

ETSI ES 203 119-4 V1.4.1 (2020-08)



ETSI STANDARD

**Methods for Testing and Specification (MTS);
The Test Description Language (TDL);
Part 4: Structured Test Objective Specification (Extension)**

Reference

RES/MTS-TDL4v141

Keywords

language, MBT, methodology, testing, TSS&TP,
TTCN-3, UML

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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 4 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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Introduction

Test purposes play an essential role in test specification processes at ETSI. Currently, TDL treats test purposes, and test objectives in general as informal text without any additional structural constraints. This extension package for TDL refines and formalizes test objective specification within TDL by introducing relevant meta-model concepts and a corresponding syntactical notation, both of which are related to TPLan ETSI ES 202 553 [i.1] and TPLan-like notations already established at ETSI. This enables test purpose specification to enter the modelling world and paves the way for improved tool support and better structured test objectives, as well as additional formal verification and validation facilities down the road by integrating and unifying the means for the specification of test purposes and test descriptions, while relying on the same underlying meta-model and benefiting from other related technologies built around this meta-model.

The present document describes the relevant abstract syntax (meta-model) extensions as well as the corresponding concrete syntactical notation.

NOTE: The use of underline (additional text) and strikethrough (deleted text) highlights the differences between base document and extended documents.

1 Scope

The present document specifies an extension of the Test Description Language (TDL) enabling the specification of structured test objectives. The extension covers the necessary additional constructs in the abstract syntax, their semantics, as well as the concrete graphical syntactic notation for the added constructs. In addition textual syntax examples of the TDL Structured Test Objectives extensions as well as BNF rules for a textual syntax for TDL with the Structured Test Objectives extensions are provided. The intended use of the present document is to serve both as a foundation for TDL tools implementing support for the specification of structured test objectives, as well as a reference for end users applying the standardized syntax for the specification of structured test objectives with TDL.

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2 References

2.1 Normative references

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

- [1] ETSI ES 203 119-1 (V1.5.1): "Methods for Testing and Specification (MTS); The Test Description Language (TDL); Part 1: Abstract Syntax and Associated Semantics".
- [2] ETSI ES 203 119-2 (V1.4.1): "Methods for Testing and Specification (MTS); The Test Description Language (TDL); Part 2: Graphical Syntax".
- [3] ETSI ES 203 119-3 (V1.4.1): "Methods for Testing and Specification (MTS); The Test Description Language (TDL); Part 3: Exchange Format".

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.

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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 ES 202 553 (V1.2.1): "Methods for Testing and Specification (MTS); TPLan: A notation for expressing Test Purposes".
- [i.2] ETSI TS 136 523-1 (V10.2.0): "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.3] ETSI TS 186 011-2: "Core Network and Interoperability Testing (INT); IMS NNI Interoperability Test Specifications (3GPP Release 10); Part 2: Test descriptions for IMS NNI Interoperability".

3 Definition of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the terms given in ETSI ES 203 119-1 [1] and the following apply:

context: set of circumstances related to the occurrence of an event

entity: object that may be involved in the occurrence of an event as part of a specific context

entity type: alias for additional meta-information that may be used to describe one or more entities

event: observable phenomenon or state that may occur in a specific context

NOTE: Related to a term of the same name defined in ETSI ES 202 553 [i.1].

event occurrence: description of the occurrence of an event in a specific context

event type: alias for additional meta-information that may be used to describe one or more events

3.2 Symbols

Void.

3.3 Abbreviations

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

| | |
|-------|---|
| BNF | Backus-Naur Form |
| EBNF | Extended Backus-Naur Form |
| IMS | IP Multimedia Subsystem |
| IUT | Implementation Under Test |
| OCL | Object Constraint Language |
| PICS | Protocol Implementation Conformance Statement |
| SUT | System Under Test |
| TDL | Test Description Language |
| TPLan | Test Purpose Notation |

4 Basic principles

4.1 Structured Test Objective Specification

The present document defines an extension for TDL enabling the specification of structured test objectives. Rather than rely on external documents or informal text provided by the default test objective specification facilities of TDL, this extension enables users to describe test objectives in a more structured and formalized manner which may enable subsequent generation of test description skeletons and consistency checking against test descriptions realizing a given test objective. In addition, the structured approach to test objective specification also enables syntactical and semantical consistency checking of the test objectives themselves.

The abstract concepts and the concrete syntax are based on TPLan ETSI ES 202 553 [i.1] to a large extent, as they also reflect concepts and practices already established at ETSI. The fundamental concept in the specification of a structured test objectives is the event occurrence which describes the occurrence of an abstract event in a specific context, comprising one or more involved entities, an event argument, as well as a time label and/or a time constraint.

Events and entities referenced in an event occurrence shall be defined in advance as part of a domain description which may then be reused across all structured test objective specifications in that domain. An entity is an abstract representation of an object involved in an event occurrence that may be realized as a component instance or a gate instance within a test description realizing the structured test objective.

An event argument may either refer to a data instance for data already defined with the facilities provided by TDL, or, following a more light weight approach, describe data inline without the need to define all data types and instances in advance. Pre-defined data and inline data may be integrated to a certain degree. Inline data may refer to pre-defined data, but pre-defined data shall not refer to inline data.

Event occurrence specifications are organized in the different compartments of a structured test objective, including initial conditions, expected behaviour, and final conditions. Multiple event occurrences are combined by means of an 'and' or 'or' operand indicating how subsequent event occurrences are related to each other (as a sequence or as alternatives, respectively).

Structured test objectives may also include references to PICS which may be used as selection criteria for the concrete realization of the test objectives. The PICS shall be defined in advance as part of the domain description. Multiple PICS references within the same structured test objective are combined by means of an 'and' or 'or' operand indicating how subsequent referenced PICS are related to each other.

4.2 Document Structure

The present document defines the structured test objective specification extension for TDL comprising:

- Meta-model extension describing additional concepts required for the specification of structured test objectives (clause 5).
- Concrete syntax extension describing corresponding shapes for the representation of the additional concepts (clause 6).
- An informative annex with examples in a textual concrete syntax (annex A).
- An informative annex with production rules for the example textual syntax (annex B).

4.3 Notational Conventions

The present document inherits the notational conventions defined in ETSI ES 203 119-1 [1] and ETSI ES 203 119-2 [2].

The abstract syntax specification and the classifier descriptions follow the notational conventions defined in clause 4.5 of Abstract Syntax and Associated Semantics [1]. The concrete syntax notation specification follows the notational conventions described in clause 4.5 of the Graphical Syntax [2].

