7.3.4.1.106	tliMatchMismatch.....	116
7.3.4.1.107	tliInfo .....	117
7.3.4.1.108	tliMChecked_m .....	117
7.3.4.1.109	tliMChecked_c .....	117
7.3.4.1.110	tliPrGetCallChecked_m.....	118
7.3.4.1.111	tliPrGetCallChecked_c .....	118
7.3.4.1.112	tliPrGetReplyChecked_m.....	119
7.3.4.1.113	tliPrGetReplyChecked_c .....	119
7.3.4.1.114	tliPrCatchChecked_m.....	120
7.3.4.1.115	tliPrCatchChecked_c .....	120
7.3.4.1.116	tliCheckedAny_m.....	121
7.3.4.1.117	tliCheckedAny_c .....	121
7.3.4.1.118	tliCheckAnyMismatch_m.....	121
7.3.4.1.119	tliCheckAnyMismatch_c .....	122
7.3.4.1.120	tliRnd .....	122
7.3.4.1.121	tliEvaluate.....	122
7.3.4.1.122	tliCCall .....	123
7.3.4.1.123	tliCCallTerminated .....	123
7.3.4.1.124	tliCtrlStartWithParameters .....	123
7.3.4.1.125	tliCtrlTerminatedWithResult .....	124
8	Java™ language mapping.....	124
8.1	Introduction .....	124
8.2	Names and scopes .....	124
8.2.1	Names .....	124
8.2.2	Scopes .....	124
8.3	Type mapping.....	125
8.3.1	Basic type mapping.....	125
8.3.2	Structured type mapping .....	125
8.3.2.0	General principles .....	125
8.3.2.1	TciParameterType .....	126
8.3.2.2	TciParameterPassingModeType .....	126
8.3.2.3	TciParameterListType .....	126
8.3.2.4	TciTypeClassType .....	127
8.3.2.5	TciTestComponentKindType .....	127
8.3.2.6	TciBehaviourIdType .....	127
8.3.2.7	TciTestCaseIdType .....	128
8.3.2.8	TciModuleIdType .....	128
8.3.2.9	TciModuleParameterIdType .....	128
8.3.2.10	TciModuleParameterListType .....	128
8.3.2.11	TciModuleParameterType.....	128
8.3.2.12	TciParameterTypeListType.....	129
8.3.2.13	TciParameterTypeType.....	129
8.3.2.14	TciModuleIdListType .....	129
8.3.2.15	TciTestCaseIdListType .....	130
8.3.2.16	TciDecodingResult.....	130
8.3.2.17	TciMatchingTypeType.....	130
8.3.2.18	LengthRestriction.....	131
8.3.2.19	Permutation .....	131
8.3.2.20	RangeBoundary.....	132
8.3.3	Abstract type mapping .....	132
8.3.3.0	General principles .....	132
8.3.3.1	Type .....	132
8.3.4	Abstract value mapping .....	133
8.3.4.0	General principles .....	133
8.3.4.1	Value .....	134
8.3.4.2	IntegerValue .....	135
8.3.4.3	FloatValue .....	135
8.3.4.4	BooleanValue .....	136
8.3.4.5	CharstringValue .....	136
8.3.4.6	BitstringValue .....	136



8.3.4.7	OctetstringValue .....	137
8.3.4.8	UniversalCharstringValue .....	138
8.3.4.9	HexstringValue .....	139
8.3.4.10	RecordValue.....	140
8.3.4.11	RecordOfValue .....	140
8.3.4.12	UnionValue .....	142
8.3.4.13	EnumeratedValue.....	142
8.3.4.14	VerdictValue .....	143
8.3.4.15	AddressValue .....	143
8.3.5	Abstract template mapping .....	143
8.3.5.0	General principles .....	143
8.3.5.1	MatchingMechanism.....	143
8.3.5.2	MatchingList .....	144
8.3.5.3	ValueRange .....	144
8.3.5.4	CharacterPattern.....	144
8.3.5.5	MatchDecodedContent.....	145
8.3.6	Abstract logging types mapping .....	145
8.3.6.0	General principles .....	145
8.3.6.1	TciValueTemplate.....	145
8.3.6.2	TciNonValueTemplate.....	145
8.3.6.3	TciValueList.....	146
8.3.6.4	TciValueDifference.....	146
8.3.6.5	TciValueDifferenceList.....	146
8.3.6.6	ComponentStatus .....	147
8.3.6.7	TimerStatus .....	147
8.3.6.8	TciStatus .....	147
8.4	Constants .....	147
8.5	Mapping of interfaces.....	149
8.5.0	Calling rules.....	149
