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Methods for Testing and Specification (MTS);
The Test Description Language (TDL);
Part 2: Graphical Syntax

Reference
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Foreword

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

The present document is part 2 of a multi-part deliverable. Full details of the entire series can be found in part 1 [1].

Modal verbs terminology

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

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1 Scope

The present document specifies the concrete graphical syntax of the Test Description Language (TDL). The intended use of the present document is to serve as the basis for the development of graphical TDL tools and TDL specifications. The meta-model of TDL and the meanings of the meta-classes are described in ETSI ES 203 119-1 [1].

2 References

2.1 Normative references

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

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

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

[1] ETSI ES 203 119-1 (V1.3.1): "Methods for Testing and Specification (MTS); The Test Description Language (TDL); Part 1: Abstract Syntax and Associated Semantics".

2.2 Informative references

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

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

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] ETSI TS 136 523-1 (V10.2.0) (10-2012): "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Packet Core (EPC); User Equipment (UE) conformance specification; Part 1: Protocol conformance specification (3GPP TS 36.523-1 version 10.2.0 Release 10)".

[i.2] ETSI TS 186 011-2 (V3.1.1) (06-2011): "IMS Network Testing (INT); IMS NNI Interoperability Test Specifications; Part 2: Test Description for IMS NNI Interoperability".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

diagram: placeholder of TDL shapes

lifeline: vertical line originates from a gate instance or a component instance, to which behavioural elements may be attached

NOTE: A lifeline from top to down represents how time passes.

shape: layout of the graphical representation of a TDL meta-class

3.2 Abbreviations

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

EBNF	Extended Backus-Naur Form
IMS	IP Multimedia Subsystem
OCL	Object Constraint Language
TDL	Test Description Language
URI	Unified Resource Identifier

4 Basic principles

4.1 Introduction

The meta-model of the Test Description Language is specified in ETSI ES 203 119-1 [1]. The presentation format of the meta-model can be different according to the needs of the users or the requests of the domain, where the TDL is applied. These presentation formats can either be text-oriented or graphic-oriented and may cover all the functionalities of the TDL meta-model or just a part of it, which is relevant to satisfy the needs of a specific application domain.

The present document specifies a concrete graphical syntax that provides a graphical representation for the whole functionality of the TDL meta-model.

The document specifies the TDL diagram, where the graphical representations of the instances of the TDL meta-classes may be placed. A graphical representation may contain a shape with textual labels placed into it. The rules, how these labels shall be interpreted are described in OCL-like expressions.

4.2 Document Structure

The present document specifies the concrete graphical syntax of the Test Description Language (TDL).

Clause 5 specifies the TDL Diagram.

Clause 6 specifies the concrete shapes defined for the TDL meta-classes. (The meta-model of TDL and the meanings of the meta-classes are described in ETSI ES 203 119-1 [1].)

- Foundation (clause 6.1)
- Data (clause 6.2)
- Time (clause 6.3)
- Test Configuration (clause 6.4)
- Test Behaviour (clause 6.5)

At the end of the document several examples illustrating the features of the TDL Graphical Syntax can be found.

4.3 Notational Conventions

4.3.0 General

Elements from the TDL meta-model [1] are typed in italic, e.g. *StructuredDataType*.

The definition of the TDL concrete graphical syntax consists of both shapes and textual labels placed into these shapes. Textual labels are differentiated into non-terminal textual labels and terminal textual labels. The production rule of a non-terminal textual label is specified by a combination of EBNF symbols and OCL-like expressions to navigate over the abstract syntax meta-model of TDL.

4.3.1 Symbols and meanings for shapes

Shapes consist of outermost borders, compartments, and textual labels (i.e. non-terminal textual labels and terminal-textual labels). The following conventions apply:

- Non-terminal textual labels are typed in small capitals (e.g. PRODUCTIONRULELABEL). The name of the label refers to a production rule with the same name that specifies how the result of the production rule is determined.
- If a non-terminal symbol name is typed in special, e.g. UNDERLINED or **BOLD** small capitals, underlined or bold font shall be used in the shape for the result of the production rule of that non-terminal symbol, e.g. SIMPLEDATAINSTANCENAMELABEL (non-terminal) and MyValue:MyType (a result of the production rule of that non-terminal) or **COMPONENTROLELABEL** (non-terminal) and **TESTER** (a result of the production rule of that non-terminal), etc.
- Terminal textual labels are typed in non-small-capital characters. They shall be typeset in the same font, as they appear on the figure, e.g. if a terminal textual label is typed in **bold**, bold font shall be used in the shape for that terminal textual symbol, e.g. **timer**, etc.
- The outermost border of a shape shall not be hidden, unless it is stated explicitly.
- Compartments and non-terminal textual labels may be hidden to simplify the internal structure of the shape.
- In the figures, optional compartments are shaded in a light grey colour, while optional non-terminal textual labels are typed in grey colour. However, the colour and the shading indicates only the optionality of a compartment or a non-terminal label. That is, if they are actually present in a test description, they shall not be shaded and shall be typed in black.
- If a non-terminal textual label is defined to be optional, that non-terminal textual label shall only be shown if the surrounding compartment is shown and the corresponding non-terminal textual production rule results in a non-empty string or a non-empty collection of strings.
- If an optional compartment contains a mandatory terminal or non-terminal textual label, the text shall only be shown if the surrounding compartment is shown.
- References to non-terminal textual production rules external to the given shape are represented by the name of the referenced production rule enclosed in angle brackets (e.g. <REFERENCEDPRODUCTIONRULE>).
- A non-terminal textual label in between hashmarks (e.g. #ELEMENT#) denotes a placeholder for a shape identified by that non-terminal textual label.

4.3.2 Symbols for non-terminal textual labels

Non-terminal textual labels are specified by production rules (so called non-terminal textual label production rule). The formal specification of a non-terminal textual label production rule is expressed by OCL. The context meta-model element for the OCL expression is specified prior to the non-terminal textual label specification. In some cases, the definition of OCL expression would be too complex for understanding. In that case, pseudo-code like helper notations are used.

The OCL expressions are combined with a variant of the Backus-Naur Form (Extended Backus-Naur Form - EBNF). The conventions within the present document for the production rules are:

- OCL keywords and helper functions are typed in **bold.**
- The keyword **context** followed by the name of TDL metaclass determines the context element for the following production rule (e.g. **context** Package).
- Non-terminal textual labels production rule identifiers are always represented in small capitals (e.g. LABELPRODUCTIONRULE).
- Non-terminal textual label production rule definitions are signified with the '**::=** ' operator.
- OCL expressions are written in lower case characters (e.g. self.name).
- Non-terminal textual labels may contain terminal symbols. A terminal symbol is enclosed in single quotes (e.g. 'keyword' or '[').
- Alternative choices between symbols in a production rule are separated by the '|' symbol (e.g. symbol1 | symbol2).
- Symbols that are optional are enclosed in square brackets ' [ ] ' (e.g. [symbol]).
- In case the context of an OCL expression needs to be changed for non-terminal textual label production rule, the predefined function *variable* **as context in <LABELPRODUCTIONRULE>** shall be used to invoke a production rule of a different metaclass, where v*ariable* refers to an instance of a metaclass that complies with the context of the invoked **<LABELPRODUCTIONRULE>.**
- If the OCL expression of a production rule results in a collection of strings, a collection helper function **separator(String)** is used to specify the delimiter between any two strings in the collection, e.g. self.collectionProperty->**separator(**','**)**. The collection helper function **newline( )** inserts a line break between any two strings in the collection.
- Iterations over collections of attributes of a metaclass use a verbatim (non-OCL) helper function *foreach* with the following syntax: **foreach** *VariableName* ':' *VariableType* [**separator(String)|newline( )**] **in** *OCLexpression* **end**. *VariableName* is an alphanumeric word signifying the variable used for subsequent statement. *VariableType* is a string that shall be the same as a TDL metaclass name. *OCLexpression* is an OCL statement that resolves in a collection of metaclass elements compliant to the metaclass given in *VariableType*. For example, the statement LABEL **::= foreach** *e:Element* ***in*** *self.attribute* **end**, iterates of the elements in the collection *self.attribute* and stores resulting element of each iteration in variable *e*. The variable *e* can be used in the body of the loop for further calculations. In every iteration, the non-terminal textual production rule LABEL is invoked, and the respective instance of metaclass *Element* that is stored in *e* will be used in the invoked production rule. The collection helper functions **separator(String)** and **newline( )** may also be applied directly to the **foreach** construct.

4.3.3 Examples

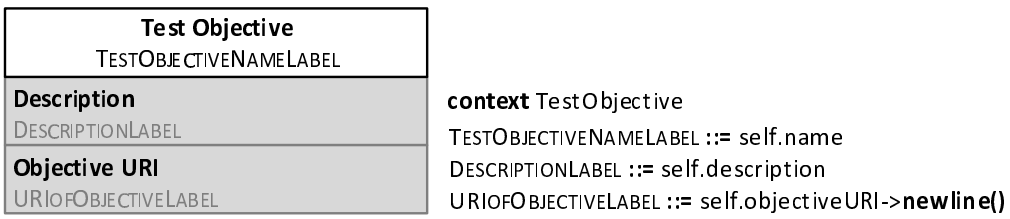
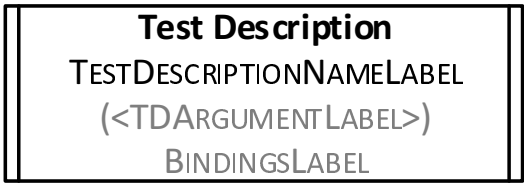


Figure 4.1: Notational convention example 1

In figure 4.1, the following notational concepts of the TDL Concrete Graphical Syntax are shown:

- The uppermost compartment contains a terminal textual label (a keyword) 'Test Objective' typed in bold.
- The context meta-model element of this shape is *TestObjective*.

- The non-terminal textual label production rule TESTOBJECTIVENAMELABEL results in the name of the context element (i.e. self.name).
- There are two optional compartments (i.e. shaded grey) shown ordered from top to down.
- Both compartments contain a mandatory terminal textual label (i.e. the label shall be shown if the surrounding compartment is shown). The terminal textual labels shall be typed in bold (**Description** and **Objective URI**, respectively).
- Both compartments contain an optional non-terminal textual label (i.e. the label shall be shown if the surrounding compartment is shown and the production rules results in a non-empty string or a non-empty collection of strings).
- The separator between the elements of the self.objectiveURI in production rule URIOFOBJECTIVELABEL is a new line.




```
context TestDescriptionReference
TESTDESCRIPTIONNAMELABEL ::= self.testDescription.name

TDARGUMENTLABEL ::= foreach d:DataUse in self.actualParameter separator(',')
                                d as context in <DATAUSELABEL>
                    end

BINDINGSLABEL ::= foreach c : ComponentInstanceBinding in self.componentInstanceBinding separator(',')
                            c.componentInstanceBinding.actualComponent.name '->'
                            c.componentInstanceBinding.formalComponent.name
                  end
```

Figure 4.2: Notational convention example showing the foreach helper function

In figure 4.2, the use of a non-OCL *foreach* helper function is illustrated. The context element when entering the foreach loop is *TestDescriptionReference*. The first foreach loop assigns iteratively each element in the collection *self.actualParameter* to the variable *d* of type *DataUse*. The variable *d* then used as it is described in the referenced production rule DATAUSELABEL. The separator between the results of the iterations is ',' (a comma character). The second foreach loop assigns iteratively each element in the collection *self.componentInstanceBinding* to the variable *c* of type *ComponentInstanceBinding*. The variable *c* is then used in a subsequent non-terminal textual label production rule to build the label for the production rule. The separator between the results of the iterations is ',' (a comma character).