4.4 Element Operations

The following operations shall be provided in an implementation of the TDL-TO extension to the TDL meta-model in order to ensure the semantic integrity of TDL-TO models, in addition to the operations defined for the TDL meta-model in ETSI ES 203 119-1 [1]. The operations are also used as reusable shortcuts for the specification of the formalized constraints and are required for their interpretation, in addition to the operations provided by the standard library of OCL:

- OclAny **getTestObjective** (): StructuredTestObjective - applicable on any TDL 'Element', returns the 'StructuredTestObjective' that contains the construct directly or indirectly.
- OclAny **contains** (object : OclAny): Boolean - applicable on any TDL 'Element', accepts a TDL 'Element' as parameter 'object', returns 'true' if the 'Element' contains the 'object' and 'false' otherwise.
- StructuredTestObjective **indexOf** (object : OclAny): Integer - applicable on a 'StructuredTestObjective', accepts a TDL 'Element' as parameter 'object', returns the position of the 'object' within the flattened list of all 'Element's directly and indirectly contained within the 'StructuredTestObjective'. The list is flattened according to a depth-first approach.

4.5 Conformance

For an implementation claiming to conform to this extension of the TDL meta-model, all concepts specified in the present document and in ETSI ES 203 119-1 [1], as well as the concrete syntax representation specified in the present document shall be implemented consistently with the requirements given in the present document and in ETSI ES 203 119-1 [1]. The electronic attachment from annex A in ETSI ES 203 119-1 [1] may serve as a starting point for a TDL meta-model implementation conforming to the present document and the overall abstract syntax of TDL [1].

5 Meta-Model Extensions

5.1 Overview

The structured test objective specification is defined within a single package in the TDL meta-model. It relies on several concepts from the 'Foundation', 'Data', and 'Time' packages of the TDL meta-model.

5.2 Foundation Abstract Syntax and Classifier Description

5.2.1 Entity

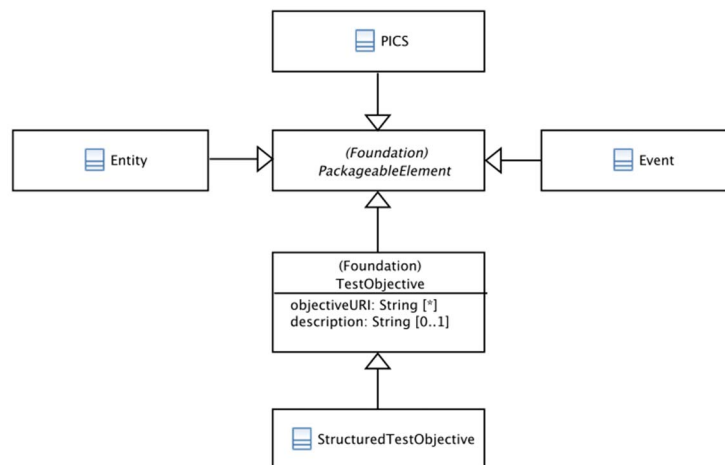


Figure 5.1: Structured Test Objective Specification Foundation Concepts

Semantics

An 'Entity' is a 'PackageableElement' that describes a participant in an 'EventOccurrence'. User defined entities, such as IUT, SUT, Tester, etc., may be referenced by means of an 'EntityReference' within an 'EventOccurrence' as the source and/or target of an 'Event' referenced in a corresponding 'EventReference'. Whether an 'Entity' corresponds to a 'ComponentInstance' or a 'GateInstance' is not specified in advance. 'Annotation's may be used to provide an indication for the type and role of the 'Entity'.

Generalizations

- PackageableElement

Properties

There are no properties specified.

Constraints

There are no constraints specified.

5.2.2 Event

Semantics

An 'Event' is a 'PackageableElement' that describes a user defined event or activity that may be referenced in an 'EventOccurrence'. The direction of an 'Event' with respect to the 'Entity' or 'Entity's referenced in the 'EventOccurrence' depends on the interpretation of the 'Event', where 'Annotation's may be used to provide additional information as an indication of the intended interpretation.

Generalizations

- PackageableElement

Properties

There are no properties specified.

Constraints

There are no constraints specified.

5.2.3 PICS

Semantics

A 'PICS' is a 'PackageableElement' that may be referenced in 'StructuredTestObjective's to indicate selection criteria for the 'StructuredTestObjective' based on features required for and/or tested with the realization of the 'StructuredTestObjective'.

Generalizations

- PackageableElement

Properties

There are no properties specified.

Constraints

There are no constraints specified.

