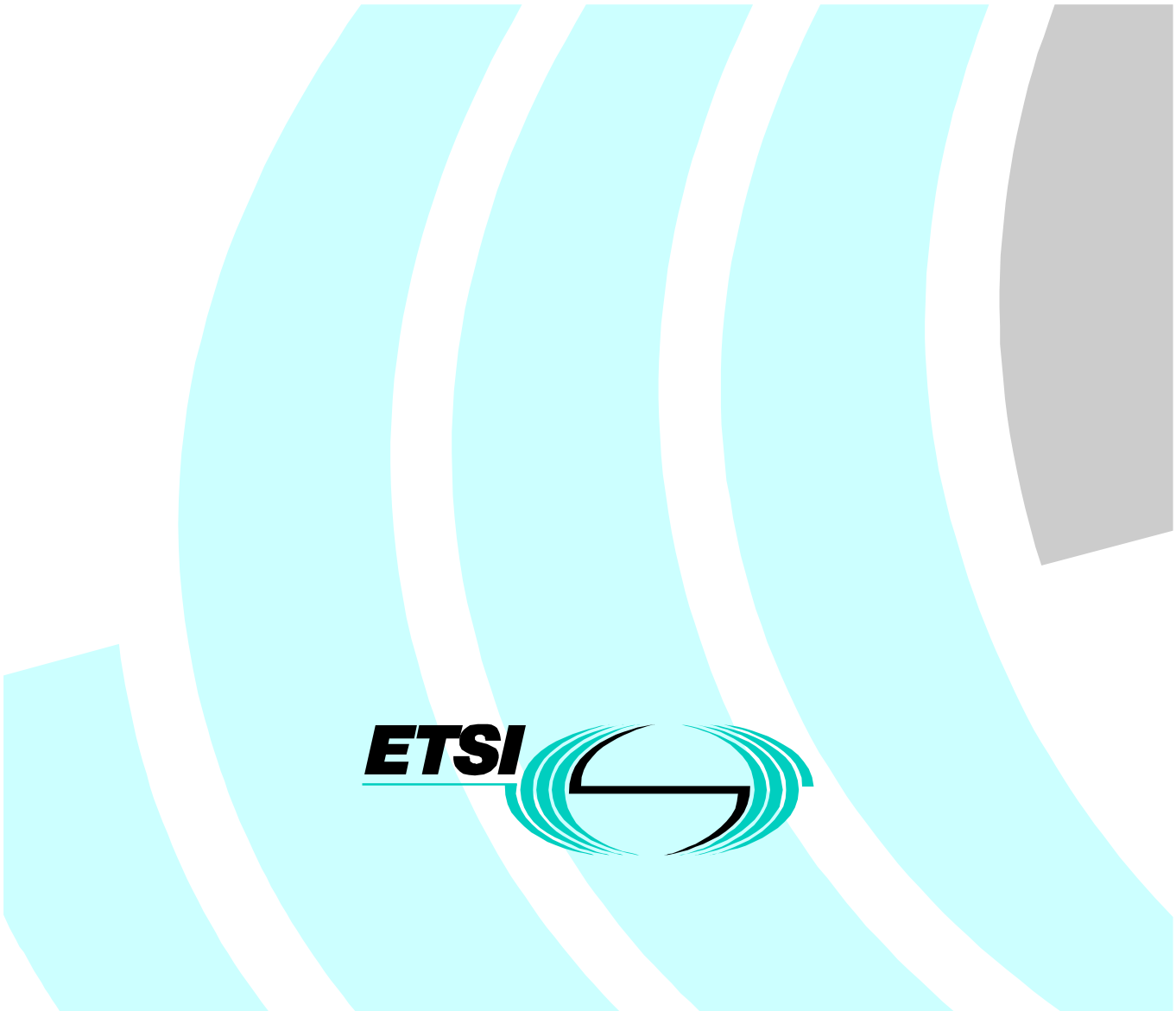
ETSI TR 101 874 V1.1.1 (2000-12)

Technical Report

Methods for Testing and Specification (MTS);
The Tree and Tabular Combined Notation version 3;
TTCN-3: TTCN-2 to TTCN-3 Mapping



Reference
DTR/MTS-00069

Keywords
MTS, testing, TTCN

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

Contents

Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: *"Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards"*, which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (http://www.etsi.org/ipr).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Foreword

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

1 Scope

The present document gives guidance on how to map TTCN-2 [2] to TTCN-3 [1]. It is intended for TTCN-3 tool implementers as well as TTCN-3 users. While every effort has been taken to provide as comprehensive guidelines as possible the present document does not necessarily cover every detail of translating between the two languages.