8.5.1	The TCI-TM interface .....	149
8.5.1.1	TCI-TM provided.....	149
8.5.1.2	TCI-TM required.....	150
8.5.2	The TCI-CD interface .....	150
8.5.2.1	TCI-CD provided .....	150
8.5.2.2	TCI-CD required .....	150
8.5.3	The TCI-CH interface .....	151
8.5.3.1	TCI-CH provided .....	151
8.5.3.2	TCI-CH required .....	152
8.5.4	The TCI-TL interface.....	153
8.5.4.1	TCI-TL provided.....	153
8.6	Optional parameters .....	157
8.7	TCI initialization .....	158
8.8	Error handling .....	158
9	ANSI C language mapping.....	158
9.1	Introduction .....	158
9.2	Value interfaces.....	158
9.3	Logging interface .....	164
9.4	Operation interfaces .....	164
9.4.1	The TCI-TM interface .....	164
9.4.1.1	TCI-TM provided.....	164
9.4.1.2	TCI-TM required.....	165
9.4.2	The TCI-CD interface.....	165
9.4.2.1	TCI-CD provided .....	165
9.4.2.2	TCI-CD required .....	165
9.4.3	The TCI-CH interface.....	165
9.4.3.1	TCI-CH provided .....	165
9.4.3.2	TCI-CH required .....	166
9.4.4	The TCI-TL interface.....	167
9.4.4.1	TCI-TL provided.....	167
9.5	Data .....	172
9.6	Miscellaneous.....	174

9.7	Optional parameters .....	174
10	C++ language mapping .....	175
10.1	Introduction .....	175
10.2	Names and scopes .....	175
10.3	Memory management.....	175
10.4	Error handling .....	175
10.5	Type mapping.....	175
10.5.0	Basic concepts .....	175
10.5.1	Encapsulated C++ types.....	175
10.5.2	General abstract data types .....	176
10.5.2.1	TciBehaviourId .....	176
10.5.2.2	TciModuleId.....	176
10.5.2.3	TciModuleParameterId .....	176
10.5.2.4	TciTestId .....	177
10.5.2.5	TciModuleIdList .....	177
10.5.2.6	TciModuleParameter .....	178
10.5.2.7	TciModuleParameterList.....	178
10.5.2.8	TciParameterPassingMode.....	179
10.5.2.9	TciParameter .....	179
10.5.2.10	TciParameterList .....	179
10.5.2.11	TciParameterType .....	180
10.5.2.12	TciParameterTypeList.....	180
10.5.2.13	TciTestComponentKind .....	181
10.5.2.14	TciTypeClass .....	181
10.5.2.15	TciTestIdList .....	182
10.5.2.16	TciMatchingTypeType.....	182
10.5.2.17	LengthRestriction.....	182
10.5.2.18	Permutation .....	183
10.5.2.19	RangeBoundary.....	184
10.5.3	Abstract TTCN-3 data types and values .....	184
10.5.3.1	TciType .....	184
10.5.3.2	TciValue.....	185
10.5.3.3	IntegerValue .....	187
10.5.3.4	FloatValue .....	187
10.5.3.5	BooleanValue .....	187
10.5.3.6	CharstringValue .....	188
10.5.3.7	UniversalCharstringValue .....	188
10.5.3.8	BitstringValue .....	189
10.5.3.9	OctetstringValue .....	190
10.5.3.10	HexstringValue .....	191
10.5.3.11	RecordValue.....	192
10.5.3.12	RecordOfValue .....	192
10.5.3.13	UnionValue .....	193
10.5.3.14	EnumeratedValue.....	193
10.5.3.15	VerdictValue .....	194
10.5.3.16	VerdictValueEnum.....	194
10.5.3.17	AddressValue .....	195
10.5.3.18	MatchingMechanism.....	195
10.5.3.19	MatchingList .....	195
10.5.3.20	ValueRange .....	196
10.5.3.21	CharacterPattern.....	196
10.5.3.22	MatchDecodedContent.....	197
10.5.4	Abstract logging types .....	197
10.5.4.1	TciValueTemplate .....	197
10.5.4.2	TciNonValueTemplate .....	198
10.5.4.3	TciValueList.....	198
10.5.4.4	TciValueDifference.....	199
10.5.4.5	TciValueDifferenceList.....	199
10.5.4.6	ComponentStatus .....	200
10.5.4.7	TimerStatus .....	200