5.3 Test Objective Abstract Syntax and Classifier Description

5.3.1 StructuredTestObjective

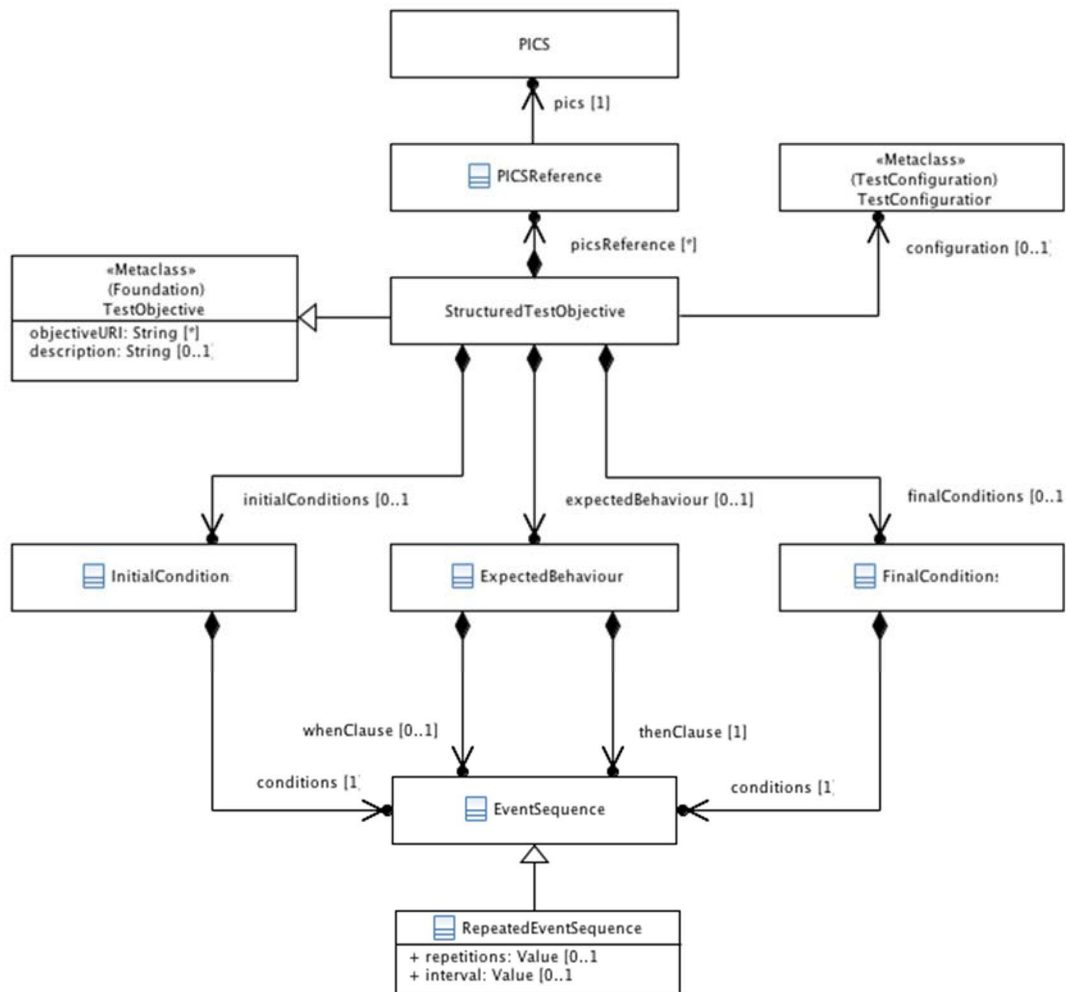


Figure 5.2: Structured Test Objective Concepts

Semantics

A 'StructuredTestObjective' is a refinement of 'TestObjective' that enables the use of additional constructs in order to formalize the description of 'TestObjective's. In addition to the 'description' and 'objectiveURI' properties inherited from 'TestObjective', a 'StructuredTestObjective' includes 'PICSReferences', 'InitialConditions', 'ExpectedBehaviour', and 'FinalConditions'. A 'StructuredTestObjective' may optionally reference a 'TestConfiguration' on which the 'StructuredTestObjective' shall be realized. The referenced 'TestConfiguration' provides descriptive information regarding the intended setup for the 'StructuredTestObjective'.

Generalizations

- TestObjective

Properties

- **picsReference** : PICSReference [*] {ordered}
An ordered set of 'PICSReferences' to 'PICS'.
- **configuration** : TestConfiguration [0..1]
A reference to a 'TestConfiguration'.

- `initialConditions` : `InitialConditions` [0..1]
Initial conditions description for the 'StructuredTestObjective'.
- `expectedBehaviour` : `ExpectedBehaviour` [0..1]
Expected behaviour description for the 'StructuredTestObjective'.
- `finalConditions` : `FinalConditions` [0..1]
Final conditions description for the 'StructuredTestObjective'.

Constraints

There are no constraints specified.

5.3.2 PICSReference

Semantics

A 'PICSReference' is an 'Element' that enables the referencing of 'PICS' within a 'StructuredTestObjective'.
A 'Comment' with body containing an 'and' or 'or' shall be used as a Boolean operand if there are two or more 'PICSReference's specified within a 'StructuredTestObjective', starting with the second 'PICSReference' to indicate how the referenced 'PICS' shall be interpreted with regard to the other referenced 'PICS' within the same 'StructuredTestObjective'. A 'Comment' with body containing 'not' may be used to indicate that the referenced 'PICS' is to be negated.

Generalizations

- Element

Properties

- `pics` : `PICS` [1]
The referenced 'PICS'.

Constraints

- **Combining Multiple 'PICSReference's**
A 'Comment' with body containing an 'and' or 'or' shall be attached to the 'PICSReference' as a Boolean operand if there are two or more 'PICSReference's and it is not the first 'PICSReference'.
inv: **MultiplePICS**:

```
self.container().picsReference->size() < 2
or self.container().picsReference->forAll(p |
  self.container().picsReference->at(0) = p
  or (not p.comment->isEmpty()
      and (p.comment->first().body = 'and'
           or p.comment->first().body = 'or'))))
```

5.3.3 InitialConditions

Semantics

'InitialConditions' is an 'Element' containing an 'EventSequence' describing the initial conditions of a 'StructuredTestObjective'.

Generalizations

- Element

Properties

- conditions : EventSequence [1]
An 'EventSequence' containing the 'EventOccurrence's describing the initial conditions for the 'StructuredTestObjective'.

Constraints

There are no constraints specified.

5.3.4 ExpectedBehaviour

Semantics

'ExpectedBehaviour' is an 'Element' containing an 'EventSequence' describing the expected behaviour specified in a 'StructuredTestObjective'.

Generalizations

- Element

Properties

- whenClause : EventSequence [0..1]
An 'EventSequence' containing the 'EventOccurrence's describing the stimuli for the 'ExpectedBehaviour' of the 'StructuredTestObjective'.
- thenClause : EventSequence [1]
An 'EventSequence' containing the 'EventOccurrence's describing the expected reaction for the 'ExpectedBehaviour' of the 'StructuredTestObjective' or the resulting expected state.

Constraints

There are no constraints specified.

5.3.5 FinalConditions

Semantics

'FinalConditions' is an 'Element' containing an 'EventSequence' describing the final conditions of a 'StructuredTestObjective'.

Generalizations

- Element

Properties

- conditions : EventSequence [1]
An 'EventSequence' containing the 'EventOccurrence's describing the final conditions for the 'StructuredTestObjective'.

Constraints

There are no constraints specified.