2 References

For the purposes of this Technical Report (TR) the following references apply:

[1] ETSI ES 201 873-1: "Methods for Testing and Specification (MTS), The Tree and Tabular Combined Notation version 3, TTCN-3: Core language".

[2] ISO/IEC 9646-3 (1998): "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 3: The Tree and Tabular Combined Notation (TTCN)".

3 Abbreviations

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

PICS	Protocol Implementation Conformance Statement
PIXIT	Protocol Implementation eXtra Information for Testing
TTCN	Tree and Tabular Combined Notation

4 Introduction

From a syntactical point of view TTCN-3 is very different from earlier versions of TTCN. However, much of the well-proven basic functionality of TTCN has been retained, and in some cases enhanced. The present document gives basic guidelines on how to port TTCN-2 code to TTCN-3 code.

5 Mapping

This clause provides an overview of the mapping from TTCN-2 to TTCN-3 by considering the tabular format of both languages. For each TTCN-2 proforma there is a description of how this is transformed to a TTCN-3 equivalent by considering each constituent field in turn.

5.1 Test Suite Structure

5.1.1 Test Suite Name

The test suite name is converted to the name of the associated TTCN-3 module in the TTCN-3 tabular Reference proforma.

5.1.2 Standards Reference

Converted to Base Standard Ref in TTCN-3 Tabular Reference proforma.

5.1.3 PICS Reference

Converted to PICS Ref in TTCN-3 Tabular Reference proforma.

5.1.4 PIXIT Reference

Converted to PIXIT Ref in TTCN-3 Tabular Reference proforma.

5.1.5 Test Method

Converted to Test method in TTCN-3 Tabular Reference proforma.

5.1.6 Test Group List

Information discarded, in TTCN-3 it is left to the tool to generate this list outside the language.

5.1.7 Test Group Selection Reference

The test Group reference and associated selection expression reference must be converted into the TTCN-3 Tabular function proformas and the Test Suite control proforma. Each testgroup should be converted into a function. With the function calling all the contained testgroups (function calls) and testcases (execute operations) from within its body. All selection expressions can then be transformed to if statements at the appropriate place (i.e. where the testgroup or testcase is called). The functions representing the outmost testgroups should then be called from the control proforma. The testcases for each testgroup are extracted form the TTCN-2 testcaselist proforma.

EXAMPLE:

The following TTCN-2 test suite structure:

group1/
  group1_1/
    test1
    test2
  group1_2/
    test3
    test4
group2/
  test5

Will translate to the following (shown in core language representation):

```
module MyModule()
{
 group TestsuiteStructure {

     function group1(){
         if( CAP_1) { group1_1()}
         if( sel2()){ group1_2()}
     }


     function group1_1(){
         execute( test1());
         execute( test2());
     }


     function group1_2(){
         execute( test3());
         execute( test4());
     }


     function group2(){
         execute( test5());
     }

 } // end of testsuite structure

 control{
         group1();
         if( IC > 10) { group2()}
 }
}
```

5.2 Test Case Index

5.2.1 Test Case list and description

The testcase list is converted into the TTCN-3 Tabular Function proforma, by listing each testcase under its associated test group.

5.2.2 Test Case selection Reference

The testcase selection reference is converted into the TTCN-3 Tabular Test suite function proforma as an if statement around the associated execute operation.

5.3 Test Step Index

5.3.1 Test Step List and description

The test step index information is discarded. This is information is needed should be automatically generated by the associated tools.

5.4 Default Index

5.4.1 Default List and description

The Default List information is discarded. This is information is needed should be automatically generated by the associated tools.

5.5 Test Suite Exports

5.5.1 Export list

The Exports information is discarded. TTCN-3 has no concept of exports lists the references of definitions from other modules is purely controlled by the import mechanism.

5.6 Imports

5.6.1 Imports list

The Imports list is converted to the TTCN-3 tabular Imports proforma.

5.7 Simple Type Definitions

5.7.1 List of type definitions

The Simple Type definitions are converted to the TTCN-3 tabular Simple types proforma.

5.7.2 Optional encoding reference

The encoding reference is copied to the encoding reference in the TTCN-3 tabular SimpleTypes proforma.