4.4 Conformance

For an implementation claiming to conform to this version of the TDL Concrete Graphical Syntax, all features specified in the present document and in ETSI ES 203 119-1 [1] shall be implemented consistently with the requirements given in the present document and ETSI ES 203 119-1 [1].

5 Diagram

There is only one diagram kind provided by TDL Concrete Graphical Syntax. This diagram is called TDL Diagram. There may be multiple instances of a TDL Diagram at the same time.

The shapes that may be placed onto a TDL Diagram are specified in clause 6.

6 Shapes

6.1 Foundation

6.1.1 Element

Concrete Graphical Notation

This is an abstract metaclass, therefore no graphical representation is defined.

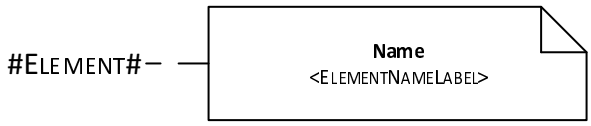
Formal Description

context Element

ELEMENTNAMELABEL ::= self.name

Comments

To a shape of any subclass of *Element*, the name of that *Element* may be attached by a thin dashed line unless it is stated otherwise in the shape definition of a given subclass of *Element*.



6.1.2 NamedElement

Concrete Graphical Notation

This is an abstract metaclass, therefore no graphical representation is defined.

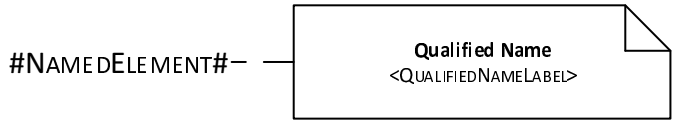
Formal Description

context NamedElement

QUALIFIEDELEMENTLABEL ::= self.qualifiedName

Comments

To a shape of any subclass of *NamedElement*, the qualified name of that *NamedElement* may be attached by a thin dashed line.



6.1.3 ElementImport

Concrete Graphical Notation

This metaclass has no dedicated shape, it is used solely in the shapes of other metaclasses.

Formal Description

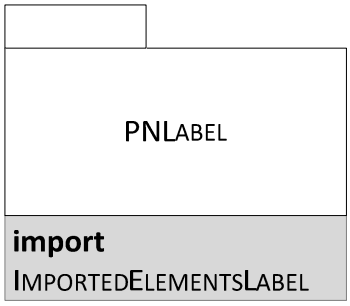
```
context ElementImport
IMPORTLABEL ::= 'from' self.importedPackage.qualifiedName
        if self.importedElement->isEmpty() then
            'all'
        else
            self.importedElement.name->separator(',')
        endif
```

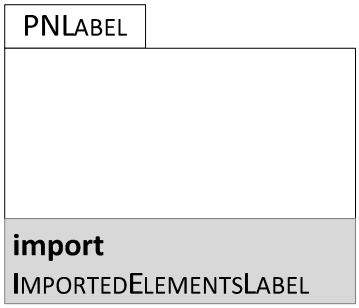
Comments

No comments.

6.1.4 Package

Concrete Graphical Notation





Formal Description

```
context Package
PNLABEL ::= self.name
IMPORTEDELEMENTSLABEL ::= foreach i:ElementImport in self.import
                              i as context in <IMPORTLABEL> separator(',')
                          end
```

Comments

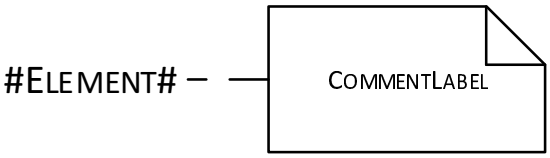
The figures above indicate the two possible representations of the *Package* shape: the PNLABEL may be written either in the top, small compartment or in the middle one.

The elements the package contains (packagedElements) may be shown within the large rectangle in the middle. In this case the PNLABEL shall be in the upper small compartment.

The lower **import** compartment is optional, it shall only be represented if the package imports other package(s) or elements from other package(s). If this compartment is present, its content shall also be present.

6.1.5 Comment

Concrete Graphical Notation



Formal Description

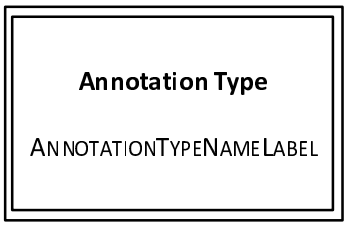
context Comment
COMMENTLABEL ::= self.body

Comments

A *Comment* shape shall be attached to the commented element by a thin dashed line.

6.1.6 AnnotationType

Concrete Graphical Notation



Formal Description

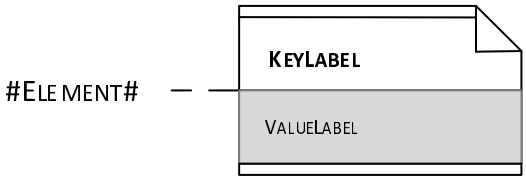
context AnnotationType
ANNOTATIONTYPENAMELABEL ::= self.name

Comments

No comments.

6.1.7 Annotation

Concrete Graphical Notation



Formal Description

context Annotation
KEYLABEL ::= self.key.name
VALUELABEL ::= self.value

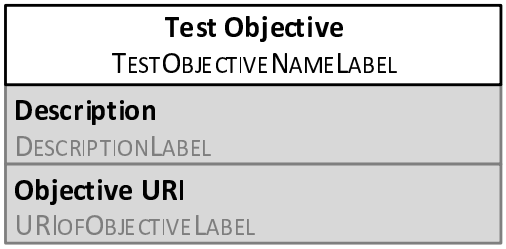
Comments

The lower compartment is optional, it shall be shown if the value of the *Annotation* is given.

An *Annotation* shape shall be attached to the annotated element by a thin dashed line.

6.1.8 TestObjective

Concrete Graphical Notation



Formal Description

context TestObjective
TESTOBJECTIVENAMELABEL ::= self.name
DESCRIPTIONLABEL ::= self.description
URIOFOBJECTIVELABEL ::= self.objectiveURI->**newline()**

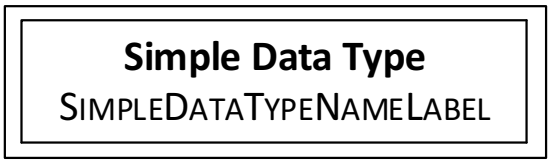
Comments

The compartments containing **Description** and **ObjectiveURI** are optional (that is any of them or both may be omitted). If an optional compartment is present, the contained terminal symbol (**Description** or **ObjectiveURI**, respectively) is mandatory, but the result of the production rule of the non-terminals (DESCRIPTIONLABEL or URIOFOBJECTIVELABEL), respectively) is optional.

6.2 Data

6.2.1 SimpleDataType

Concrete Graphical Notation



Formal Description

context SimpleDataType

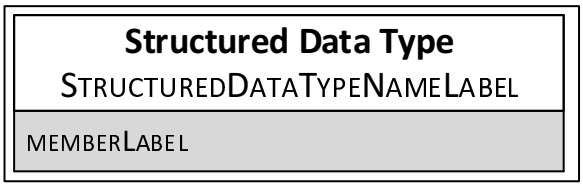
SIMPLEDATATYPENAMELABEL ::= self.name

Comments

No comments.

6.2.2 StructuredDataType

Concrete Graphical Notation



Formal Description

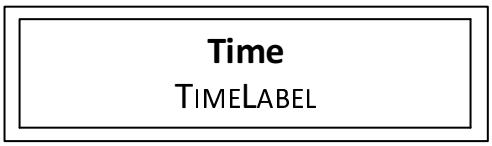
```
context StructuredDataType
STRUCTUREDDATATYPENAMELABEL ::= self.name
MEMBERLABEL ::=  foreach m: Member in self.member newline()
                    if m.isOptional then '['m as context in <PARAMETERLABEL>']'
                    else
                        m as context in <PARAMETERLABEL>
                    endif
                end
```

Comments

The compartment containing MEMBERLABEL is optional, it shall be shown if the *StructuredDataType* has at least one member.

6.2.3 Time

Concrete Graphical Notation



Formal Description

```
context Time

TIMELABEL ::= self.name
```

Comments

No comments.

6.2.4 DataInstance

Concrete Graphical Notation

This is an abstract metaclass, therefore no graphical representation is defined.

Formal Description

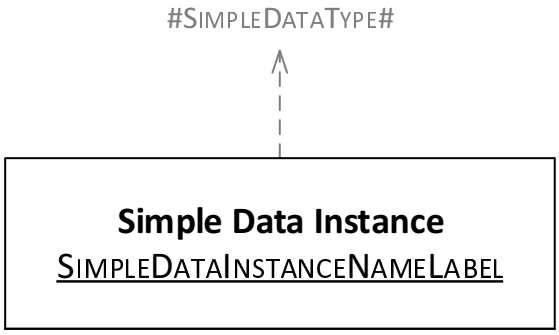
context DataInstance
DATAINSTANCELABEL ::= self.name ':' self.dataType.name

Comments

No comments.

6.2.5 SimpleDataInstance

Concrete Graphical Notation



Formal Description

context SimpleDataInstance
SIMPLEDATAINSTANCENAMELABEL ::= self **as context in** <DATAINSTANCELABEL>

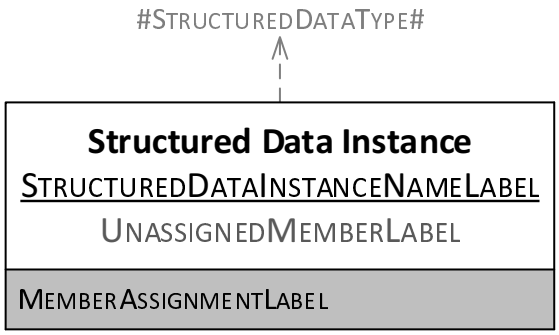
Comments

The result of the production rule of SIMPLEDATAINSTANCENAMELABEL shall be typed by underline font.

A *SimpleDataInstance* shape may optionally be connected to a *SimpleDataType* shape by dashed arrow. If this connection is present, then the ':' and the self.dataType.name may be omitted in the SIMPLEDATAINSTANCENAMELABEL.