5.4 Events Abstract Syntax and Classifier Description

5.4.1 EventSequence

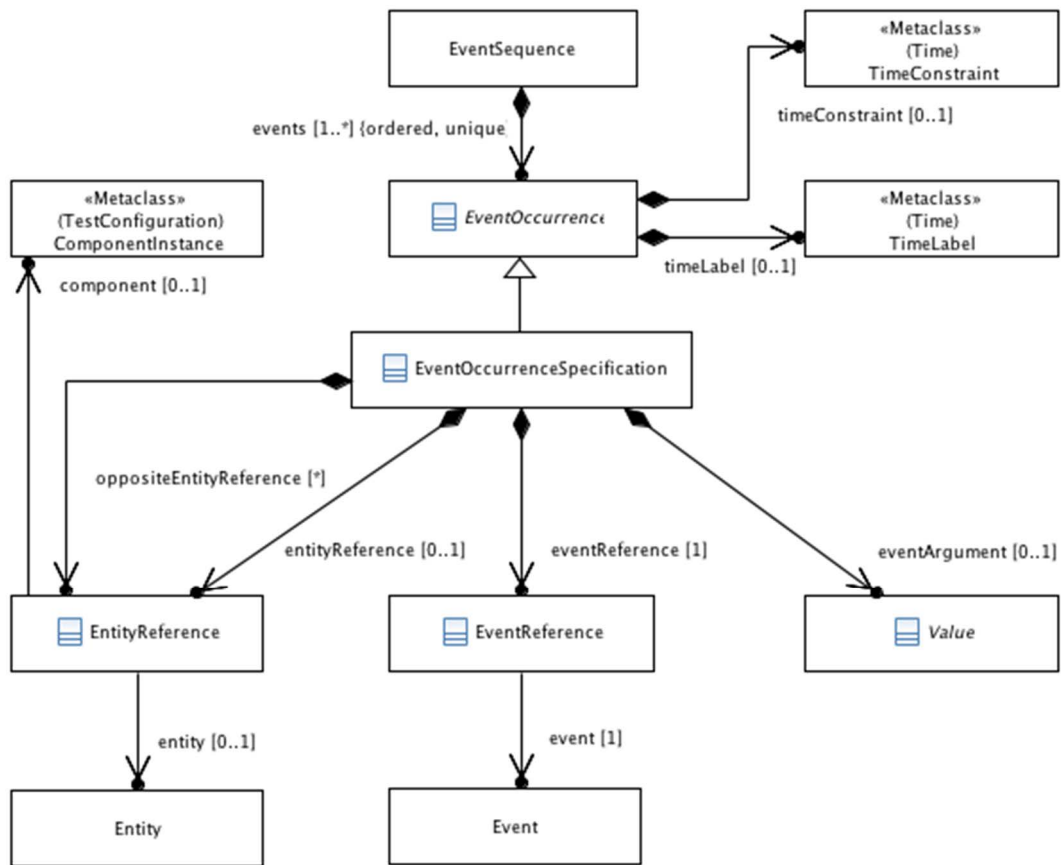


Figure 5.3: Events Concepts

Semantics

'EventSequence' is an 'Element' containing 'EventOccurrence's.

Generalizations

- Element

Properties

- `events : EventOccurrence [1..*] {ordered}`
A sequence of 'EventOccurrence's.

Constraints

There are no constraints specified.

5.4.2 RepeatedEventSequence

Semantics

'RepeatedEventSequence' is an 'EventSequence' optionally specifying a number of repetitions or a repetition interval. In case neither the number of repetitions nor the repetition interval is specified, the 'EventOccurrences' defined in the 'RepeatedEventSequence' may occur indefinite number of times with arbitrary frequency. If the 'repetitions' property is defined, the associated 'EventOccurrence's are executed the specified number of times. If the 'interval' property is defined, the associated 'EventOccurrence' are executed repeatedly with the specified time interval.

Generalizations

- EventSequence

Properties

- repetitions : Value [0..1]
A 'Value' expression that specifies the number of repetitions the 'EventOccurrence's shall be executed.
- interval: Value [0..1]
A 'Value' expression that specifies the interval between each repeated execution of the 'EventOccurrence's.

Constraints

- **Either 'repetitions', or 'interval' or neither shall be specified**
At most one of the optional properties 'repetitions' or 'interval' shall be defined.
inv: **RepetitionOrInterval:**
self.repetitions.oclIsUndefined() or self.interval.oclIsUndefined()
- **The 'repetitions' 'Value' shall be countable and positive**
The expression assigned to the 'repetitions' property shall evaluate to a positive and countable 'Value'.
inv: **RepetitionCount:**
This constraint cannot be expressed in OCL
- **The 'interval' 'Value' shall be countable and positive**
The expression assigned to the 'repetitions' property shall evaluate to a positive and countable 'Value'.
inv: **RepetitionInterval:**
This constraint cannot be expressed in OCL

5.4.3 EventOccurrence

Semantics

An 'EventOccurrence' is an 'Element' describing an occurrence of an 'Event' within an 'EventSequence'. The 'EventOccurrence' also includes an optional 'TimeLabel' and/or a 'TimeConstraint' for the specification of temporal relationships between 'EventOccurrence's. In case there is more than one 'EventOccurrence' within an 'EventSequence', a 'Comment' with body containing an 'and' or 'or' shall be used as an operand, starting with the second 'EventOccurrence' to indicate how the 'EventOccurrence' shall be related to the previous 'EventOccurrence' within the same 'EventSequence', i.e. whether both 'EventOccurrence's are required or whether only one of the 'EventOccurrence's shall take place. The 'or' operand takes precedence, thus given a 'SimpleEventSequence' *EO1* and *EO2* or *EO3*, the intended interpretation is that *EO1* takes place followed by *EO2* or *EO3* taking place. While this is opposite to conventional logical operator precedence (i.e. 'and' takes precedence over 'or'), conventional logical operator precedence is not applicable in the context of 'EventOccurrence's as the intended interpretation shall be implementable by means of an 'AlternativeBehaviour' or a 'ConditionalBehaviour' in TDL.

Additional 'Comment's may be added to describe the 'EventOccurrence'.

Generalizations

- Element

Properties

- **timeLabel** : TimeLabel [0..1]
A 'TimeLabel' that may be added to the 'EventOccurrence' in order to be able to specify 'TimeConstraint's for subsequent 'EventOccurrence's with relation to the 'EventOccurrence'.
- **timeConstraint** : TimeConstraint [0..1]
A 'TimeConstraint' that may be added to the 'EventOccurrence' to describe temporal relationships to previous 'EventOccurrence's.

Constraints

- **Combining Multiple 'EventOccurrence's**
A 'Comment' with body containing an 'and' or 'or' shall be attached to the 'EventOccurrence' as an operand if there are two or more 'EventOccurrence's and it is not the first 'EventOccurrence'.
inv: **MultipleEventOccurrences:**
self.container().oclIsTypeOf(EventSpecificationTemplate)
or self.container().events->size() < 2
or self.container().events->forAll(o |
self.container().events->at(0) = o
or (not o.comment->isEmpty()
and (o.comment->first().body = 'and'
or o.comment->first().body = 'or'))))

5.4.4 EventOccurrenceSpecification

Semantics

An 'EventOccurrenceSpecification' is an 'Element' describing a concrete occurrence of an 'Event', including qualified references to the 'Event', to the 'Entity' related to the occurrence of the 'Event' and to any other 'Entity's involved in the 'EventOccurrenceSpecification'. It also includes a 'Value' as an argument describing the details of the 'EventOccurrenceSpecification' such as the data being sent or received, or a state an involved 'Entity' is in.

