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SERIES Z: LANGUAGES AND GENERAL SOFTWARE
ASPECTS FOR TELECOMMUNICATION SYSTEMS

Formal description techniques (FDT) – Testing and Test
Control Notation (TTCN)

Testing and Test Control Notation version 3: TTCN-3 tabular presentation format (TFT)

ITU-T Recommendation Z.162

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ITU-T Recommendation Z.162

Testing and Test Control Notation version 3: TTCN-3 tabular presentation format (TFT)

Summary

ITU-T Recommendation Z.162 defines TFT, the Tabular Format for TTCN-3. TFT is the tabular presentation format for TTCN-3 (*Testing and Test Control Notation 3*) Core Language defined in [ITU-T Z.161]. It is similar in appearance and functionality to TTCN-2 defined in ITU-T Rec. X.292 for conformance testing. The tabular format provides an alternative way of displaying the core language as well as emphasizing those aspects that are particular to the requirements of a standardized conformance test suite. While the core language may be used independently of the tabular presentation format, the tabular format cannot be used without the core language. Use and implementation of the tabular presentation format shall be done on the basis of the core language. This Recommendation defines proformas, syntax mappings, additional static semantics, operational semantic restrictions, display and other attributes. Together, these characteristics form the tabular presentation format.

TFT inherits all the essential properties of the Core Language and is intended for specification of test suites that are independent of platforms, test methods, protocol layers and protocols. TTCN-3 can be used for 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 and APIs. The specification of test suites for physical layer protocols is outside the scope of this Recommendation.

Source

ITU-T Recommendation Z.162 was approved on 13 November 2007 by ITU-T Study Group 17 (2005-2008) under the ITU-T Recommendation A.8 procedure.

FOREWORD

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ITU-T Recommendation Z.162

Testing and Test Control Notation version 3: TTCN-3 tabular presentation format (TFT)

1 Scope

This Recommendation defines the tabular presentation format of TTCN Version 3 (or TTCN-3). This Recommendation is based on the TTCN-3 core language defined in [ITU-T Z.161].

The specification of other formats is outside the scope of this Recommendation.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

[ITU-T Z.161] ITU-T Recommendation Z.161 (2007), *Testing and Test Control Notation version 3: TTCN-3 core language*.

[ITU-T Z.164] ITU-T Recommendation Z.164 (2007), *Testing and Test Control Notation version 3: TTCN-3 operational semantics*.

3 Abbreviations

This Recommendation uses the following abbreviations and acronyms:

ASN.1	Abstract Syntax Notation One
ATS	Abstract Test Suite
BNF	Backus-Nauer Form
MTC	Master Test Component
PICS	Protocol Implementation Conformance Statement
PIXIT	Protocol Implementation eXtra Information for Testing
TFT	Tabular presentation Format for TTCN-3
TTCN	Testing and Test Control Notation

4 Introduction

The Tabular presentation Format for TTCN-3 (TFT) is a graphical format that is similar in appearance and functionality to earlier versions of TTCN, which are conformance testing oriented. The core language of TTCN-3 is defined in [ITU-T Z.161] and provides a full text-based syntax, static semantics as well as defining the use of the language with ASN.1. The operational semantics are defined in [ITU-T Z.164]. The tabular format provides an alternative way of displaying the core language as well as emphasizing those aspects that are particular to the requirements of a standardized conformance test suite.