6.2.6 StructuredDataInstance

Concrete Graphical Notation



```
context StructuredDataInstance
STRUCTUREDDATAINSTANCENAMELABEL ::= self as context in <DATAINSTANCELABEL>
UNASSIGNEDMEMBERLABEL ::= if self.unassignedMember = AnyValue then 'UnassignedMembers as ?'
                          else if self.unassignedMember = AnyValueOrOmit then 'UnassignedMembers as *'
                          endif
MEMBERASSIGNMENTLABEL ::=     foreach m : MemberAssignment in self.memberAssignment newline()
                                    if not self.member.name.oclIsUndefined() then
                                          [self.member.name ':=']
                                    else
                                          ' '
                                    endif
                                    self.memberSpec as context in <STATICDATAUSELABEL>
                              end
```

Formal Description

```
STRUCTUREDDATAINSTANCENAMELABEL ::= self as context in <DATAINSTANCELABEL>
MEMBERASSIGNMENTLABEL ::=     foreach m : MemberAssignment in self.memberAssignment newline()
                                    if not self.member.name.oclIsUndefined() then
                                          [self.member.name ':=']
                                    else
                                          ' '
                                    endif
                                    self.memberSpec as context in <STATICDATAUSELABEL>
                              end
```

Comments

The result of the production rule of STRUCTUREDDATAINSTANCENAMELABEL shall be typed by underline font.

The UNASSIGNEDMEMBERLABEL is optional.

The lower compartment containing MEMBERASSIGNMENTLABEL is optional. For each member the name is optional.

The *StructuredDataInstance* shape may optionally be connected to a *StructuredType* shape by dashed arrow. If this connection is present, then the ':' and the self.dataType.name may be omitted in the STRUCTUREDDATAINSTANCENAMELABEL.

6.2.7 Parameter

Concrete Graphical Notation

This metaclass has no dedicated shape, it is used solely in the shapes of other metaclasses.

Formal Description

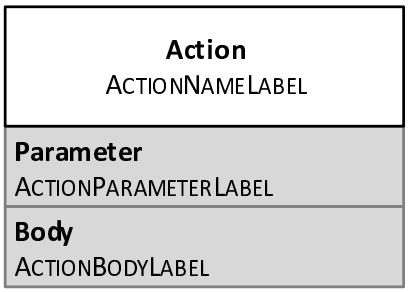
```
context Parameter
PARAMETERLABEL ::=    self.name ':' dataType.name
```

Comments

No comments.

6.2.8 Action

Concrete Graphical Notation



Formal Description

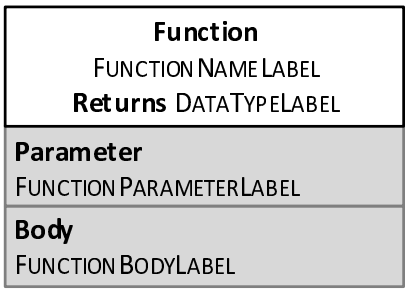
```
context Action
ACTIONNAMELABEL ::= self.name
ACTIONPARAMETERLABEL ::= foreach p:Parameter in self.formalParameter separator(',')
                                p as context in <PARAMETERLABEL>
                         end
ACTIONBODYLABEL ::= self.body
```

Comments

The compartments containing **Parameter** and ACTIONBODYLABEL are optional (that is any of them or both may be omitted). If an optional compartment is present, its content shall also be present.

6.2.9 Function

Concrete Graphical Notation



Formal Description

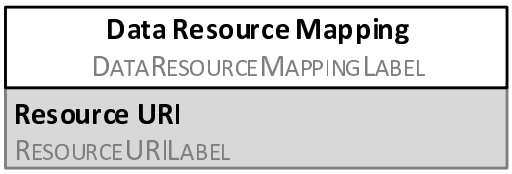
```
context Function
FUNCTIONNAMELABEL ::= self.name
DATATYPELABEL ::= self.returnType.name
FUNCTIONPARAMETERLABEL ::= foreach p:Parameter in self.formalParameter separator(',')
                                p as context in <PARAMETERLABEL>
                         end
FUNCTIONBODYLABEL ::= self.body
```

Comments

The compartments containing **Parameter** and FUNCTIONBODYLABEL are optional (that is any of them or both may be omitted). If an optional compartment is present, its content shall also be present.

6.2.10 DataResourceMapping

Concrete Graphical Notation



Formal Description

context DataResourceMapping

DATARESOURCEMAPPINGLABEL **::=** self.name

RESOURCEURILABEL **::=** self.resourceURI

Comments

The DATARESOURCEMAPPINGLABEL is optional.

The compartment containing the **Resource URI** is optional. When the optional RESOURCEURILABEL is present, this compartment shall be shown.

6.2.11 ParameterMapping

Concrete Graphical Notation

This metaclass has no dedicated shape, it is used solely in the *DataElementMapping* shape.

Formal Description

context ParameterMapping

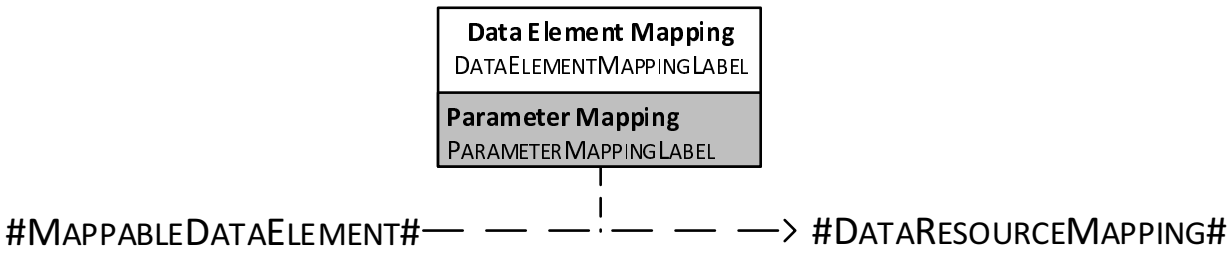
PARAMETERURILABEL ::= self.parameter.name [':=' self.memberURI]

Comments

No comments.

6.2.12 DataElementMapping

Concrete Graphical Notation



Formal Description

```
context DataElementMapping
DATAELEMENTMAPPINGLABEL ::= self.name [':=' self.elementURI]
PARAMETERMAPPINGLABEL ::= foreach p:ParameterMapping in self.parameterMapping newline()
                              p as context in <PARAMETERURILABEL>
                          end
```

Comments

In the DATAELEMENTMAPPINGLABEL the elementURI is optional.

The lower compartment containing Parameter Mapping is optional.

6.2.13 DataUse

Concrete Graphical Notation

This is an abstract metaclass, therefore no graphical representation is defined.

Formal Description

```
context DataUse
DATAUSELABEL ::= if self.oclIsKindOf(StaticDataUse) then
                    self as context in <STATICDATAUSELABEL>
                 else if self.oclIsKindOf(DynamicDataUse) then
                    self as context in <DYNAMICDATAUSELABEL>
                 endif
DATAUSEARGUMENTLABEL ::= if not self.argument->isEmpty() then
                             self as context in <ARGUMENTLABEL>
                         else
                             ''
                         endif
ARGUMENTLABEL ::= '('foreach p:ParameterUse in self.argument separator(',')
                      p.parameter.name' := ' p.dataUse as context in <DATAUSELABEL>
                  end')'
REDUCTIONLABEL ::= self.reduction.name->separator('.')
```

Comments

No comments.

6.2.14 StaticDataUse

Concrete Graphical Notation

This is an abstract metaclass, therefore no graphical representation is defined.

Formal Description

```
context StaticDataUse
STATICDATAUSELABEL ::= if self.oclIsKindOf(DataInstanceUse) then
        self as context in <DATAINSTANCEUSELABEL>
      else if self.oclIsKindOf(AnyValue) then
        self as context in <ANYVALUELABEL>
      else if self.oclIsKindOf(AnyValueOrOmit) then
        self as context in <ANYVALUEORMITLABEL>
      else if self.oclIsKindOf(OmitValue) then
        self as context in <OMITVALUELABEL>
      endif
```

Comments

No comments.

6.2.15 DataInstanceUse

Concrete Graphical Notation

This metaclass has no dedicated shape, it is used solely in the shapes of other metaclasses.

Formal Description

```
context DataInstanceUse
DATAINSTANCEUSELABEL ::= if not self.dataInstance ->isEmpty() then
                           self.dataInstance.name
                         else
                           ''
                         endif
                         if not self.dataType ->isEmpty() then
                           'new ' self.dataType.name
                         else
                           ''
                         endif
                         if not self.unassignedMember ->isEmpty() then
                           if self.unassignedMember = UnassignedMemberTreatment::AnyValue then '?'
                           else if self.unassignedMember = UnassignedMemberTreatment::AnyValueOrOmit then '*'
                           endif
                         else
                           ''
                         endif
                         self as context in <ARGUMENTLABEL>
                         if not self.reduction->isEmpty() then
                           'locate' self as context in <REDUCTIONLABEL>
                         else
                           ''
                         endif
```

Comments

No comments.

6.2.16 AnyValue

Concrete Graphical Notation

This metaclass has no dedicated shape, it is used solely in the shapes of other metaclasses.

Formal Description

context AnyValue

ANYVALUELABEL ::= '? '

Comments

No comments.

6.2.17 AnyValueOrOmit

Concrete Graphical Notation

This metaclass has no dedicated shape, it is used solely in the shapes of other metaclasses.

Formal Description

context AnyValueOrOmit

ANYVALUEOROMITLABEL ::= '*'

Comments

No comments.

6.2.18 OmitValue

Concrete Graphical Notation

This metaclass has no dedicated shape, it is used solely in the shapes of other metaclasses.

Formal Description

context OmitValue

OMITVALUELABEL ::= 'omit'

Comments

No comments.

6.2.19 DynamicDataUse

Concrete Graphical Notation

This is an abstract metaclass, therefore no graphical representation is defined.

Formal Description

```
context DynamicDataUse
DYNAMICDATAUSELABEL ::=  if self.oclIsTypeOf(VariableUse) then
                             self as context in <VARIABLEUSELABEL>
                         else if self.oclIsTypeOf(FormalParameterUse) then
                             self as context in <FORMALPARAMETERUSELABEL>
                         else if self.oclIsTypeOf(FunctionCall) then
                             self as context in <FUNCTIONCALLLABEL>
                         else if self.oclIsTypeOf(TimeLabel) then
                             self as context in <TIMELABEL>
                             endif
```

Comments

No comments.

6.2.20 FunctionCall

Concrete Graphical Notation

This metaclass has no dedicated shape, it is used solely in the shapes of other metaclasses.

Formal Description

```
context FunctionCall
FUNCTIONCALLLABEL ::= self as context in <DataUseARGUMENTLABEL>
                      if not self.reduction->isEmpty() then
                        'returns' self as context in <REDUCTIONLABEL>
                      else
                        ''
                      endif
```

Comments

No comments.

6.2.21 FormalParameterUse

Concrete Graphical Notation

This metaclass has no dedicated shape, it is used solely in the shapes of other metaclasses.

Formal Description

```
context FormalParameterUse
FORMALPARAMETERUSELABEL ::=  self.name self as context in <DATAUSEARGUMENTLABEL> self as context in
                             <REDUCTIONLABEL>
```

Comments

No comments.

6.2.22 VariableUse

Concrete Graphical Notation

This metaclass has no dedicated shape, it is used solely in the shapes of other metaclasses.