Generalizations

- Element

Properties

- **entityReference** : EntityReference [0..1]
An 'EntityReference' to the 'Entity' related to the occurrence of the 'Event'.
- **oppositeEntityReference** : EntityReference [0..*]
'EntityReference's to other 'Entity's involved in the 'EventOccurrence'.
- **eventReference** : EventReference [1]
An 'EventReference' to the occurring 'Event'.
- **eventArgument** : Value [0..1]
A 'Value' describing the details of the 'EventOccurrence'.

Constraints

There are no constraints specified.

5.4.5 EntityReference

Semantics

An 'EntityReference' is an 'Element' that enables the referencing of 'Entity's within 'EventOccurrence's. 'Comment's may be used to add qualifiers describing peculiarities of the referenced 'Entity' related to the specific 'EventOccurrence'. Alternatively, an 'EntityReference' may be used to reference a 'ComponentInstance' of a 'TestConfiguration' instead of an 'Entity'.

Generalizations

- Element

Properties

- entity : Entity [0..1]
The referenced 'Entity'.
- component : ComponentInstance [0..1]
The referenced 'ComponentInstance'.

Constraints

- **An 'Entity' or a 'ComponentInstance' shall be referenced.**
There shall be a reference to an 'Entity' or a 'ComponentInstance' but not both.
inv: **EntityOrComponentInstance:**
(not self.entity.ocllsUndefined() and self.component.ocllsUndefined())
or (self.entity.ocllsUndefined() and not self.component.ocllsUndefined())

5.4.6 EventReference

Semantics

An 'EventReference' is an 'Element' that enables the referencing of 'Events' within 'EventOccurrence's. 'Comment's may be used to add qualifiers describing peculiarities of the referenced 'Event' related to the specific 'EventOccurrence'.

Generalizations

- Element

Properties

- event : Event [1]
The referenced 'Event'.

Constraints

There are no constraints specified.

5.5 Data Abstract Syntax and Classifier Description

5.5.1 Value

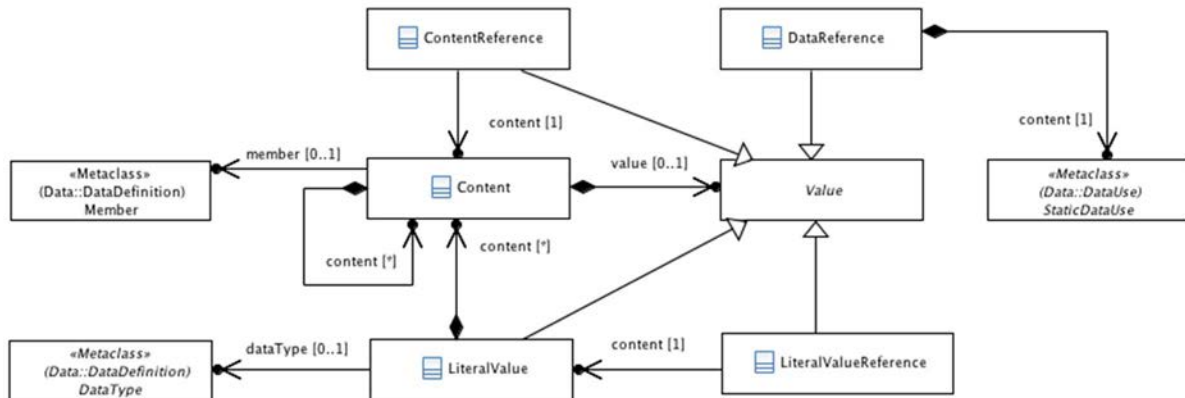


Figure 5.4: Data Concepts

Semantics

A 'Value' is an abstract 'Element' that is refined into 'DataReference', 'LiteralValue', 'LiteralValueReference' and 'ContentReference'. A 'DataReference' enables the referencing of 'DataInstance's defined in advance, as well as the corresponding 'AnyValue', 'AnyValueOrOmit', and 'OmitValue' specifications for a predefined 'DataType'. The remaining 'Value' refinements enable the inline description of data content and data structures, without the requirement of defining 'DataType's and 'DataInstance's in advance. 'DataInstance's and inline data descriptions may be combined to the extent that inline data descriptions may contain 'DataReference's to 'DataInstance's, but 'DataInstance's relying on declared 'DataType's may not reference inline data descriptions. 'Comment's may be used to add qualifiers describing further details related to the 'Value' with regard to the specific context of its usage. With the exception of 'DataInstance's, all inline descriptions are only visible within the containing 'StructuredTestObjective' and may only be referenced within the same 'StructuredTestObjective', where only 'LiteralValue's and 'Content' used in previous 'EventOccurrence's may be referenced in subsequent 'EventOccurrence's.

Generalizations

- Element

Properties

There are no properties specified.

Constraints

There are no constraints specified.

5.5.2 LiteralValue

Semantics

A 'LiteralValue' is a 'Value' that represents any literal label used as an argument of an 'EventOccurrence' or as a value of 'Content'. 'Comment's may be used to provide additional information related to the type and semantics of the 'LiteralValue'. A 'LiteralValue' may contain 'Content's enabling the definition of a substructure of the 'LiteralValue' that describes the details of the 'LiteralValue'.

Generalizations

- Value

Properties

- content : Content [0..*] {ordered}
The 'Content's of the 'LiteralValue'.

Constraints

There are no constraints specified.

5.5.3 Content

Semantics

A 'Content' is an 'Element' that enables the specification of composite 'LiteralValue's which contain additional 'Value's assigned to the 'Content'. Alternatively, 'Content' may contain nested 'Content' without specifying a 'Value' enabling the specification of relevant sub-structures without full details of the 'Values' assigned to each structural feature.

Generalizations

- Element

Properties

- content : Content [0..*] {ordered}
Nested contents of the 'Content'.
- value : Value [0..1]
A 'Value' assigned to the 'Content'.

Constraints

- **No nested 'Content's if 'Value' is provided**
Either nested 'Content's or 'Value' may be specified within 'Content', but not both.
inv: **ContentOrValue**:
self.content->isEmpty() or self.value.oclIsUndefined()

5.5.4 LiteralValueReference

Semantics

A 'LiteralValueReference' is a 'Value' that enables the referencing of 'LiteralValues' from previous 'EventOccurrence's within the containing 'StructuredTestObjective' as an argument of an 'EventOccurrence' or as a value of 'Content'.

Generalizations

- Value

Properties

- content : LiteralValue [1]
The referenced 'LiteralValue'.