10.5.4.8	TciStatus .....	200

10.6	Operations mapping .....	201
10.6.1	TCI-TM .....	201
10.6.1.1	TciTmRequired .....	201
10.6.1.2	TciTmProvided .....	201
10.6.2	TCI-CD .....	202
10.6.2.1	TciCdRequired .....	202
10.6.2.2	TciCdProvided .....	202
10.6.3	TCI-CH .....	203
10.6.3.1	TciChRequired .....	203
10.6.3.2	TciChProvided .....	204
10.6.4	TCI-TL .....	206
10.6.4.1	TciTlProvided .....	206
11	W3C XML mapping .....	214
11.1	Introduction .....	214
11.2	Scopes .....	214
11.3	Type mapping .....	215
11.3.1	Mapping of simple types .....	215
11.3.1.1	TBoolean .....	215
11.3.1.2	TString .....	215
11.3.1.3	TInteger .....	215
11.3.1.4	TriTimerDurationType .....	215
11.3.1.5	TciParameterPassingModeType .....	215
11.3.1.6	TriStatusType .....	215
11.3.1.7	TciStatusType .....	215
11.3.1.8	ComponentStatusType .....	215
11.3.1.9	TimerStatusType .....	215
11.3.1.10	PortStatusType .....	216
11.3.2	Complex type mapping .....	216
11.3.2.1	TriPortIdType .....	216
11.3.2.2	TriComponentIdType .....	216
11.3.2.3	TriComponentIdListType .....	216
11.3.2.4	Port .....	217
11.3.2.5	Id .....	217
11.3.2.6	TriMessageType .....	217
11.3.2.7	TriParameterType .....	218
11.3.2.8	TriParameterListType .....	218
11.3.2.9	TriAddressType .....	218
11.3.2.10	TriAddressListType .....	219
11.3.2.11	TriExceptionType .....	219
11.3.2.12	TriSignatureIdType .....	219
11.3.2.13	TriTimerIdType .....	220
11.3.2.14	TriTimerDurationType .....	220
11.3.2.15	QualifiedName .....	220
11.3.2.16	TciBehaviourIdType .....	220
11.3.2.17	TciTestIdType .....	221
11.3.2.18	TciParameterType .....	221
11.3.2.19	TciParameterListType .....	221
11.3.2.20	TriPortIdListType .....	222
11.3.3	Abstract value mapping .....	222
11.3.3.1	Value .....	222
11.3.3.2	IntegerValue .....	224
11.3.3.3	FloatValue .....	224
11.3.3.4	BooleanValue .....	225
11.3.3.5	Void .....	225
11.3.3.6	VerdictValue .....	225
11.3.3.7	BitstringValue .....	225
11.3.3.8	HexstringValue .....	225
11.3.3.9	OctetstringValue .....	226
11.3.3.10	CharstringValue .....	226
11.3.3.11	UniversalCharstringValue .....	226
11.3.3.12	RecordValue .....	226

11.3.3.13	RecordOfValue .....	227
11.3.3.14	ArrayValue .....	229
11.3.3.15	SetValue .....	229
11.3.3.16	SetOfValue .....	229
11.3.3.17	EnumeratedValue .....	230
11.3.3.18	UnionValue .....	230
11.3.3.19	AnytypeValue .....	230
11.3.3.20	AddressValue .....	231
11.3.3.21	ComponentValue .....	231
11.3.3.22	PortValue .....	231
11.3.3.23	DefaultValue .....	232
11.3.3.24	TimerValue .....	232
11.3.3.25	MatchingMechanism .....	233
11.3.3.26	MatchingList .....	233
11.3.3.27	ValueRange .....	234
11.3.3.28	CharacterPattern .....	234
11.3.3.29	MatchDecodedContent .....	234
11.3.4	Abstract logging types mapping .....	235
11.3.4.1	TciValueTemplate .....	235
11.3.4.2	TciNonValueTemplate .....	236
11.3.4.3	TciValueList .....	237
11.3.4.4	TciValueDifference .....	237
11.3.4.5	TciValueDifferenceList .....	237
11.4	Mapping of the operations on the logging interface .....	238
11.4.0	Mapping rules .....	238
11.4.1	Event .....	238
11.4.2	The TCI-TL interface .....	238
11.4.2.1	TCI-TL provided .....	238
12	C# mapping .....	260
12.1	Introduction .....	260
12.2	Names and scopes .....	260
12.2.1	Names .....	260
12.2.2	Scopes .....	261