Formal Description

```
context VariableUse
VARIABLEUSELABEL ::= self.componentInstance.name'.'variable.name self as context in <DATAUSEARGUMENTLABEL>
                     if not self.reduction->isEmpty() then
                         'locate' self as context in <REDUCTIONLABEL>
                     else
                         ''
                     endif
```

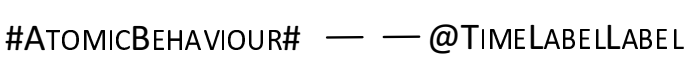
Comments

No comments.

6.3 Time

6.3.1 TimeLabel

Concrete Graphical Notation



Formal Description

```
context TimeLabel
TIMELABELLABEL ::= self.name
```

Comments

A *TimeLabel* shape shall be attached to the labelled *AtomicBehaviour* by a thin dashed line.

6.3.2 TimeLabelUse

Concrete Graphical Notation

This metaclass has no dedicated shape, it is used solely in the shapes of other metaclasses.

Formal Description

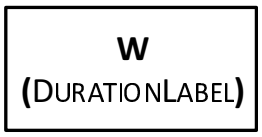
```
context TimeLabelUse
TIMELABELUSELABEL ::= self.timeLabel.name
```

Comments

No comments.

6.3.3 Wait

Concrete Graphical Notation



Formal Description

context Wait

DURATIONLABEL **::=** self.period **as context in** <DATAUSELABEL>

Comments

The *Wait* shape shall cover all the lifelines of that component instance, which is referred to by self.componentInstance.

6.3.4 Quiescence

Concrete Graphical Notation

Formal Description

context Quiescence
DURATIONLABEL **::=** self.period **as context in** <DATAUSELABEL>
GATELABEL ::= self.gateReference.gate **as context in** <GATEINSTANCENAMELABEL>

Comments

GATELABEL is optional.

If the *Quiescence* refers to a component instance (property *self.componentInstance* is set), then the *Quiescence* shape:

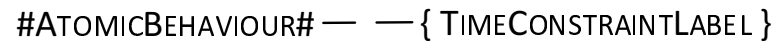
- shall cover all the lifelines of that component instance; and
- GATELABEL shall not be present,

otherwise the *Quiescence* shape shall:

- either cover only the lifeline of that gate, which is referred to by self.gateReference if notation (a) defined in clause 6.5.1. is used; or
- the GATELABEL shall be present if notation (b) defined in clause 6.5.1 is used.

6.3.5 TimeConstraint

Concrete Graphical Notation



Formal Description

context TimeConstraint

TIMECONSTRAINTLABEL **::=** self.timeConstraintExpression **as context in** <DATAUSELABEL>

Comments

A *TimeConstraint* shape shall be attached to an *AtomicBehaviour* shape by a thin dashed line.

6.3.6 TimerStart

Concrete Graphical Notation

Formal Description

context TimerStart
TIMERSTARTLABEL **::=** self.timer.name
DURATIONLABEL **::=** self.period **as context in** <DATAUSELABEL>

Comments

The *TimerStart* shape shall cover all the lifelines of that component instance, which is referred to by self.componentInstance.

6.3.7 TimeOut

Concrete Graphical Notation

Formal Description

context TimeOut
TIMEOUTLABEL **::=** self.timer.name

Comments

The *TimeOut* shape shall cover all the lifelines of that component instance, which is referred to by self.componentInstance.

6.3.8 TimerStop

Meta-Model Reference

Concrete Graphical Notation

Formal Description

```
context TimerStop
TIMERSTOPLABEL ::= self.timer.name
```

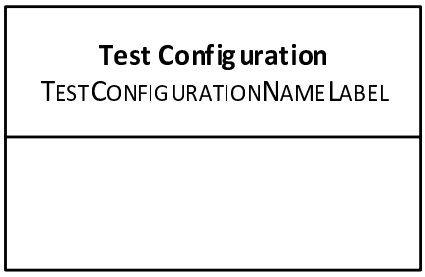
Comments

The *TimerStop* shape shall cover all the lifelines of that component instance, which is referred to by self.componentInstance.

6.4 Test Configuration

6.4.1 TestConfiguration

Concrete Graphical Notation



Formal Description

```
context TestConfiguration
TESTCONFIGURATIONNAMELABEL ::= self.name
```

Comments

Into the lower empty compartment the elements of the *TestConfiguration* shall be placed.

6.4.2 GateType

Concrete Graphical Notation

Formal Description

```
context GateType
GATETYPENAMELABEL ::= self.name
DATATYPELISTLABEL ::= self.dataType.name->separator(',')
```

Comments

No comments.

6.4.3 GateInstance

Concrete Graphical Notation

Formal Description

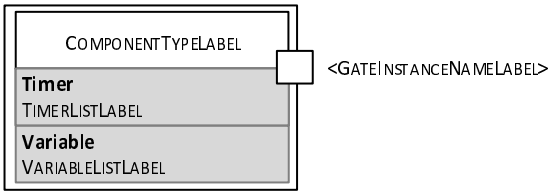
```
context GateInstance
GATEINSTANCENAMELABEL ::= self.name [':' self.type.name]
```

Comments

In GATEINSTANCENAMELABEL the ':' self.type.name is optional.

6.4.4 ComponentType

Concrete Graphical Notation



Formal Description

```
context ComponentType
COMPONENTTYPELABEL ::= self.name
TIMERLISTLABEL ::= self.timer.name->separator(',')
VARIABLELISTLABEL ::= foreach v:Variable in self.variable separator(',')
                          self.variable.name ':' self.variable.dataType.name
                      end
```

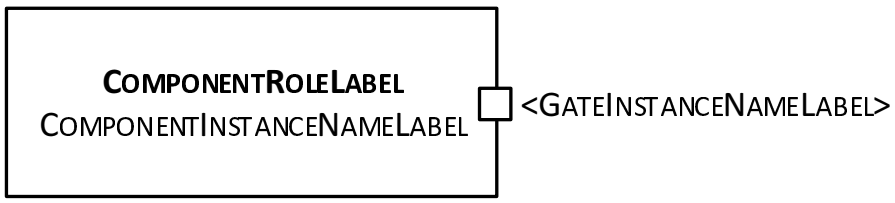
Comments

A *ComponentType* shape shall contain all *GateInstance* shapes defined for the corresponding *ComponentType*, at any side or corner.

The compartments containing **Timer** and **Variable** are optional (that is any of them or both may be omitted). If an optional compartment is present, its content shall also be present.

6.4.5 ComponentInstance

Concrete Graphical Notation



Formal Description

```
context ComponentInstance
COMPONENTROLELABEL ::= if self.role = ComponentInstanceRole::SUT then 'SUT' else 'TESTER' endif
COMPONENTINSTANCENAMELABEL ::= self.name':'self.type.name
```

Comments

A *ComponentInstance* shape shall contain all *GateInstance* shapes defined for the corresponding *ComponentType,* at any side or corner.

The terminal symbols '**SUT**' and '**TESTER**' shall be typed in bold.

NOTE: If the *ComponentInstance* shape is used inside the **Behaviour** compartment of a *TestSpecification* shape, all the rectangles representing the *GateInstance*(s) of a *ComponentInstance* may be left out, see notation (b) in clause 6.5.1.

6.4.6 Connection

Concrete Graphical Notation

Formal Description

```
context Connection
NAMEOFCONNECTIONLABEL ::= self.name
```

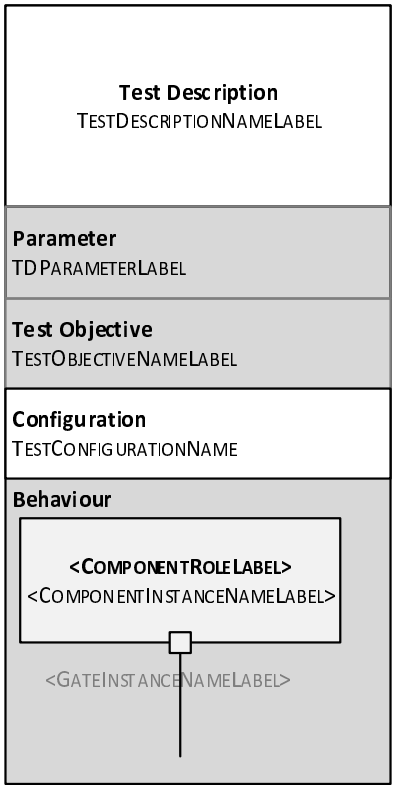
Comments

NAMEOFCONNECTIONLABEL is optional.

6.5 Test Behaviour

6.5.1 TestDescription

Concrete Graphical Notation



Formal Description

```
context TestDescription
TESTDESCRIPTIONNAMELABEL ::= self as context in <NAMEDELEMENTLABEL>

TDPARAMETERLABEL ::= foreach p:Parameter in self.formalParameter separator(',')
                          p as context in <ParameterLabel>
                     end
TESTOBJECTIVENAMELABEL ::= foreach t:TestObjective in self.testObjectivet  newline()
                               t as context in <NAMEDELEMENTLABEL>
                           end

TESTCONFIGURATIONNAME ::= self.testConfiguration as context in <NAMEDELEMENTLABEL>
```

Comments

The compartments containing **Parameter**, **TestObjective** and **Behaviour** are optional (that is any or all of them may be omitted). If an optional compartment is present, its content shall also be present.

In the lowest compartment the the behaviour of the test description may be described. In this compartment, there shall be as many *ComponentInstance* shapes as many component instances are defined in the *TestConfiguration* referenced in a **Configuration** compartment.

For each *ComponentInstance* shape either the rectangles representing the *GateInstance*(s) shall be (a) shown or (b) not shown.

- In notation (a) from each gate instance a vertical line ("lifeline") shall originate, to which each *Behaviour* element defined in that test description and associated with that gate shall be attached.
  - If a component instance has only one gate the *GateInstanceNameLabel* is optional.
  - If a *GateInstance* of a *ComponentInstance* is not connected in the *TestConfiguration* referenced in a **Configuration** compartment, it is optional if that *GateInstance* and its lifeline are shown or not.
- In notation (b) from the *ComponentInstance* shape only one vertical line ("lifeline") shall originate, to which each *Behaviour* element defined in that test description and associated with any of the *GateInstance*(s) of that *ComponentInstance* shall be attached.

The time of a lifeline passes from top to down.

Implementation only of one of the two notations (a) and (b) is required, the implementation of the other is optional.

If both notations are implemented, for a given *ComponentInstance*, the two notations, (a) and (b) shall not be mixed.

NOTE: In a *TestDescription* the two notations, (a) and (b) may be mixed for different *ComponentInstance*s, that is for some *ComponentInstance*(s) the notation (a) while for other *ComponentInstance*(s) the notation (b) may be used.

6.5.2 Behaviour

Concrete Graphical Notation

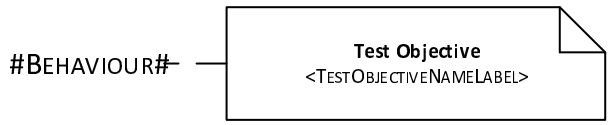
This is an abstract metaclass, therefore no graphical representation is defined.

Formal Description

n.a.

Comments

To a shape of any subclass of *Behaviour*, the following test objective reference shape may be attached by a thin dashed line.