Constraints

- **Referenced 'LiteralValue' visibility**
Only 'LiteralValue's defined within previous 'EventOccurrence's of the containing 'StructuredTestObjective' may be referenced.
inv: **VisibleValue:**
self.getTestObjective().contains(self.content)
and self.getTestObjective().indexOf(self.content) < self.getTestObjective().indexOf(self)

5.5.5 ContentReference

Semantics

A 'ContentReference' is a 'Value' that enables the referencing of the 'Content' of 'LiteralValues' from previous 'EventOccurrence's within the containing 'StructuredTestObjective' as an argument of an 'EventOccurrence' or as a value of 'Content'.

Generalizations

- Value

Properties

- content : Content [1]
The referenced 'Content'.

Constraints

- **Referenced 'Content' visibility**
Only 'Content' defined within previous 'EventOccurrence's of the containing 'StructuredTestObjective' may be referenced.
inv: **VisibleContent:**
self.getTestObjective().contains(self.content)
and self.getTestObjective().indexOf(self.content) < self.getTestObjective().indexOf(self)

5.5.6 DataReference

Semantics

A 'DataReference' is a 'Value' that enables the referencing of 'DataInstance's by means of a 'DataInstanceUse', as well as the use of 'AnyValue', 'AnyValueOrOmit', and 'OmitValue' specifications for a predefined 'DataType' as an argument of 'EventOccurrence's or as a value of 'Content'.

Generalizations

- Value

Properties

- content : StaticDataUse [1]
Specification of the referenced 'DataInstance'.

Constraints

- 'DataUse' restrictions within 'DataReference'**
 Only 'StaticDataUse' may be used directly or indirectly in 'ParameterBinding's of the 'StaticDataUse' within a 'DataReference'.
 inv: **DataReferenceContents**:
 self.content.ocIsInstanceOf(StaticDataUse)

 and self.content.argument->forall(a | a.dataUse.ocIsInstanceOf(StaticDataUse))

 and self.content.argument->closure(a |

 a.dataUse.argument)->forall(a|a.dataUse.ocIsInstanceOf(StaticDataUse))
- No 'reduction' within 'DataReference'**
 The 'reduction' property of 'StaticDataUse' inherited from 'DataUse' shall not be used within a 'DataReference'.
 inv: **DataReferenceReduction**:
 self.content.reduction->isEmpty()

5.6 Event Templates Abstract Syntax and Classifier Description

5.6.1 EventSpecificationTemplate

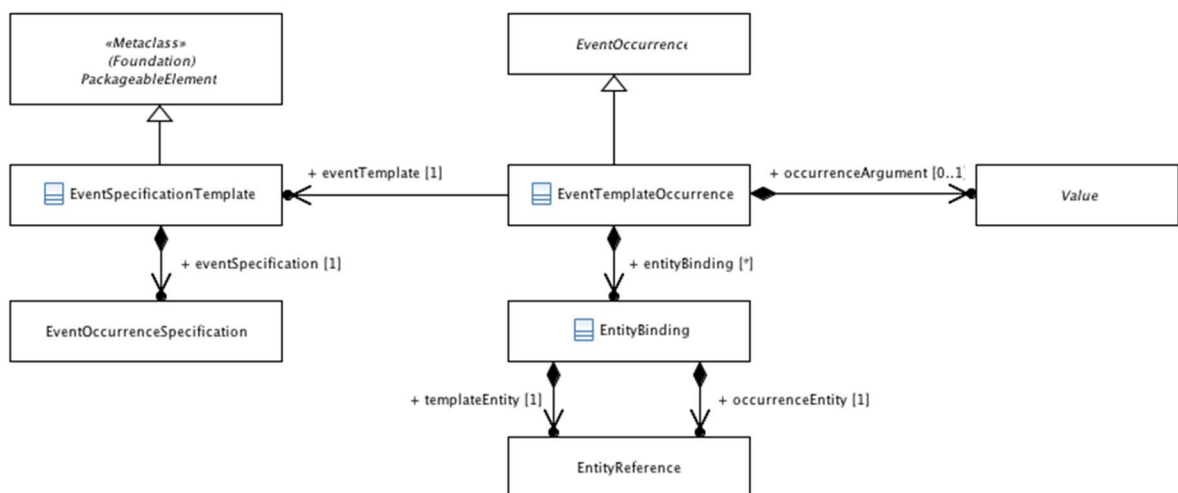


Figure 5.5: Event Templates Concepts

Semantics

'EventSpecificationTemplate' is a 'PackageableElement' containing a single reusable 'EventOccurrenceSpecification'. An 'EventSpecificationTemplate' may be referenced within an 'EventSequence' by means of an 'EventTemplateOccurrence'.

Generalizations

- PackageableElement

Properties

- eventSpecification : EventOccurrenceSpecification [1]
A reusable 'EventOccurrenceSpecification'.

Constraints

There are no constraints specified.

5.6.2 EventTemplateOccurrence

Semantics

An 'EventTemplateOccurrence' is an 'EventOccurrence' referring to a reusable 'EventSpecificationTemplate' that defines a concrete occurrence of the referenced 'EventSpecificationTemplate' within an 'EventSequence'. Optional 'EntityBinding's may be specified to override some or all of the 'EntityReference' specified in 'EventOccurrenceSpecification' of the referenced 'EventTemplateSpecification' with new 'EntityReference's. Optional 'Value' specification may be specified to overriding the 'Value' specified as argument in 'EventOccurrenceSpecification' of the referenced 'EventTemplateSpecification' with a new 'Value'.

Generalizations

- EventOccurrence

Properties

- eventTemplate : EventSpecificationTemplate [1]
The referenced 'EventSpecificationTemplate'.
- entityBinding : EntityBinding [0..*]
Optional 'EntityBinding's for substituting the 'EntityReference' specified in 'EventOccurrenceSpecification' of the referenced 'EventTemplateSpecification' with new 'EntityReference's.
- occurrenceArgument : Value [0..1]
Optional 'Value' specification overriding the 'Value' specified as argument in 'EventOccurrenceSpecification' of the referenced 'EventTemplateSpecification'.