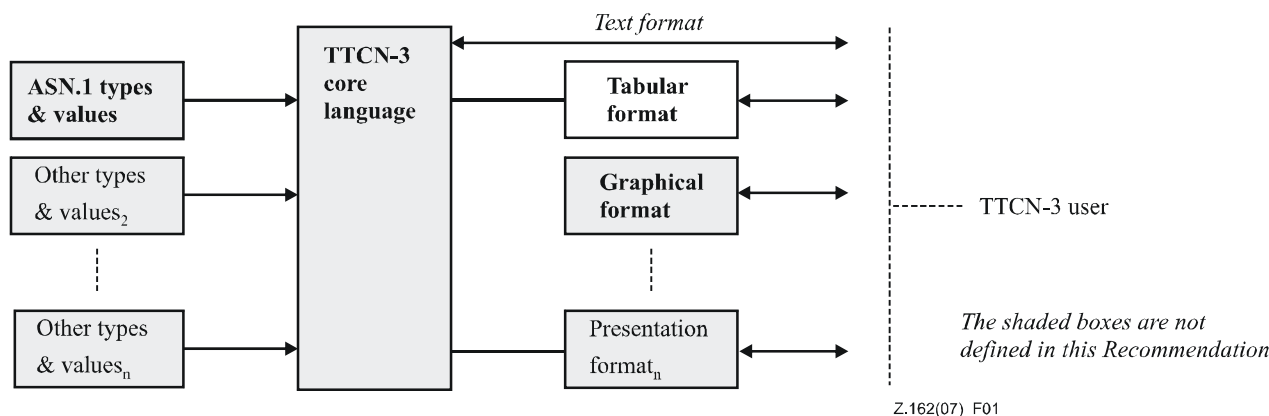


Figure 1 – User's view of the core language and the various presentation formats

The core language may be used independently of the tabular presentation format. However, the tabular format cannot be used without the core language. Use and implementation of the tabular presentation format shall be done on the basis of the core language.

This Recommendation defines the:

- proformas;
- syntax mappings;
- additional static semantics;
- operational semantic restrictions;
- display and other attributes.

Together these characteristics form the tabular presentation format.

5 Conventions

This clause defines the conventions, which have been used when defining the TTCN proformas and the TTCN core language grammar.

5.1 Syntactic metanotation

Table 1 defines the metanotation used to specify the extended BNF grammar for TTCN (henceforth called BNF).

Table 1 – The TTCN.MP syntactic metanotation

<code>::=</code>	is defined to be
<code>abc xyz</code>	abc followed by xyz
<code> </code>	alternative
<code>[abc]</code>	0 or 1 instances of abc
<code>{abc}</code>	0 or more instances of abc
<code>{abc}+</code>	1 or more instances of abc
<code>(...)</code>	textual grouping
<code>abc</code>	the non-terminal symbol abc
abc	a terminal symbol abc
<code>"abc"</code>	a terminal symbol abc

The BNF productions are defined in Annex A of [ITU-T Z.161].

5.2 Specification text

- a) **Bold text** shall be used for references to proforma fields.
- b) *Italics text* shall be used for references to the TTCN-3 core language BNF productions.
- c) **Bold courier new** text shall be used for core language keywords.

5.3 Proformas

- a) **Bold text** shall appear verbatim in each actual table in a TTCN-3 module.
- b) *Italics text* shall not appear verbatim in a TTCN-3 module. This font is used to indicate that actual text shall be substituted for the italicized symbol. Syntax requirements for the actual text can be found either following the definition of the proforma or in the TTCN-3 core language BNF. Square brackets before and after the *Italics text* indicates that inclusion of the text into the given field of the proforma is optional.

5.4 Core language

- a) **Bold text** of characters in quotes (e.g., '{') is used for reserved keywords and terminals in the core language.
- b) *Italics text* shall not appear verbatim in a TTCN-3 module. This font is used to indicate that actual text shall be substituted for the italicized symbol. Syntax requirements for the actual text can be found either following the definition of the proforma or in the TTCN-3 core language BNF.
- c) The "... " notation is a place holder for any arbitrary contents that is not explicitly shown.

5.5 General mapping rules

The mapping between the tabular presentation format and the TTCN-3 core language consists of a set of transformations. For every syntactical element within each proforma there is an associated transformation. The transformations make it also possible to transform any core language module into a tabular representation.

These transformations fall into two classes. The first class directly converts between a tabular element and a core language construct with the same meaning. The second class converts between a tabular element and an associated core language construct, which has no meaning at the core language level.

A typical example for the first class of transformations would be an identifier field. This field can be directly transformed from tabular to the core language and retains its meaning i.e., identifying same language element.

The second class of transformations is typically some form of comment or directive as to how a language element should be displayed in the presentation format. These elements have no direct meaning in the core language and are expressed using the *WithStatement*.

The syntax and semantics specified in this Recommendation are specific to the ETSI tabular presentation format. In order to unambiguously identify within the core language which presentation format is being used the following special display statement shall be specified as the first display statement associated with the TTCN-3 core language module:

```

1: module TTCN3ModuleId  "{"
2:   ...
3:   }" with "{"
4:     display "" "presentation format" "==" "ETSI Tabular version"
5:     MajorVersion "." MinorVersion "" ";
6:   ...
7:   }"

```

NOTE – All With Statements associated with a given proforma should be grouped together in a contiguous list.

The **Group** fields in the proformas are never translated into *WithStatements* but are derived from the actual group structure of the module specification.