6.5.3 CombinedBehaviour

Concrete Graphical Notation

Formal Description

n.a.

Comments

CombinedBehaviour is an abstract metaclass that can be refined to several subclasses. The figure above gives a general overview, how the combined behaviour elements shall be organized. Further constraints are explained in the respective subclauses describing the symbols of subclasses of *CombinedBehaviour*. Depending on the concrete type of the *CombinedBehaviour*, it may or may not contain more than one blocks. The outermost border of the contained *Block*(s) shall not not be visible. If more than one block is defined, they shall be separated by thin dashed lines. Any number of periodic and/or exceptional behaviour may be attached in any order to a *CombinedBehaviour*.

A *CombinedBehaviour* shape shall cover all the lifelines.

6.5.4 Block

Concrete Graphical Notation

Formal Description

context Block

GUARDLABEL ::= self.block.guard **as context in** <DATAUSELABEL>

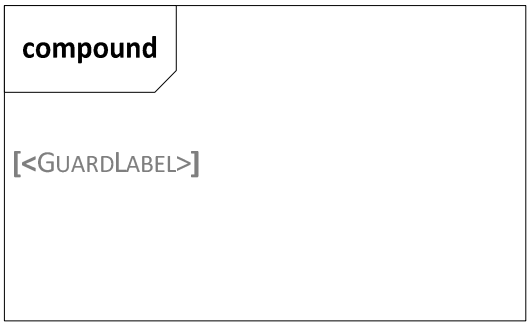
Comments

A *Block* shall not stand on its own, only as a part of a *CombinedBehaviour*. Therefore the border of the *Block* is not visible (the border on the figure above is indicated only for visualization purposes). If a *CombinedBehaviour* contains more than one *Block*, they shall be separated by dashed lines.

The [GUARDLABEL] is optional. If a *Block* of a *CombinedBehaviour* contains a GUARDLABEL, it shall be placed in between square brackets ('[' and ']').

6.5.5 CompoundBehaviour

Concrete Graphical Notation



Formal Description

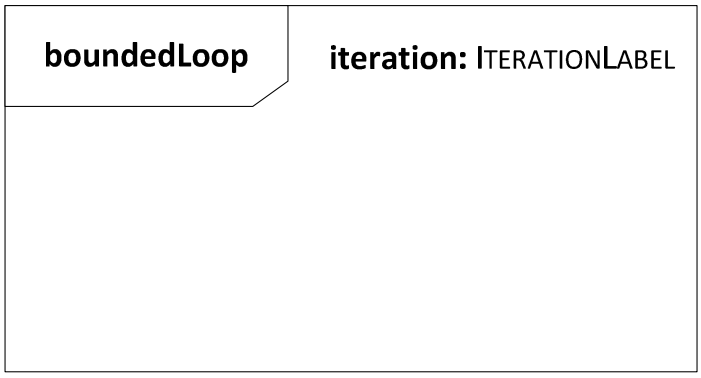
n.a.

Comments

[GUARDLABEL] is optional.

6.5.6 BoundedLoopBehaviour

Concrete Graphical Notation



Formal Description

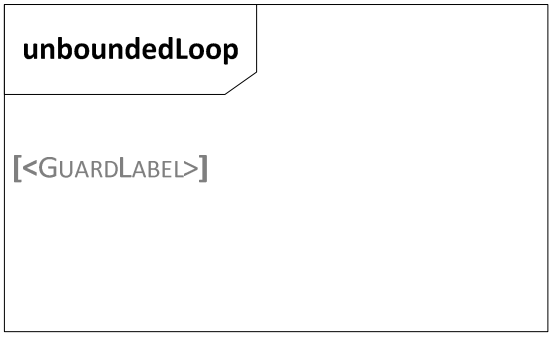
context BoundedLoopBehaviour
ITERATIONLABEL **::=** self.numIteration **as context in** <DATAUSELABEL>

Comments

No comments.

6.5.7 UnboundedLoopBehaviour

Concrete Graphical Notation



Formal Description

n.a.

Comments

[GUARDLABEL] is optional.

6.5.8 AlternativeBehaviour

Concrete Graphical Notation

Formal Description

n.a.

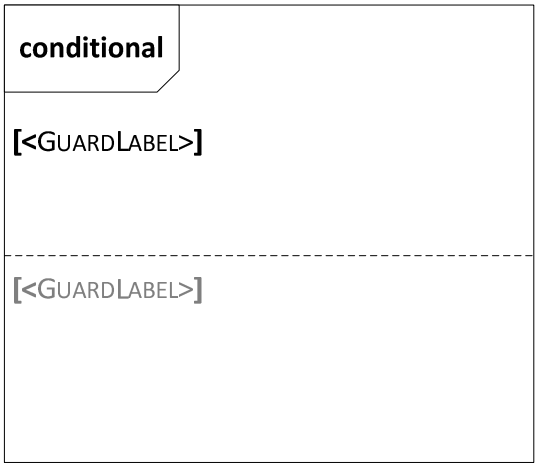
Comments

Any number of blocks may be contained, they shall be separated by dashed lines.

[GUARDLABEL] of any block is optional.

6.5.9 ConditionalBehaviour

Concrete Graphical Notation



Formal Description

n.a.

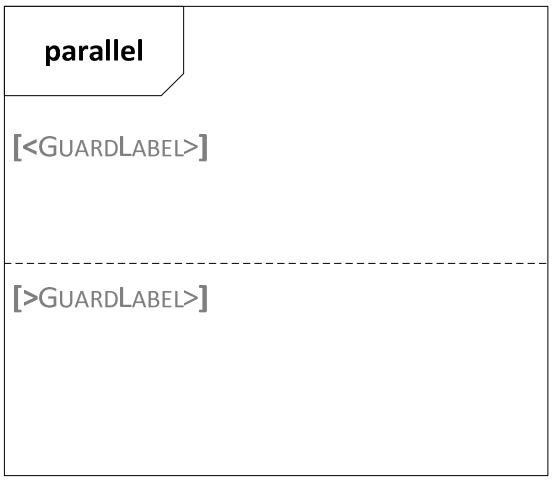
Comments

Any number of blocks may be contained, they shall be separated by dashed lines.

[GUARDLABEL] of the last block is optional.

6.5.10 ParallelBehaviour

Concrete Graphical Notation



Formal Description

n.a.

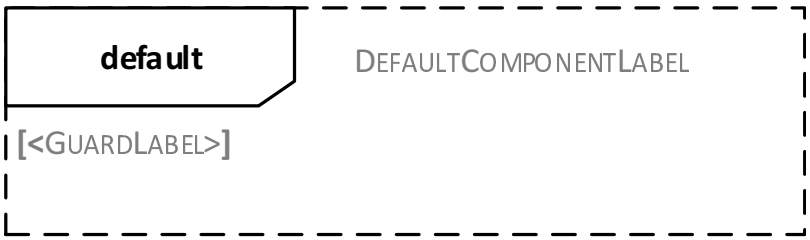
Comments

Any number of blocks may be contained, they shall be separated by dashed lines.

[GUARDLABEL] of any block is optional.

6.5.11 DefaultBehaviour

Concrete Graphical Notation



Formal Description

```
context DefaultBehaviour
DEFAULTCOMPONENTLABEL ::= if not self.guardedComponent->isEmpty() then
                              'for Component ' self.guardedComponent.name
                          else
                              ''
                          endif
```

Comments

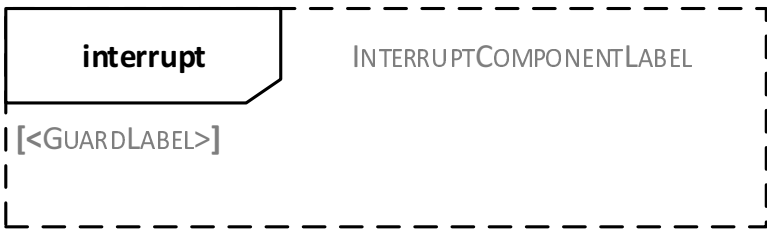
A *DefaultBehaviour* shape may be attached to any *CombinedBehaviour*.

[GUARDLABEL] is optional.

DEFAULTCOMPONENTLABEL shall only present if guardedComponent is set.

6.5.12 InterruptBehaviour

Concrete Graphical Notation



Formal Description

```
context InterruptBehaviour
INTERRUPTCOMPONENTLABEL ::= if not self.guardedComponent->isEmpty() then
                                'for Component ' self.guardedComponent.name
                            else
                                ''
                            endif
```

Comments

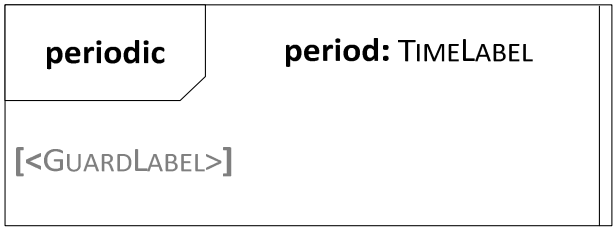
An *InterruptBehaviour* shape may be attached to any *CombinedBehaviour*.

[GUARDLABEL] is optional.

INTERRUPTCOMPONENTLABEL shall only present if guardedComponent is set.

6.5.13 PeriodicBehaviour

Concrete Graphical Notation



Formal Description

context PeriodicBehaviour
TIMELABEL **::=** self.period **as context in** <DATAUSELABEL>

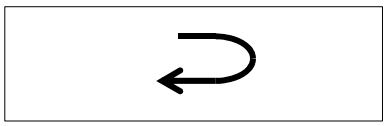
Comments

A *PeriodicBehaviour* shape may be attached to any *CombinedBehaviour*.

[GUARDLABEL] is optional.

6.5.14 Break

Concrete Graphical Notation



Formal Description

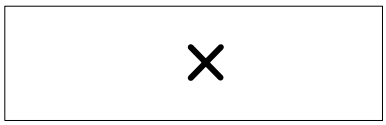
n.a.

Comments

The *Break* shape shall cover all the lifelines.

6.5.15 Stop

Concrete Graphical Notation



Formal Description

n.a.

Comments

The *Stop* shape shall cover all the lifelines.

6.5.16 VerdictAssignment

Concrete Graphical Notation

Formal Description

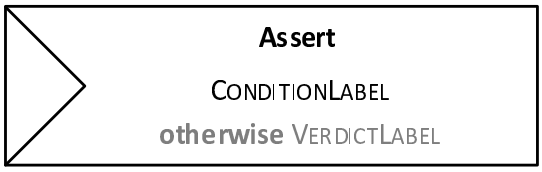
context Verdict
VERDICTLABEL **::=** self.verdict **as context in** <DATAUSELABEL>

Comments

The *VerdictAssignment* shape shall cover all the lifelines.