5.7.3 Group Reference

The group reference is copied to the group reference in the TTCN-3 tabular SimpleTypes proforma.

5.8 Structured Type Definitions

5.8.1 Single tabular type definition

The structured type definition is converted to the TTCN-3 tabular Structured type proforma.

5.8.2 Encoding reference per field

The encoding reference is copied to the field encoding in the TTCN-3 Structured type proforma.

5.8.3 Encoding variation for overall type

The overall encoding is copied to the Encoding field in the TTCN-3 Structured type proforma.

5.8.4 Group Reference

The group reference is copied to the TTCN-3 Structured type proforma.

5.9 ASN.1 Type Definitions

5.9.1 Single (visible) ASN.1 type definition

The ASN.1 type must be copied to a separate ASN.1 module (there is no direct way within the tabular to specify ASN.1 only to reference definitions in external ASN.1 modules) and added to the import list in the TTCN-3 Tabular Imports proforma.

5.9.2 Encoding variation for overall type

The encoding variation must be copied into the encoding field of the relevant TTCN-3 Tabular Imports proforma.

5.9.3 Group Reference

The group reference information relative to ASN.1 definitions can be translated into the naming of the generated ASN.1 modules.

5.10 ASN.1 Type Definitions By Reference

5.10.1 List of type references

The ASN.1 types must be translated into one or more TTCN-3 Tabular Imports proformas.

5.10.2 Encoding variation per type

The encoding variation must be copied into the encoding field of the relevant TTCN-3 Tabular Imports proforma.

5.11 Test Suite Operation Procedural Definition

5.11.1 Single operation specification

The operation specification should be converted to a TTCN-3 Function proforma.

5.11.2 Result type

The result type is copied into the Return type field of the TTCN-3 Function proforma.

5.11.3 Parameterization

The operation parameters are translated into the function parameter list within the TTCN-3 Function proforma.

5.11.4 Group reference

The group reference is copied into the group reference field of the TTCN-3 Function proforma.

5.12 Test Suite Operation Description

5.12.1 Single operation description (text)

The operation description should be converted into a comment block within to a TTCN-3 Function proforma. The function will be specified as **`external`** (by prepending the external keyword before the function identifier.

5.12.2 Result type

The operation parameters are translated into the function parameter list within the TTCN-3 Function proforma.

5.12.3 Group reference

The group reference is copied into the group reference field of the TTCN-3 Function proforma.

5.13 Test Suite Parameter Declarations

5.13.1 List of constants derived from PICS and PIXIT

The PICS and PIXIT definitions shall be converted to entries in the TTCN-3 tabular Test Suite Parameter proforma.

5.13.2 Default value specification

Default values are not directly translated into TTCN-3. Note in TTCN-3 the setting of all PICS and PIXIT values is considered as external to the TTCN definition and therefore the setting of the default values is also a function of external tools.

5.13.3 PICS/PIXIT reference

The PICS/PIXIT reference is copied into the associated field of the TTCN-3 tabular Test Suite Parameter proforma.

5.13.4 Group reference

The Group reference is copied into the associated field of the TTCN-3 tabular Test Suite Parameter proforma.

5.14 Test Case Selection Expression Definitions

List of selection expressions

The selection expressions should be translated into functions returning a **`boolean`** value. Therefore the body of the selection expression is copied into a TTCN-3 tabular function proforma.

5.15 Group reference

The Group reference is copied into the associated field of the TTCN-3 tabular Function proforma.

5.16 Test Suite Constant Declarations

5.16.1 List of constants

The test suite constants should be copied into a TTCN-3 tabular constants proforma.

5.16.2 Group reference

The Group reference is copied into the associated field of the TTCN-3 tabular constants proforma.

5.17 Test Suite Constant Declarations By Reference

5.17.1 List of constant references

The constant references should be converted into entries with in a TTCN-3 tabular imports proforma.

5.17.2 Group reference

The Group reference is copied into the associated field of the TTCN-3 tabular imports proforma.

5.18 Test Suite Variable Declarations

5.18.1 List of Global variables

The list of global variables should be copied into the TTCN-3 tabular test suite control proforma.

5.18.2 Value initialization

The value initialization should be copied into the associated field of the TTCN-3 tabular test suite control proforma.

5.18.3 Group reference

The group reference may be copied into the associated comment field of the TTCN-3 tabular test suite control proforma.