6 Proformas

6.1 Test Suite Control

Test Suite Control			
Module Name	TTCN3ModuleId		
Version	[TabFreeText]		
Date	[TabFreeText]		
Base Standard Ref	[TabFreeText]		
Test Standard Ref	[TabFreeText]		
PICS Ref	[TabFreeText]		
PIXIT Ref	[TabFreeText]		
Test Method(s)	[TabFreeText]		
Encoding	[TabFreeText]		
Comments	[TabFreeText]		
Local Def Name	Type	Initial Value	Comments
[VarConstOrTimerIdentifier]	[ConstTypeOrTimer]	[Expression]	[TabFreeText]
...	...	...	...
Behaviour			
ModuleControlBody			
Detailed Comments	[TabFreeText]		

Figure 2 – Test Suite Control proforma

6.1.1 Mapping

The Test Suite Control proforma is translated into three parts. The first part consists of the header fields and the **Detailed Comments** field, which are converted to display attributes within the *WithStatement* associated with the overall TTCN-3 module. The **Module Name** field is mapped to the module identifier.

The second part consists of local constants, variables and timers defined in the control part. These definitions can occur anywhere in the control part of the core language, but for the proforma they are separated from the rest of the module control body and displayed in a separate table. The order of the definitions shall be preserved, since the definitions can depend on each other. The **Type** column shall be set to the keyword **timer** for all timers and to the constant type preceded by the keyword **const** for all constants. The **Comments** fields of the local definitions table are converted to display attributes within the *WithStatement* associated with the control part of the TTCN-3 core language module.

The third part is the control part of the TTCN-3 core language module minus the local constants, variables and timers.

```
1: module TTCN3ModuleId "{"
2:   control "{"
3:   var Type VarIdentifier [":=" Expression] ";"
4:   timer TimerIdentifier [":=" Expression] ";"
5:   const Type ConstIdentifier ":=" ConstantExpression;
6:   ModuleControlBody
7:   }" with "{"
8:     { VarConstOrTimerCommentsAttribute }
9:   }"
10: }" with "{"
11:   ModuleAttributes
12:   [EncodeAttribute;]
13: }"
```

Example:

Test Suite Control			
Module Name	Example1		
Version	1.01		
Date	19 July 2001		
Base Standards Ref	ITU-T Recommendation Q.123		
Test Standards Ref	ITU-T Recommendation Q.123.1		
PICS Ref	ITU-T Recommendation Q.123.2, Annex A		
PIXIT Ref	ITU-T Recommendation Q.123.2, Annex B		
Test Method(s)	local		
Encoding	BER		
Comments	ATS written by STF 133		
Local Def Name	Type	Initial Value	Comments
PI	const float	3.14	the ratio
x	float	PI * 2	double PI
t1	timer	15	a 15 second timer
Behaviour			
/* group1/ */ /* group1_1/ */ execute(test1); execute(test2); /* group1_2/ */ execute(test3); execute(test4); /* group2/ */ execute(test5);			
Detailed Comments	detailed comments		

Maps to:

```
1: module Example1 {
2:   control {
3:     const float PI := 3.14;
4:     var float x := PI * 2;
5:     timer t1 := 15;
6:
7:     /* group1/ */
8:     /* group1_1/ */
9:     execute(test1());
10:    execute(test2());
11:    /* group1_2/ */
12:    execute(test3());
13:    execute(test4());
14:    /* group2/ */
15:    execute(test5());
16:  } with {
17:    display (PI) "comments := the ratio";
18:    display (x) "comments := double PI";
19:    display (t1) "comments := a 15 second timer";
20:  }
21: } with {
22:   display "presentation format := ETSI Tabular version 1.0";
23:   display "module version := 1.01";
24:   display "module date := 19 July 2001";
25:   display "module base standards ref := ITU-T Recommendation Q.123";
26:   display "module test standards ref := ITU-T Recommendation Q.123";
27:   display "module pics ref := ITU-T Recommendation Q.123, Annex A";
28:   display "module pixit ref := ITU-T Recommendation Q.123, Annex B";
29:   display "module test method := local";
30:   display "module comments := ATS written by STF 133";
31:   display "module detailed comments := detailed comments";
32:   encode "BER";
33: }
```

6.2 Test Suite Parameters

Test Suite Parameters				
Name	Type	Initial Value	PICS/PIXIT Ref	Comments
<i>ModuleParIdentifier</i>	<i>ModuleParType</i>	<i>[ConstantExpression]</i>	<i>[TabFreeText]</i>	<i>[TabFreeText]</i>
Detailed Comments	<i>[TabFreeText]</i>			

Figure 3 – Test Suite Parameters proforma

6.2.1 Mapping

All entries in the Test Suite Parameters proforma are mapped to the *ModuleParLists* in *ModuleParameterDefs* of the associated TTCN-3 module. If there is more than one *ModuleParameterDef* then all *ModuleParLists* are collected and represented in one **Test Suite Parameters** proforma.