6.5.17 Assertion

Concrete Graphical Notation



Formal Description

context Assertion
CONDITIONLABEL **::=** self.condition **as context in** <DATAUSELABEL>
VERDICTLABEL **::=** self.otherwise **as context in** <DATAUSELABEL>

Comments

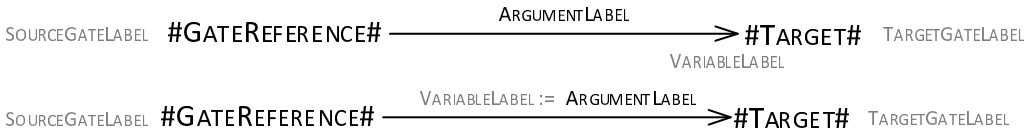
'**otherwise**' and VERDICTLABEL are optional. Either none of them or both of them shall be shown.

The *Assertion* shape shall cover all the lifelines.

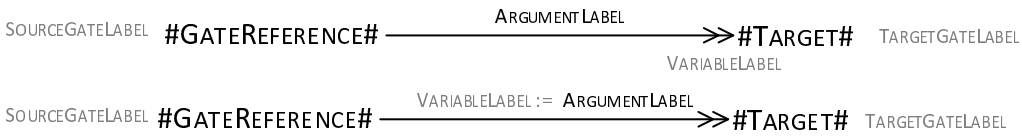
6.5.18 Interaction

Concrete Graphical Notation

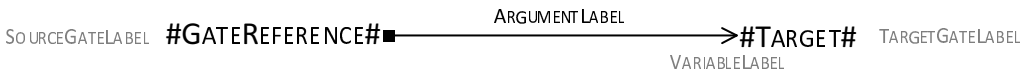
Point-to-point Interaction



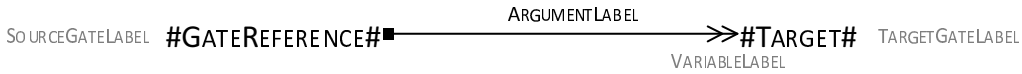
Point-to-point Trigger Interaction



Multipoint Interaction



Multipoint Trigger Interaction



Formal Description

context Interaction
ARGUMENTLABEL **::=** self.argument **as context in** <DATAUSELABEL>
VARIABLELABEL **::=** self.target.variable.name
SOURCEGATELABEL ::= self.sourceGate.gate **as context in** <GATEINSTANCENAMELABEL>
TARGETGATELABEL ::= self.target.targetGate.gate **as context in** <GATEINSTANCENAMELABEL>

Comments

SOURCEGATELABEL, TARGETGATELABEL, VARIABLELABEL '**:=** ' are optional.

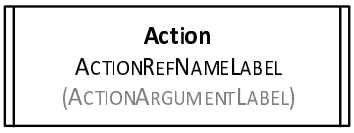
The ends of an interaction (GATEREFERENCE and TARGET) shall be placed onto the lifeline of the corresponding gate instances, if notation (a) defined in 6.5.1 is used. If notation (b) defined in 6.5.1. is used, then the corresponding end of an interaction shall be placed on the lifeline of the corresponding component instance and SOURCEGATELABEL, and/or TARGETGATELABEL shall be present, respectively.

In case of a point-to-point or point-to-point trigger interaction, the VARIABLELABEL - if present - may be placed either above the arrow as an assignment or under the arrowhead.

In case of a point-to-multipoint or point-to-multipoint trigger interaction, the originating GATEREFERENCE shall be indicated by a small black square, and there shall be as many arrows present as many destinations are in the point-to-multipoint interaction. In this case, optionally there may be a VARIABLELABEL presented under each arrowhead.

6.5.19 ActionReference

Concrete Graphical Notation



Formal Description

context ActionReference

ACTIONREFNAMELABEL **::=** self.action **as context in** <ACTIONNAMELABEL>

ACTIONARGUMENTLABEL **::= foreach** d:DataUse **in** self.actualParameter **separator(',')**
d **as context in** <DATAUSELABEL>
end

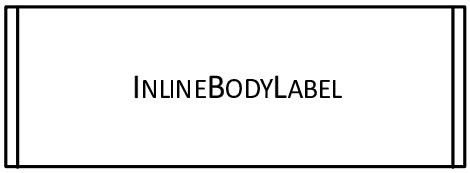
Comments

(ACTIONARGUMENTLABEL) is optional.

In case the *ActionReference* is not related to a *ComponentInstance* (the componentInstance property is not set), the *ActionReference* shape shall cover all the lifelines, otherwise only all the lifelines of the referenced *ComponentInstance*.

6.5.20 InlineAction

Concrete Graphical Notation



Formal Description

context InlineAction

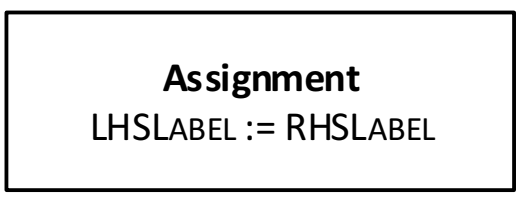
INLINEBODYLABEL **::=** self.body

Comments

In case the *InlineAction* is not related to a *ComponentInstance* (the componentInstance property is not set), the *InlineAction* shape shall cover all the lifelines, otherwise only all the lifelines of the referenced *ComponentInstance*.

6.5.21 Assignment

Concrete Graphical Notation



Formal Description

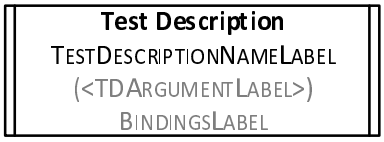
```
context Assignment
LHSLABEL ::= self.variable as context in <VARIABLELABEL>
RHSLABEL ::= self.expression as context in <DATAUSELABEL>
```

Comments

The *Assignment* shape shall cover all the lifelines of that *ComponentInstance* which is referred to by the componentInstance property of the *Assignment*.

6.5.22 TestDescriptionReference

Concrete Graphical Notation



Formal Description

```
context TestDescriptionReference
TESTDESCRIPTIONNAMELABEL ::= self.testDescription.name

TDARGUMENTLABEL ::= foreach d:DataUse in self.actualParameter separator(',')
                                d as context in <DATAUSELABEL>
                    end

BINDINGSLABEL ::= foreach c : ComponentInstanceBinding in self.componentInstanceBinding separator(',')
                            c.componentInstanceBinding.actualComponent.name '->'
                            c.componentInstanceBinding.formalComponent.name
                  end
```

Comments

(TDARGUMENTLABEL) and BINDINGSLABEL are optional (that is any of them or both may be omitted).

The *TestDescriptionReference* shape shall cover all the lifelines.

Annex A (informative): Examples

A.0 Overview

This annex provides several examples to illustrate how the different elements of the TDL Graphical Syntax can be used and demonstrates the applicability of TDL in several different areas.

The first example in clause A.1 demonstrates the usage of data-related concepts.

The second example in clause A.2 shows a scenario when a 'Tester' performs a test scenario on one interface of the 'SUT'. The example is taken from ETSI TS 136 523-1 [i.1].

The third example in clause A.3 provides an example for interoperability testing in IMS. The example is taken from ETSI TS 186 011-2 [i.2].