5.19 Test Case Variable Declarations

5.19.1 List of local variable

The set of testcase variables must be copied into the variable list of each generated TTCN-3 tabular testcase proforma.

5.19.2 Value initialization

The value initialization is copied into the appropriate field of the TTCN-3 tabular testcase proforma.

5.19.3 Group reference

The group reference information for test case variables is discarded.

5.20 PCO Type Declarations

5.20.1 List of PCO types

Each PCO type is converted into a TTCN-3 tabular port type proforma.

5.20.2 Reference to PCO role

The PCO role is added to the comment field of the TTCN-3 tabular port type proforma.

5.20.3 Group reference

The group reference is copied to the associated field of the TTCN-3 tabular port type proforma.

5.21 PCO Declarations

5.21.1 List of PCO names

The PCO declaration together with the CP declaration and Component declaration are converted into the TTCN-3 tabular Component type proforma.

5.21.2 Group reference

The group reference for PCOs is discarded.

5.22 CP Declarations

5.22.1 List of CPs

The PCO declaration together with the CP declaration and Component declaration are converted into the TTCN-3 tabular Component type proforma.

5.22.2 Group reference

The group reference for CPs is discarded.

5.23 Timer Declarations

5.23.1 List of timers

The set of timers must be copied into the variable and timer list for each generated TTCN-3 tabular testcase proforma.

5.23.2 Duration definition

This field is converted into seconds and copied into the associated field of the TTCN-3 tabular Testcase Proforma.

5.23.3 Units of duration definition

This field is used for the value conversion and then discarded.

5.23.4 Group reference

This field is discarded.

5.24 Test Component Declarations

5.24.1 List of components

The PCO declaration together with the CP declaration and Component declaration are converted into the TTCN-3 tabular Component type proforma.

5.24.2 Component Role specification

The component role can be added as a comment in the Component type proforma.

5.24.3 Number of PCOs per component

This field is used to generate the port list for the component.

5.24.4 Number of CPs per component

This field is used to generate the port list for the component.

5.24.5 Group reference

The group reference is copied into the associated field of the component type proforma.

5.25 Test Component Configuration Declaration

5.25.1 List of Components Used

The components used must be converted into **`create`** statements at the beginning of the test case behaviour within every TTCN-3 tabular test case proforma.

5.25.2 List of PCOs USED

Information discarded.

5.25.3 List of CPs Used

Information discarded.

5.25.4 Group reference

Information discarded.

5.26 ASP Type Definition

5.26.1 Single tabular ASP type definition

Converted into TTCN-3 tabular structured type proforma.

5.26.2 List of field names and types

Copied into body of TTCN-3 tabular structured type proforma.

5.26.3 PCO type reference

Converted into entry within the appropriate port type proforma for the specified PCO.

5.26.4 Group reference

The group reference is copied to the appropriate field of the TTCN-3 tabular type proforma.

5.27 ASN.1 ASP Type Definition

5.27.1 Single ASP type definition

The ASN.1 type must be copied to a separate ASN.1 module (there is no direct way within the tabular to specify ASN.1 only to reference definitions in external ASN.1 modules) and added to the import list in the TTCN-3 Tabular Imports proforma.

5.27.2 PCO type reference

Converted into entry within the appropriate port type proforma for the specified PCO.

5.27.3 Group reference

The group reference information relative to ASN.1 definitions can be translated into the naming of the generated ASN.1 modules.

5.28 ASN.1 ASP Type Definitions By Reference

5.28.1 List of ASP type references

Convert to a TTCN-3 tabular imports proforma.

5.28.2 Group reference

The group reference information is discarded.

5.29 PDU Type Definition

5.29.1 Single tabular PDU definition

The PDU type definition is converted to the TTCN-3 tabular Structured type proforma.

5.29.2 PCO type reference

Converted into entry within the appropriate port type proforma for the specified PCO.

5.29.3 Encoding reference per field

The encoding reference is copied to the field encoding in the TTCN-3 Structured type proforma.

5.29.4 Encoding variation for overall type

The overall encoding is copied to the Encoding field in the TTCN-3 Structured type proforma.

5.29.5 Group Reference

The group reference is copied to the TTCN-3 Structured type proforma.

5.30 ASN.1 PDU Type Definition

5.30.1 Single PDU definition

The ASN.1 PDU type must be copied to a separate ASN.1 module (there is no direct way within the tabular to specify ASN.1 only to reference definitions in external ASN.1 modules) and added to the import list in the TTCN-3 Tabular Imports proforma.