12.3	Null value mapping .....	261
12.4	Type mapping .....	261
12.4.1	Basic type mapping .....	261
12.4.1.0	Mapped types .....	261
12.4.1.1	TciVerdict .....	262
12.4.2	Structured type mapping .....	262
12.4.2.0	Mapping rules .....	262
12.4.2.1	TciParameterPassingModeType .....	262
12.4.2.2	TciParameterType .....	262
12.4.2.3	TciParameterListType .....	262
12.4.2.4	TciTypeClassType .....	263
12.4.2.5	TciTestComponentKindType .....	263
12.4.2.6	TciBehaviourIdType .....	264
12.4.2.7	TciTestCaseIdType .....	264
12.4.2.8	TciTestCaseIdListType .....	264
12.4.2.9	TciModuleIdType .....	264
12.4.2.10	TciModuleIdListType .....	264
12.4.2.11	TciModuleParameterIdType .....	265
12.4.2.12	TciModuleParameterType .....	265
12.4.2.13	TciModuleParameterListType .....	265
12.4.2.14	TciParameterTypeType .....	265
12.4.2.15	TciParameterTypeListType .....	266
12.4.2.16	TciMatchingTypeType .....	266
12.4.2.17	LengthRestriction .....	267
12.4.2.18	Permutation .....	267
12.4.2.19	RangeBoundary .....	267
12.4.3	Abstract type mapping .....	267
12.4.3.0	Mapping rules .....	267

12.4.3.1	Type .....	268
12.4.4	Abstract value mapping .....	269
12.4.4.0	Mapping rules .....	269
12.4.4.1	Value .....	269
12.4.4.2	IntegerValue .....	270
12.4.4.3	FloatValue .....	271
12.4.4.4	BooleanValue .....	271
12.4.4.5	CharstringValue .....	271
12.4.4.6	BitstringValue .....	271
12.4.4.7	OctetstringValue .....	272
12.4.4.8	UniversalCharstringValue .....	273
12.4.4.9	HexstringValue .....	274
12.4.4.10	RecordValue .....	275
12.4.4.11	RecordOfValue .....	275
12.4.4.12	UnionValue .....	276
12.4.4.13	EnumeratedValue .....	277
12.4.4.14	VerdictValue .....	277
12.4.4.15	AddressValue .....	277
12.4.5	Abstract template mapping .....	278
12.4.5.0	Mapping rules .....	278
12.4.5.1	MatchingMechanism .....	278
12.4.5.2	MatchingList .....	278
12.4.5.3	ValueRange .....	278
12.4.5.4	CharacterPattern .....	279
12.4.5.5	MatchDecodedContent .....	279
12.4.6	Abstract logging types mapping .....	279
12.4.6.0	Mapping rules .....	279
12.4.6.1	TciValueTemplate .....	279
12.4.6.2	TciNonValueTemplate .....	280
12.4.6.3	TciValueList .....	280
12.4.6.4	TciValueDifference .....	280
12.4.6.5	TciValueDifferenceList .....	281
12.4.6.6	TciStatusType .....	281
12.4.6.7	ComponentStatusType .....	281
12.4.6.8	TimerStatusType .....	281
12.5	Mapping of interfaces .....	282
12.5.0	Calling rules .....	282
12.5.1	TCI-TM interface .....	282
12.5.1.1	TCI-TM provided .....	282
12.5.1.2	TCI-TM required .....	283
12.5.2	TCI-CD interface .....	283
12.5.2.1	TCI-CD provided .....	283
12.5.2.2	TCI-CD required .....	283
12.5.3	TCI-CH interface .....	283
12.5.3.1	TCI-CH provided .....	283
12.5.3.2	TCI-CH required .....	284
12.5.4	TCI-TL interface .....	285
12.5.4.1	TCI-TL provided .....	285
12.6	Optional parameters .....	292
12.7	Error Handling .....	292
<b>Annex A (normative):</b>	<b>IDL Specification of TCI .....</b>	<b>293</b>
<b>Annex B (normative):</b>	<b>XML Mapping for TCI TL Provided .....</b>	<b>311</b>
B.0	Introduction .....	311
B.1	TCI-TL XML Schema for Simple Types .....	311
B.2	TCI-TL XML Schema for Types .....	312
B.3	TCI-TL XML Schema for Values .....	314
B.4	TCI-TL XML Schema for Templates .....	318