A.1 Illustration of Data use in TDL Graphical Syntax

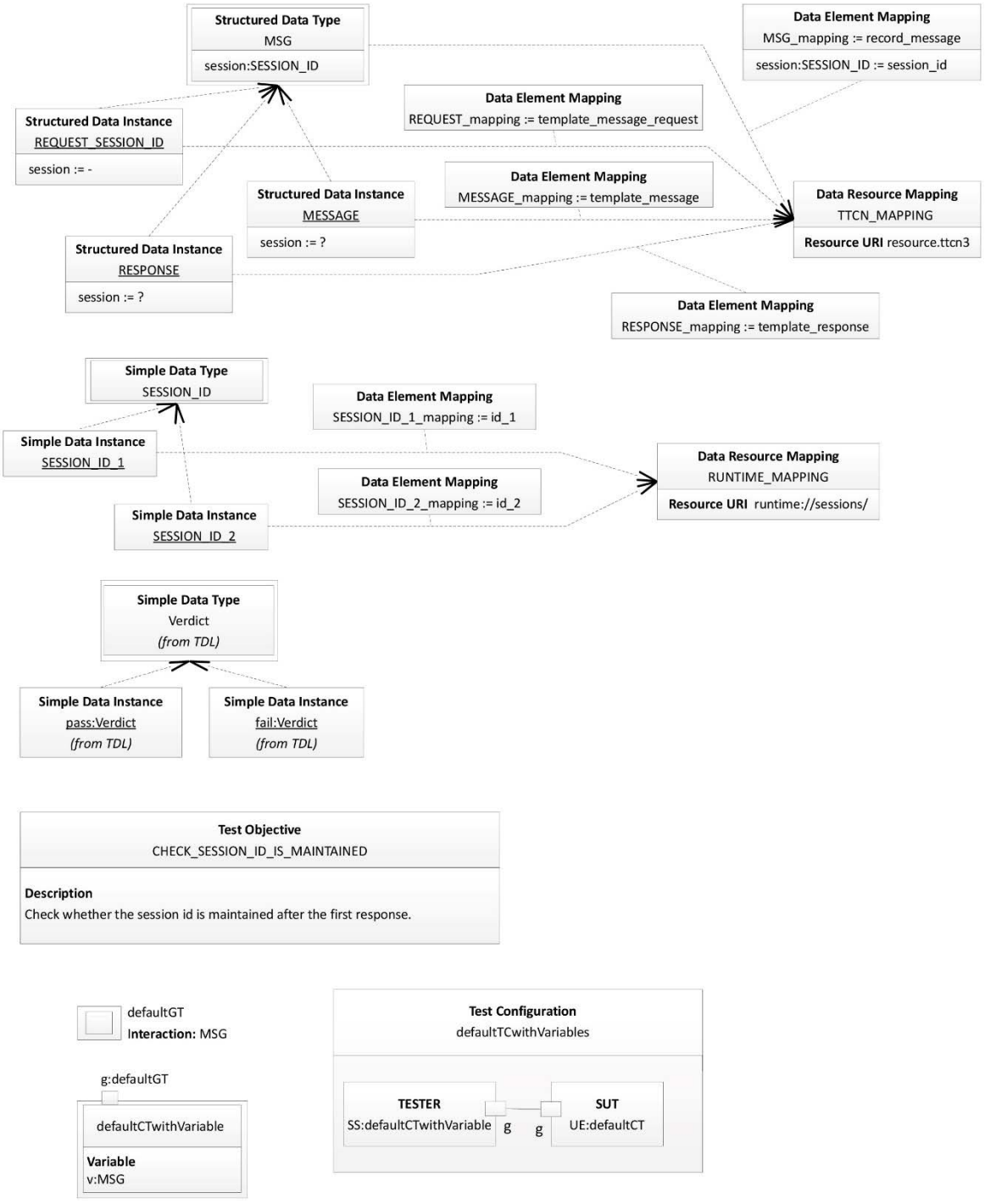


Figure A.1.1: Illustration of Data use in TDL Graphical Syntax Part 1

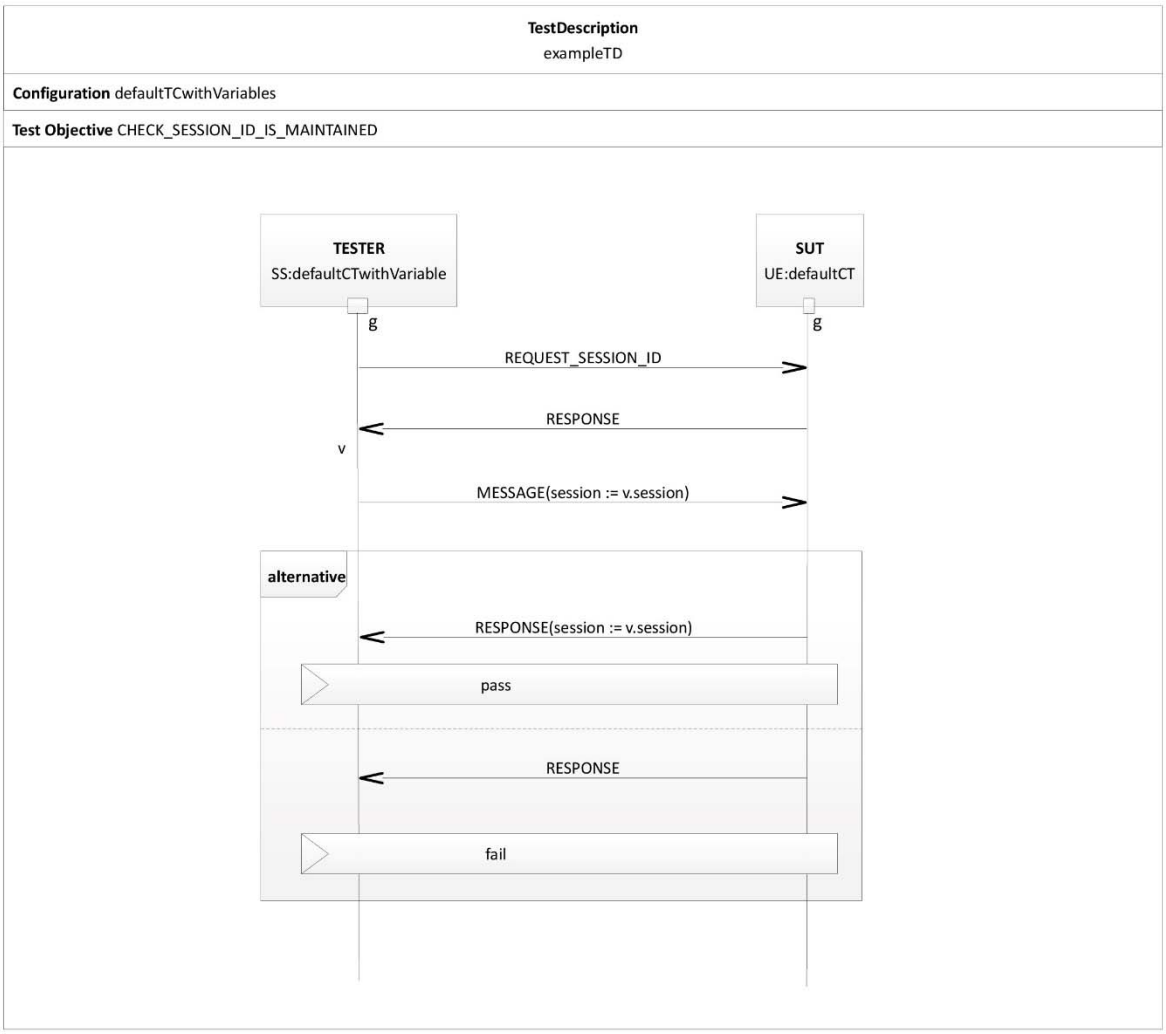


Figure A.1.2: Illustration of Data use in TDL Graphical Syntax Part 2

A.2 Interface Testing

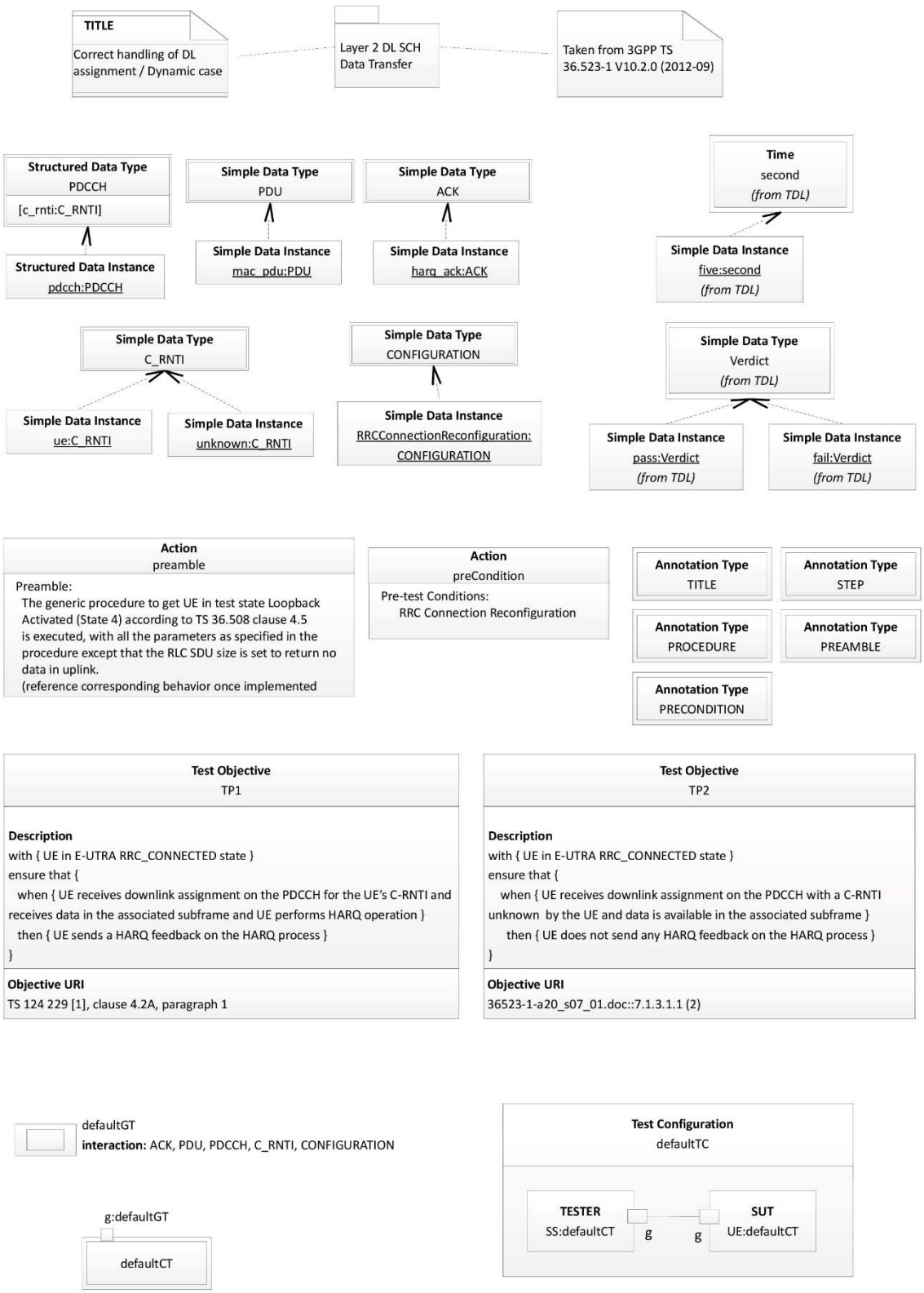


Figure A.2.1: Illustration of an interface testing in TDL Graphical Syntax Part 1

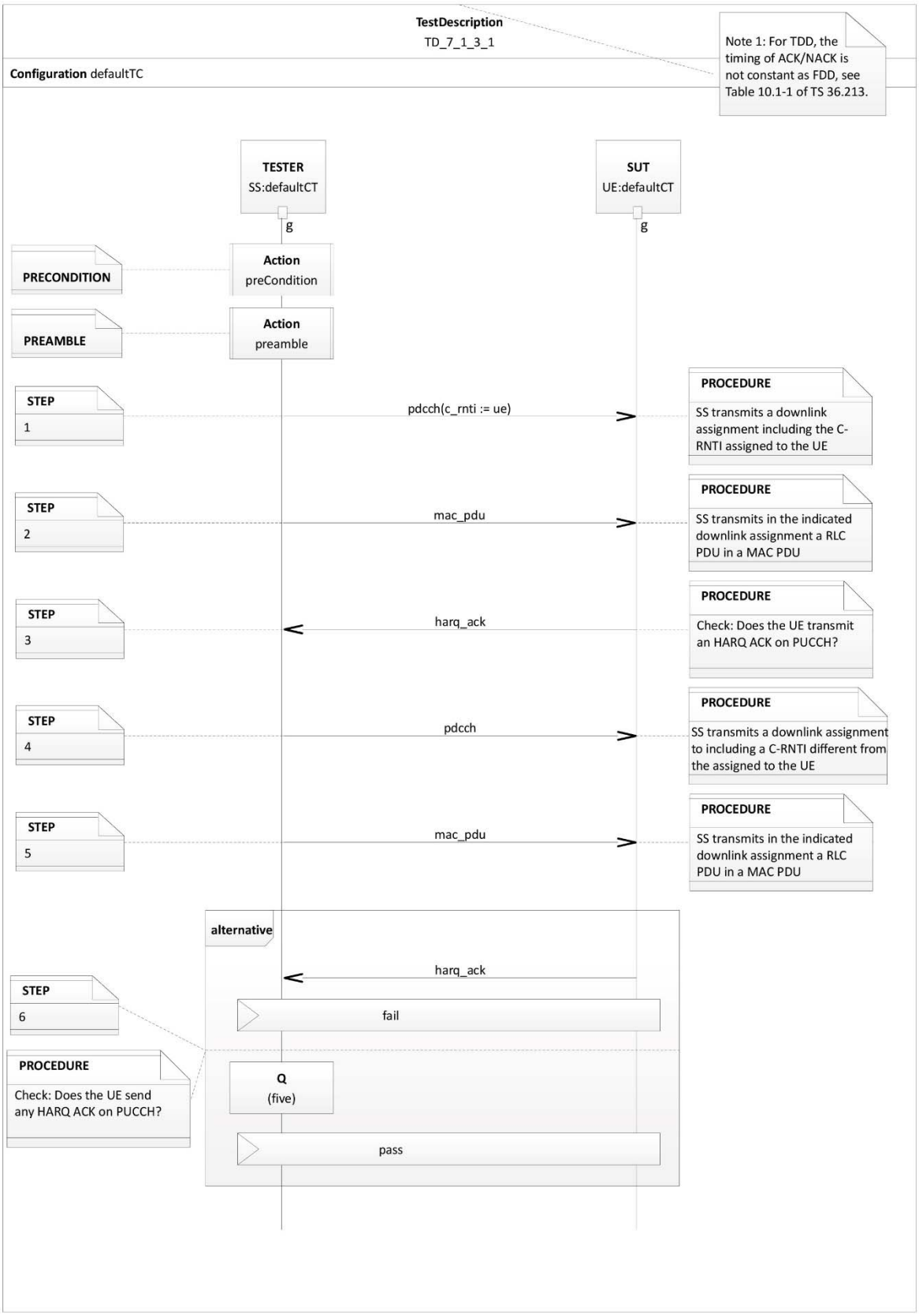


Figure A.2.2: Illustration of an interface testing in TDL Graphical Syntax Part 2