5.30.2 PCO type reference

Converted into entry within the appropriate port type proforma for the specified PCO.

5.30.3 Overall encoding rule reference

The encoding reference must be converted into the encoding field associated with the TTCN-3 tabular imports proforma.

5.30.4 Overall encoding variation reference

The encoding reference must be converted into the encoding field associated with the TTCN-3 tabular imports proforma.

5.30.5 Group reference

The group reference information relative to ASN.1 definitions can be translated into the naming of the generated ASN.1 modules.

5.31 ASN.1 PDU Type Definitions By Reference

5.31.1 List of referenced ASN.1 PDU types

Convert to a TTCN-3 tabular imports proforma.

5.31.2 PCO type reference

Converted into entry within the appropriate port type proforma for the specified PCO.

5.31.3 Overall encoding rule reference

The encoding reference must be converted into the encoding field associated with the TTCN-3 tabular imports proforma.

5.31.4 Overall encoding variation reference

The encoding reference must be converted into the encoding field associated with the TTCN-3 tabular imports proforma.

5.31.5 Group reference

The group reference information is discarded.

5.32 Encoding Definitions

5.32.1 List of encoding rules

The encoding definitions are copied into a TTCN-3 tabular encoding proforma.

5.32.2 Encoding rule reference per entry

The reference is directly copied into the appropriate field of the TTCN-3 tabular encoding proforma.

5.32.3 Default expression (to determine default encoding rule)

The default expression is directly copied into the appropriate field of the TTCN-3 tabular encoding proforma.

5.32.4 Group reference

The group reference is directly copied into the appropriate field of the TTCN-3 tabular encoding proforma.

5.33 Encoding Variations

5.33.1 List of encoding variations

The encoding variations are also copied into a TTCN-3 tabular encoding proforma.

5.33.2 Encoding rule reference per entry

The reference is directly copied into the appropriate field of the TTCN-3 tabular encoding proforma.

5.33.3 Default expression (to determine default encoding rule)

The default expression is directly copied into the appropriate field of the TTCN-3 tabular encoding proforma.

5.33.4 Group reference

The group reference is directly copied into the appropriate field of the TTCN-3 tabular encoding proforma.

5.34 Invalid Field Encoding Operation Definition

5.34.1 Specification of single encoding operation

The operation specification should be converted to a TTCN-3 Function proforma.

5.34.2 Result type

The result type is copied into the Return type field of the TTCN-3 Function proforma.

5.34.3 Parameterization

The operation parameters are translated into the function parameter list within the TTCN-3 Function proforma.

5.34.4 Group reference

The group reference is copied into the group reference field of the TTCN-3 Function proforma.

5.35 CM Type Definitions

5.35.1 Single tabular CM type definition

The CM type definition is converted to the TTCN-3 tabular Structured type proforma.

5.35.2 Group Reference

The group reference is copied to the TTCN-3 Structured type proforma.

5.36 ASN.1 CM Type Definitions

5.36.1 Single CM type definition

The ASN.1 CM type must be copied to a separate ASN.1 module (there is no direct way within the tabular to specify ASN.1 only to reference definitions in external ASN.1 modules) and added to the import list in the TTCN-3 Tabular Imports proforma.

5.36.2 Group reference

The group reference information relative to ASN.1 definitions can be translated into the naming of the generated ASN.1 modules.

5.37 Alias Definitions

5.37.1 List of alias definitions

The alias information is not converted into TTCN-3. This means that any conversion tool must convert all alias names to full names.

5.37.2 Group reference

This information is discarded.

5.38 Structured Type Constraints Declarations

5.38.1 Single tabular constraint

The Type constraint should be converted into a TTCN-3 tabular template proforma.

5.38.2 List of field values

The list of field values should be copied into the body of the TTCN-3 tabular template proforma.

5.38.3 Encoding specified per field

Should be copied into the body of the TTCN-3 tabular template proforma.

5.38.4 Structured type reference

The type reference field should be copied into the relevant field of the TTCN-3 tabular template proforma.

5.38.5 Derivation path

The derivation path should be copied into the relevant field of the TTCN-3 tabular template proforma.

5.38.6 Encoding variation

Should be copied into the body of the TTCN-3 tabular template proforma.

5.38.7 Parameterization

The parameter list should be copied into the relevant field of the TTCN-3 tabular template proforma.