Constraints

- **'EntityReference' of referenced 'EventSpecificationTemplate'**
If 'EntityBinding's are provided, the 'Entity's or 'ComponentInstance's referenced in the 'templateEntity' properties shall also be referenced by one of the 'EntityReferences' in the 'EventOccurrenceSpecification' of the 'EventSpecificationTemplate' referenced in the 'EventTemplateOccurrence'.
inv: **EntityTemplateOccurrenceConsistency:**
self.entityBinding->forAll(b |
 (not b.templateEntity.entity.ocIsUndefined())
 and (b.templateEntity.entity =
 self.eventTemplate.eventSpecification.entityReference.entity))
 or (not b.templateEntity.component.ocIsUndefined())
 and (b.templateEntity.component =
 self.eventTemplate.eventSpecification.entityReference.component)
 or self.eventTemplate.eventSpecification.oppositeEntityReference->exists(e |
 (not b.templateEntity.entity.ocIsUndefined())
 and (e.entity = b.templateEntity.entity))
 or (not b.templateEntity.component.ocIsUndefined())
 and (e.component = b.templateEntity.component))))))

5.6.3 EntityBinding

Semantics

An 'EntityBinding' is an 'Element' used for substituting the 'EntityReference' specified in 'EventOccurrenceSpecification' of a 'EventTemplateSpecification' referenced within an 'EventTemplateOccurrence' with new 'EntityReference's.

Generalizations

- Element

Properties

- `templateEntity` : EntityReference [1]
An 'EntityReference' describing the 'Entity' referenced in the 'EventOccurrenceSpecification' of the 'EventSpecificationTemplate'.
- `occurrenceEntity` : EntityReference [1]
An 'EntityReference' describing the 'Entity' that shall replace the 'EntityReference' referenced in the 'EventOccurrenceSpecification' of the 'EventSpecificationTemplate' in the 'EventTemplateOccurrence'.

Constraints

There are no constraints specified.

6 Graphical Syntax Extensions

6.1 Foundation

6.1.1 Entity

Concrete Graphical Notation



Formal Description

context Entity

ENTITYLABEL ::= self.name

Constraints

There are no constraints specified.

Comments

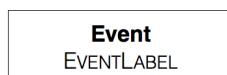
No comments.

Example



6.1.2 Event

Concrete Graphical Notation



Formal Description

context Event

EVENTLABEL ::= self.name

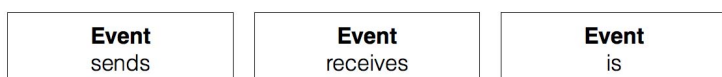
Constraints

There are no constraints specified.

Comments

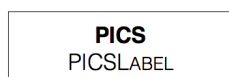
No comments.

Example



6.1.3 PICS

Concrete Graphical Notation



Formal Description

context PICS

PICSLABEL ::= self.name

Constraints

There are no constraints specified.

Comments

No comments.

Example



6.1.4 Comment

Concrete Graphical Notation

Inherited from ETSI ES 203 119-2 [2] for 'Comment's not contained in a 'StructuredTestObjective', overridden for 'Comment's directly or indirectly contained in a 'StructuredTestObjective'.

Formal Description

context Comment

QUALIFIER ::= self.body

NOTQUALIFIER ::= if self.body = 'not'
then


```

    self.body
  endif

```

```

ANDORQUALIFIER ::= if self.body = 'and'
                   or self.body = 'or'
                   then
                     self.body
                   endif

```

```

ARTICLEQUALIFIER ::= if self.body = 'a'
                     or self.body = 'an'
                     or self.body = 'the'
                     then
                       self.body
                     endif

```

```

ASSIGNMENTQUALIFIER ::= if self.body = 'indicating value'
                       or self.body = 'set to'
                       then
                         self.body
                       endif

```

```

COMMONWORDQUALIFIER ::= if self.body = 'after'
                        or self.body = 'before'
                        or self.body = 'from'
                        or self.body = 'of'
                        or self.body = 'to'
                        then
                          self.body
                        endif

```

```

DIRECTIONQUALIFIER ::= if self.body = 'by'
                       or self.body = 'for'
                       or self.body = 'from'
                       or self.body = 'in'
                       or self.body = 'into'
                       or self.body = 'to'
                       then
                         self.body
                       endif

```

```

QUANTIFIEDQUALIFIER ::= if self.body = 'all'
                        or self.body = 'any'
                        or self.body = 'few'
                        or self.body = 'multiple'
                        or self.body = 'no'
                        or self.body = 'only'
                        or self.body = 'several'
                        or self.body = 'some'
                        then
                          self.body
                        endif

```

```

REFERENCEQUALIFIER ::= if self.body = 'associated with'
                       or self.body = 'carrying'
                       or self.body = 'contained in'
                       or self.body = 'corresponding to'
                       or self.body = 'derived from'
                       then
                         self.body
                       endif

```

```

TIMECONSTRAINTQUALIFIER ::=
    if self.body = 'after'
    or self.body = 'before'
    or self.body = 'during'
    or self.body = 'within'
    then
        self.body
    endif

```

```

NOTE LABEL ::= '(' 'Note' self.name ':' self.body ')'

```

Constraints

- **Default comment label**

The QUALIFIER label only applies to 'Comment's that do not match the conditions for any of the other qualifier labels.

Comments

No comments.

Example

Not available.

6.2 Test Objective

6.2.1 StructuredTestObjective

Concrete Graphical Notation

| | |
|---------------------------|------------------------|
| TP Id | TESTOBJECTIVENAMELABEL |
| Test Objective | DESCRIPTIONLABEL |
| Reference | URIOfOBJECTIVELABEL |
| Config Id | <CONFIGLABEL> |
| PICS Selection | <PICSELECTIONLABEL> |
| Initial Conditions | |
| INITIALCONDITIONSLABEL | |
| Expected Behaviour | |
| EXPECTEDBEHAVIOURLABEL | |
| Final Conditions | |
| FINALCONDITIONSLABEL | |

| |
|---------------------------|
| Test Purpose |
| TESTOBJECTIVENAMELABEL |
| Test Objective |
| DESCRIPTIONLABEL |
| Reference |
| URIOfOBJECTIVELABEL |
| Configuration |
| <CONFIGLABEL> |
| PICS Selection |
| <PICSELECTIONLABEL> |
| Initial Conditions |
| INITIALCONDITIONSLABEL |
| Expected Behaviour |
| EXPECTEDBEHAVIOURLABEL |
| Final Conditions |
| FINALCONDITIONSLABEL |

Formal Description

context StructuredTestObjective

```

TESTOBJECTIVENAMELABEL ::= self.name
DESCRIPTIONLABEL ::= self.description
URIOBJECTIVELABEL ::= self.objectiveURI->newline()
CONFIGLABEL ::= self.configuration.name
PICSSSELECTIONLABEL ::= foreach p:PICSReference in self.picsReferences p as context in <PICSSREFERENCELABEL> end
PICSSREFERENCELABEL ::= [p.comment->first() as context in <ANDORQUALIFIER>] [p.comment->last() as context in <NOTQUALIFIER>] p.pics.name
INITIALCONDITIONSLABEL ::= 'with' '{'
    self.initialConditions.conditions as context in <EVENTSEQUENCELABEL>
    '}'

EXPECTEDBEHAVIOURLABEL ::= 'ensure' 'that' '{'
    if self.expectedBehaviour.whenClause.oclIsUndefined() then
        self.expectedBehaviour.thenClause as context in <EVENTSEQUENCELABEL>
    else
        'when' '{'
            self.expectedBehaviour.whenClause as context in <EVENTSEQUENCELABEL>
        '}'
        'then' '{'
            self.expectedBehaviour.thenClause as context in <EVENTSEQUENCELABEL>
        '}'
    endif
    '}'

FINALCONDITIONSLABEL ::= 'with' '{'
    self.finalConditions.conditions as context in <EVENTSEQUENCELABEL>
    '}'