A.3 Interoperability Testing

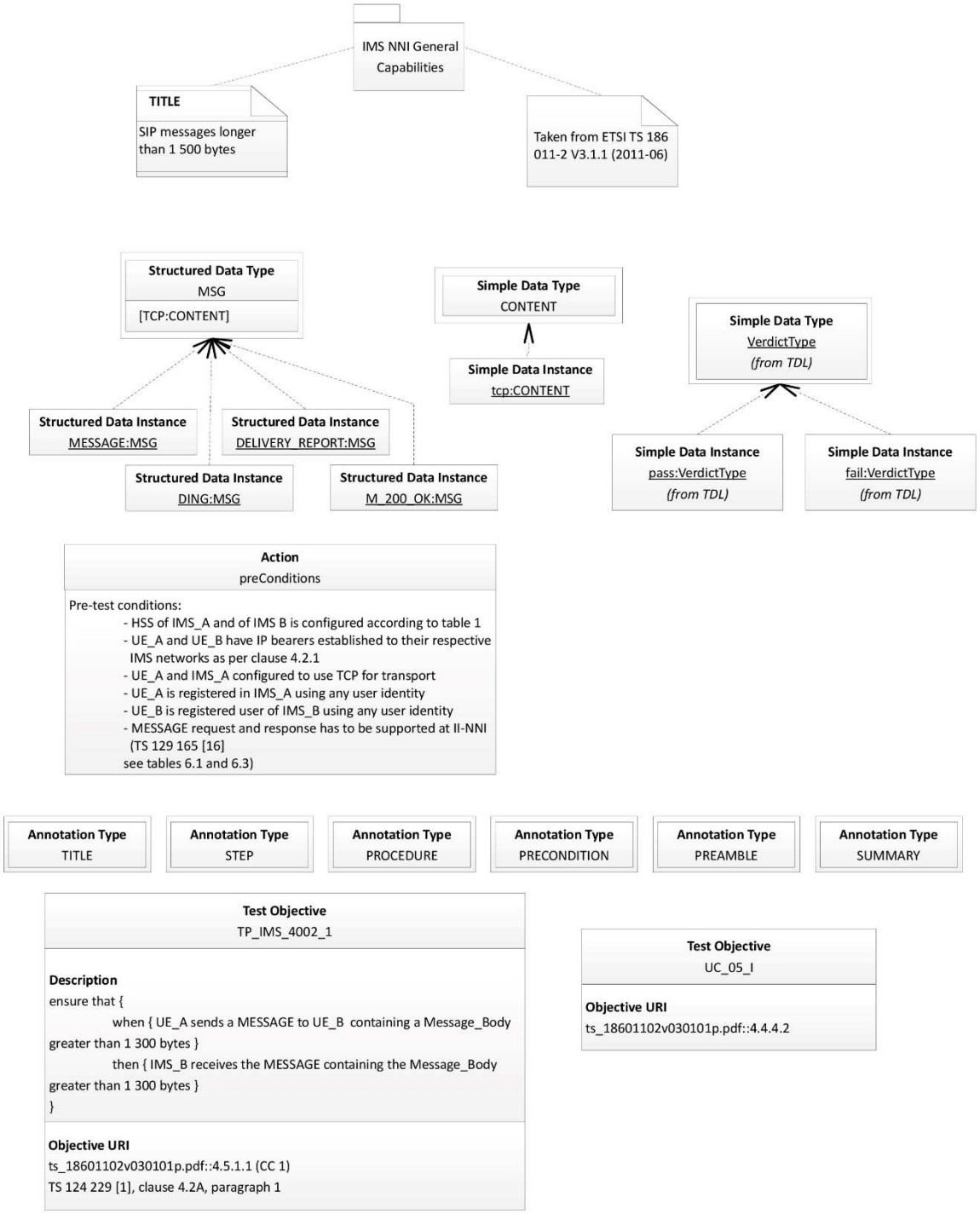


Figure A.3.1: Illustration of an interoperability testing in TDL Graphical Syntax Part 1

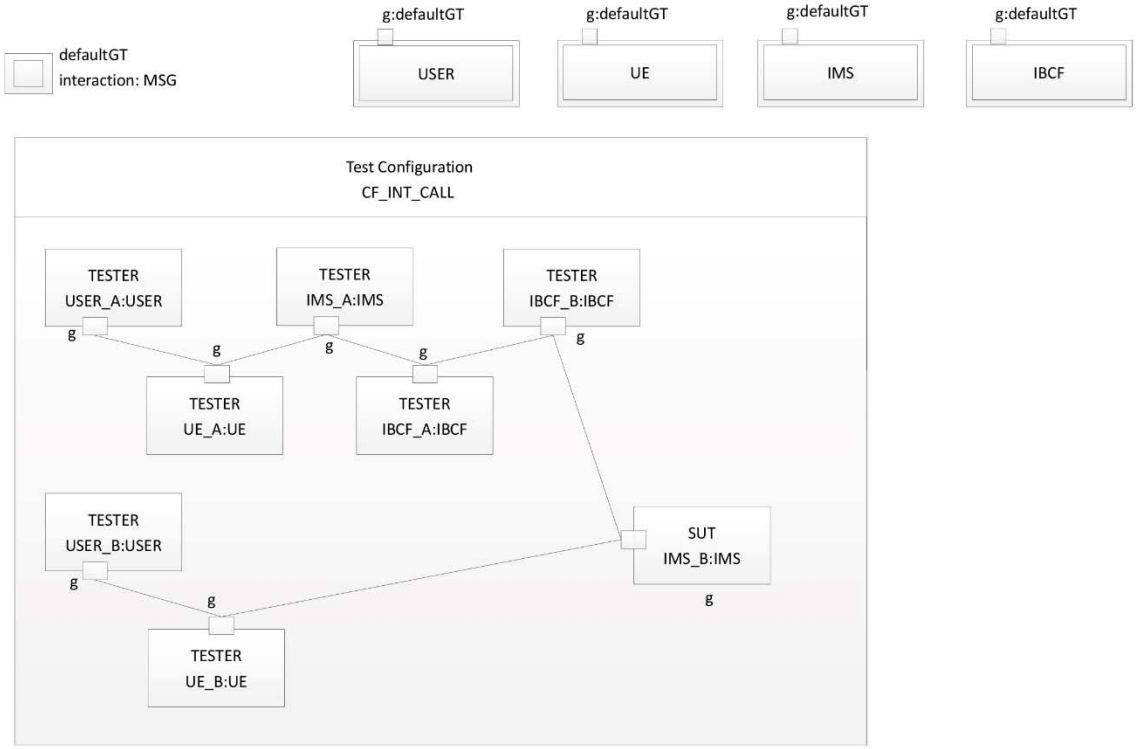


Figure A.3.2: Illustration of an interoperability testing in TDL Graphical Syntax Part 2

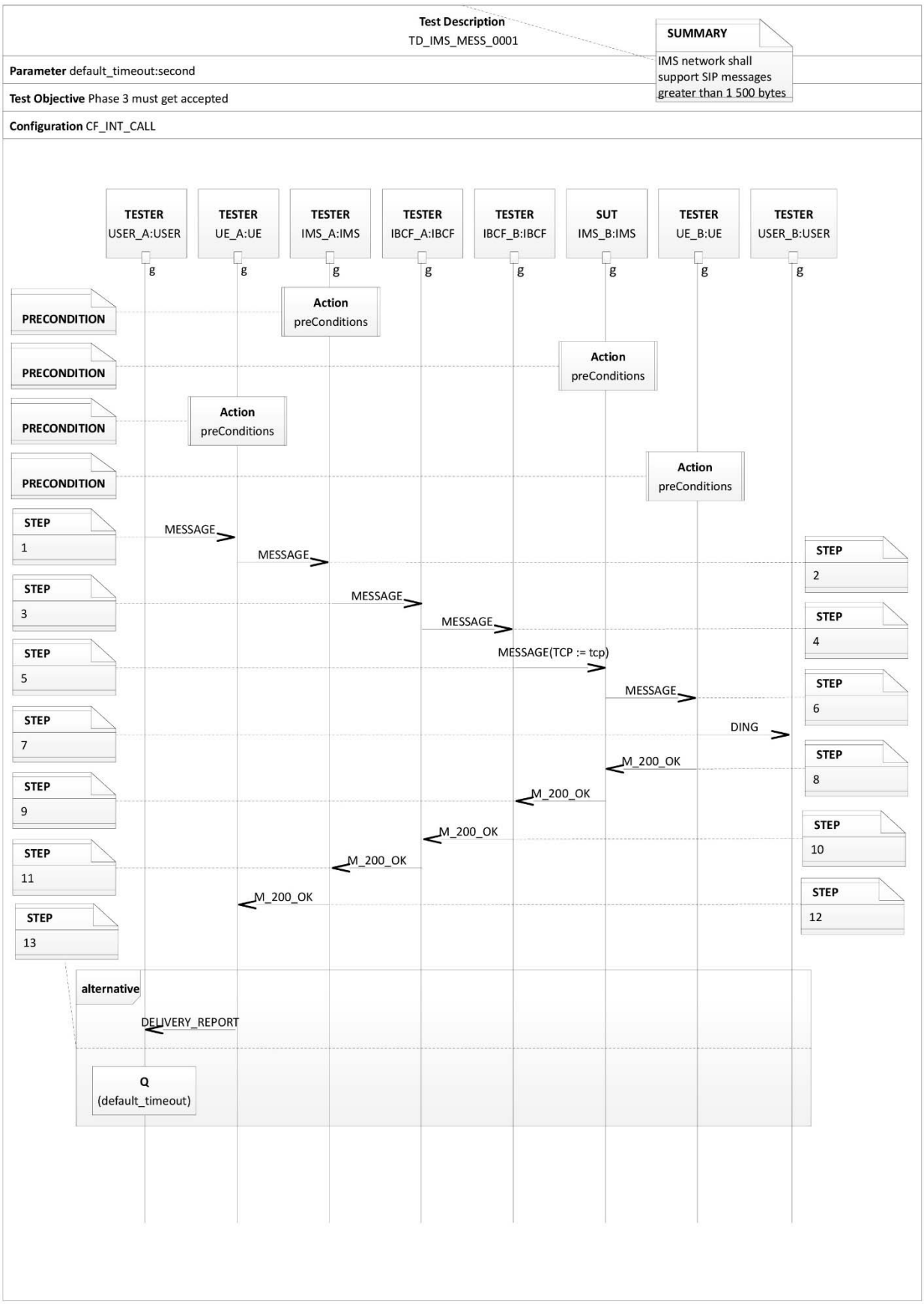


Figure A.3.3: Illustration of an interoperability testing in TDL Graphical Syntax Part 3

History

Document history		
V1.1.1	June 2015	Publication
V1.2.1	July 2016	Membership Approval Procedure MV 20160911: 2016-07-13 to 2016-09-12
V1.2.1	September 2016	Publication