5.38.8 Group reference

The group reference should be copied into the relevant field of the TTCN-3 tabular template proforma.

5.39 ASP Constraints Declaration

5.39.1 Single tabular constraint

The ASP constraint should be converted into a TTCN-3 tabular template proforma.

5.39.2 List of field values

The list of field values should be copied into the body of the TTCN-3 tabular template proforma.

5.39.3 ASP type reference

The type reference field should be copied into the relevant field of the TTCN-3 tabular template proforma.

5.39.4 Derivation path

The derivation path should be copied into the relevant field of the TTCN-3 tabular template proforma.

5.39.5 Parameterization

The parameter list should be copied into the relevant field of the TTCN-3 tabular template proforma.

5.39.6 Group reference

The group reference should be copied into the relevant field of the TTCN-3 tabular template proforma.

5.40 PDU Constraints Declaration

5.40.1 Single tabular constraint

The PDU constraint should be converted into a TTCN-3 tabular template proforma.

5.40.2 List of field values

The list of field values should be copied into the body of the TTCN-3 tabular template proforma.

5.40.3 Encoding specified per field

Should be copied into the body of the TTCN-3 tabular template proforma.

5.40.4 Structured type reference

The PDU reference field should be copied into the relevant field of the TTCN-3 tabular template proforma.

5.40.5 Derivation path

The derivation path should be copied into the relevant field of the TTCN-3 tabular template proforma.

5.40.6 Encoding variation

Should be copied into the body of the TTCN-3 tabular template proforma.

5.40.7 Parameterization

The parameter list should be copied into the relevant field of the TTCN-3 tabular template proforma.

5.40.8 Group reference

The group reference should be copied into the relevant field of the TTCN-3 tabular template proforma.

5.41 CM Constraints Declaration

5.41.1 Single tabular constraint

The CM constraint should be converted into a TTCN-3 tabular template proforma.

5.41.2 List of field values

The list of field values should be copied into the body of the TTCN-3 tabular template proforma.

5.41.3 Structured type reference

The type reference field should be copied into the relevant field of the TTCN-3 tabular template proforma.

5.41.4 Derivation path

The derivation path should be copied into the relevant field of the TTCN-3 tabular template proforma.

5.41.5 Parameterization

The parameter list should be copied into the relevant field of the TTCN-3 tabular template proforma.

5.41.6 Group reference

The group reference should be copied into the relevant field of the TTCN-3 tabular template proforma.

5.42 ASN.1 Type Constraint Declaration

5.42.1 Single constraint

The ASN.1 Type constraint should be converted into a TTCN-3 tabular template proforma.

5.42.2 List of field values

The list of field values should be converted into the body of the TTCN-3 tabular template proforma.

5.42.3 Encoding specified per field

Should be copied into the body of the TTCN-3 tabular template proforma.

5.42.4 ASN.1 type reference

The type reference field should be copied into the relevant field of the TTCN-3 tabular template proforma.

5.42.5 Derivation path

The derivation path should be copied into the relevant field of the TTCN-3 tabular template proforma.

5.42.6 Encoding variation

Should be copied into the body of the TTCN-3 tabular template proforma.

5.42.7 Parameterization

The parameter list should be copied into the relevant field of the TTCN-3 tabular template proforma.

5.42.8 Group reference

The group reference should be copied into the relevant field of the TTCN-3 tabular template proforma.

5.43 ASN.1 ASP Constraint Declaration

5.43.1 Single constraint

The ASN.1 ASP constraint should be converted into a TTCN-3 tabular template proforma.

5.43.2 List of field values

The list of field values should be converted into the body of the TTCN-3 tabular template proforma.

5.43.3 Encoding specified per field

Should be copied into the body of the TTCN-3 tabular template proforma.

5.43.4 ASN.1 type reference

The type reference field should be copied into the relevant field of the TTCN-3 tabular template proforma.

5.43.5 Derivation path

The derivation path should be copied into the relevant field of the TTCN-3 tabular template proforma.

5.43.6 Parameterization

The parameter list should be copied into the relevant field of the TTCN-3 tabular template proforma.

5.43.7 Group reference

The group reference should be copied into the relevant field of the TTCN-3 tabular template proforma.

5.44 ASN.1 PDU Constraint Declaration

5.44.1 Single constraint

The ASN.1 PDU constraint should be converted into a TTCN-3 tabular template proforma.

5.44.2 List of field values

The list of field values should be converted into the body of the TTCN-3 tabular template proforma.

5.44.3 Encoding specified per field

Should be copied into the body of the TTCN-3 tabular template proforma.

5.44.4 ASN.1 type reference

The type reference field should be copied into the relevant field of the TTCN-3 tabular template proforma.

5.44.5 Derivation path

The derivation path should be copied into the relevant field of the TTCN-3 tabular template proforma.

5.44.6 Encoding variation

Should be copied into the body of the TTCN-3 tabular template proforma.

5.44.7 Parameterization

The parameter list should be copied into the relevant field of the TTCN-3 tabular template proforma.

5.44.8 Group reference

The group reference should be copied into the relevant field of the TTCN-3 tabular template proforma.

5.45 ASN.1 CM Constraint Declaration

5.45.1 Single constraint

The ASN.1 CM constraint should be converted into a TTCN-3 tabular template proforma.

5.45.2 List of field values

The list of field values should be converted into the body of the TTCN-3 tabular template proforma.

5.45.3 Encoding specified per field

Should be copied into the body of the TTCN-3 tabular template proforma.

5.45.4 ASN.1 CM reference

The type reference field should be copied into the relevant field of the TTCN-3 tabular template proforma.

5.45.5 Derivation path

The derivation path should be copied into the relevant field of the TTCN-3 tabular template proforma.

5.45.6 Parameterization

The parameter list should be copied into the relevant field of the TTCN-3 tabular template proforma.

5.45.7 Group reference

The group reference should be copied into the relevant field of the TTCN-3 tabular template proforma.

5.46 Test case Dynamic Behaviour

The testcase dynamic behaviour must be converted into a TTCN-3 tabular Testcase proforma.

5.46.1 Sequential behaviour

In TTCN-2 sequential behaviour is described by successively incremented levels of indentation:

```
A
  B
    C
```

In TTCN-3 sequential behaviour is expressed by a sequence of statements:

```
A;
B;
C;
```

5.46.2 Alternative behaviour

Alternative behaviour in TTCN-2:

```
A
B
C
```

is translated to:

```
alt {
  [] A;
  [] B;
  [] C;
}
```

In general a TTCN-2 statement line

Event ***[****Qualifier****]*** ***(****AssignmentList****)*** *TimerOps*

will be translated to

```
alt {
  :
  [Qualifier] Event { AssignmentList ; TimerOps }
  :
}
```

If the statement line specifies a qualifier and is the only alternative on its level of indentation (ie., sequential behaviour), instead of embracing it with the **alt**-construct, the **if**-construct may be used:

if (Qualifier**) {** *Event* **;** *AssignmentList* **;** *TimerOps* **}**

In cases, where a qualifier is not specified, only the following remains:

Event **;** *AssignmentList* **;** *TimerOps*

5.46.3 Events

It is required to have the TTCN-2 constraints appropriately mapped to TTCN-3 templates. It is also necessary that TTCN-3 ports are defined that reflect the corresponding TTCN-2 PCOs and CPs.

5.46.3.1 Receive

The RECEIVE event:

A?*B* with constraint *C*

is translated to:

A.receive(*C*);

With *C* referring to a (parameterised) TTCN-3 template the data type (B) must not be specified:

A?*B* without a constraint;

is translated to:

A.receive(*B*:*);

5.46.3.2 Send

The SEND event:

A!*B* with constraint *C;*

is translated to:

A.send(*C*);

With *C* referring to a (parameterized) TTCN-3 template the data type (B) must not be specified.

5.46.3.3 The IMPLICIT SEND event

The corresponding TTCN-3 construct is the sut.action statement. It allows a (parameterised) template or an arbitrary text string to be passed to the system under test.

<IUT!*B*> with constraint C

is translated to:

sut.send(*C*).

5.46.3.4 Otherwise

The OTHERWISE event:

A?OTHERWISE;

is translated to:

A.receive.

5.46.3.5 Timeout

The TIMEOUT event:

?TIMEOUT *T*;

is translated to:

T.timeout.

5.46.3.6 Done

The DONE event:

?DONE(*PTC1*);

could be translated to:

PTC1.done.

5.46.4 Timer operations

In TTCN-3 timer operations are normal behaviour statements.

5.46.4.1 The START operation

Starting two timers with default durations:

START *T0*, START *T1*

is translated to:

T0.start;
T1.start;

Starting a timer with a duration value overriding the default duration:

START *T0* (*V0*)

is translated to

T0.start(*V0*);

Whereas in TTCN-2 *V0* had to evaluate to a positive, non-zero INTEGER, it must evaluate to a value of type float in TTCN-3.

5.46.4.2 The CANCEL operation

A running timer is stopped by means of the stop operation:

STOP *T0*

is translated to

T0.stop;

5.46.4.3 The READTIMER operation

READTIMER *T0* (*PASSED_TIME*)

is translated to:

PASSED_TIME := *T0*.read;

Whereas in TTCN-2 the type of the *PASSED_TIME* variable had to be INTEGER, it must be float in TTCN-3.

5.46.5 Other constructs

5.46.5.1 The ATTACH construct

In TTCN-2 the attached sub-tree can be a local sub-tree of the attaching test step or it can be a test step itself. Whenever it is possible to translate the sub-tree to a named alternative (named alt) in TTCN-3, this should be done.

If the ATTACH construct appears within sequential behaviour, it will be translated as follows:

A
 +SUB_TREE
  B

is translated to

A; SUB_TREE; B;

If the ATTACH construct appears as an alternative within a set of alternatives:

A
+*SUB_TREE*
B

is translated to

```
alt {
  [] A;
  [expand] SUB_TREE;
  [] B;
}
```

In cases, where a sub-tree (test step) cannot be translated to a named alternative in TTCN-3, it has to be translated to a function. This is necessary, e. g. when an attached test step defines its own defaults: In TTCN-3 default expansion is performed after the expansion of named alternatives - so the default trees of the attaching tree would unavoidably be expanded into the text of the attached tree. Unfortunately, if a sub-tree is represented by a function instead of a named alternative, it cannot be used as an alternative within a set of alternatives.

5.46.5.2 Labels and the GOTO statement

If a TTCN-2 behaviour line contains an entry in the Label column, it is translated by defining the label first:

LABEL A!B C

is translated to

```
label LABEL;
A.send(C);
```

Within an alt-construct, a label definition must not occur outside a statement block.

5.46.5.3 The REPEAT statement

REPEAT *STEP1* UNTIL [*FLAG*]

is translated to

```
do {
  STEP1;
} while (not FLAG);
```

5.46.5.4 The RETURN statement

The TTCN-2 RETURN statement shall only be used in a Default trees.

RETURN

is translated to the TTCN-3 statement

```
goto alt;
```

5.46.5.5 Default behaviour

The ACTIVATE statement

The TTCN-2 RETURN statement shall only be used in a Default trees.

ACTIVATE(*DEF1*,*DEF2*)

is translated to the TTCN-3 statements

```
deactivate;
activate(DEF1,DEF2);
```

The deactivate statement is necessary, because the TTCN-2 ACTIVATE implicitly deactivates all previously activated default behaviour.

In TTCN-2 deactivation of all default behaviour is achieved by

ACTIVATE()

The TTCN-3 equivalent is

deactivate;

5.47 Test Step Dynamic Behaviour

The teststep dynamic behaviour should be converted into the TTCN-3 tabular Named Alternative proforma or under certain circumstances a TTCN-3 tabular Function proforma (see 4.45.5.1 for clarification).

5.47.1 List of behaviour statements in tree structure

The behaviour is translated as specified for testcases in clause 4.45.

5.47.2 Parameterization

The parameters are copied to the parameter list of the relevant TTCN-3 proforma.

5.47.3 Purpose

The field should be copied to the purpose field of the named alternative or the comment field of the function proforma.

5.47.4 Group reference

This field should be copied into the group field of the relevant TTCN-3 tabular proforma.

5.48 Default Dynamic Behaviour

The default behaviour should be converted into the TTCN-3 tabular default behaviour proforma.

5.48.1 List of behaviour statements in tree structure

The behaviour is translated as specified for testcases in clause 4.45.

5.48.2 Parameterization

The parameters are copied to the parameter list of the Named Alternative TTCN-3 proforma.

5.48.3 Purpose

The field should be copied to the purpose field of the named alternative proforma.

5.48.4 Group reference

This field should be copied into the group field of the named Alternative TTCN-3 tabular proforma.

Proformas (48) to (51) in [2] are not considered since they can be handled in an analogous way to the first four TTCN-2 proformas.

History

Document history		
V1.1.1	December 2000	Publication