```

Constraints

- **Spaces in the 'name' of an 'Element' and the 'body' of a 'Comment'**
A 'name' of an 'Element' or a 'body' of a 'Comment' shall be enclosed in single or double quotes when the corresponding 'Element' or 'Comment' is contained within a 'PICSReference' or an 'EventSequence'.

Comments

The labels for the DESCRIPTIONLABEL, URIOBJECTIVELABEL, and PICSSSELECTIONLABEL are optional and displayed only if the respective model elements are defined. The corresponding compartments are always displayed.

The compartments containing the INITIALCONDITIONSLABEL, the EXPECTEDBEHAVIOURLABEL, and the FINALCONDITIONSLABEL are optional and displayed only if the respective model elements are defined. The corresponding headings containing the keywords **Initial Conditions**, **Expected Behaviour**, and **Final Conditions** are mandatory only if the related compartments are displayed, otherwise they may be hidden.

In the alternate notation shown above, all compartments except the TestObjective compartment are optional and only displayed if the respective model elements are defined.

Example

| | |
|---|---|
| TP Id | TP/GEONW/FDV/BAH/BV/01 |
| Test Objective | Check defined values of default Gn parameters in the basic header |
| Reference | |
| Config Id | |
| PICS Selection | |
| Initial Conditions | |
| <pre>with { the IUT entity being "in" the initial state }</pre> | |
| Expected Behaviour | |
| <pre>ensure that { when { the IUT entity is requested to send a "GUC packet" } then { the IUT entity sends a "GUC packet" containing BasicHeader containing "version field" indicating value "itsGnProtocolVersion MIB parameter" , "RHL field" indicating value "itsGnDefaultHopLimit MIB parameter" ; } }</pre> | |

6.3 Events

6.3.1 EventSequence

Concrete Graphical Notation

There is no shape associated with this element. Instead, it is represented as a label within the context of a 'StructuredTestObjective'.

Formal Description

context EventSequence

```
EVENTSEQUENCELABEL ::= if self.oclIsTypeOf(RepeatedEventSequence) then self as context in <REPEATEDEVENTSEQUENCELABEL>
  else if self.oclIsTypeOf(EventSequence) then self as context in <SIMPLEEVENTSEQUENCELABEL>
  endif
```

```
SIMPLEEVENTSEQUENCELABEL ::= foreach e:EventOccurrence in self.events newline() e as context in <EVENTOCCURRENCELABEL> end
```

Constraints

There are no constraints specified.

Comments

No comments.

Example

```
the IUT entity being in the initial state and
the IUT entity using a "CBF algorithm" and
the IUT entity having received a "Beacon information" from the ItsNodeB or
the IUT entity having received any message from the ItsNodeD
repeat 2 times { the UE entity sends a "HARQ feedback on the HARQ process" }
```

6.3.2 RepeatedEventSequence

Concrete Graphical Notation

There is no shape associated with this element. Instead, it is represented as a label within the context of a 'StructuredTestObjective'.

Formal Description

context RepeatedEventOccurrence

```
REPEATEDEVENTSEQUENCELABEL ::= 'repeat'
    if self.interval.ocllsUndefined() then
        self.repetitions as context in <EVENTARGUMENTLABEL> 'times'
    else
        'every' self.interval as context in <EVENTARGUMENTLABEL>
    endif
    foreach e:EventOccurrence in self.events newline() e as context in <EVENTOCCURRENCELABEL> end
```

Constraints

There are no constraints specified.

Comments

No comments.

Example

```
repeat 2 times {
    the IUT entity having received a "Beacon information" from the ItsNodeB entity and
    the IUT entity having received any message from the ItsNodeD entity
}

repeat every CBF_MAX {
    the IUT entity saves the "GBC packet" into the CBF buffer entity and
    the IUT entity starts a "contention timer" containing
        duration set to CBF_MAX
    ;
    and
    the IUT entity broadcasts the received "GBC packet"
}
```

6.3.3 EventOccurrence

Concrete Graphical Notation

There is no shape associated with this element as it is abstract.

Formal Description

context EventOccurrence

```
EVENTOCCURRENCELABEL ::= if self.ocllsTypeOf(EventOccurrenceSpecification) then self as context in <EVENTOCCURRENCE SPECIFICATION LABEL>
    else if self.ocllsTypeOf(EventTemplateOccurrence) then self as context in <EVENTTEMPLATEOCCURRENCE LABEL>
    endif
```

Constraints

There are no constraints specified.

Comments

No comments.

Example

Not available.

6.3.4 EventOccurrenceSpecification

Concrete Graphical Notation

There is no shape associated with this element. Instead, it is represented as a label within the context of a 'StructuredTestObjective'.

Formal Description

context EventOccurrenceSpecification

```

EVENTOCCURRENCESPECIFICATIONLABEL ::= [self.comment->first() as context in <ANDORQUALIFIER>]
    if self.timeLabel.oclIsUndefined() then
        if not self.timeConstraint.oclIsUndefined() then
            self.timeConstraint as context in <TIMECONSTRAINTLABEL>
        endif
    else
        self.timeLabel as context in <TIMELABELLABEL>
        if self.timeConstraint.oclIsUndefined() then
            '!'
        else
            '!' self.timeConstraint as context in <TIMECONSTRAINTLABEL>
        endif
    endif
    [self.entityReference as context in <ENTITYREFERENCELABEL>]
    self.eventReference as context in <EVENTREFERENCELABEL>
    [self.eventArgument as context in <EVENTARGUMENTLABEL>]
    [foreach e:EntityReference in self.oppositeEntityReference separator(',') e as context in <OppositeENTITYLABEL> end]
    [foreach c:Comment in self.comment separator(',') e as context in <NOTELABEL> end]

```

Constraints

There are no constraints specified.

Comments

No comments.

Example

```

the IUT entity having received a "Beacon information" from the ItsNodeB entity
(Note 1: "Beacon information may be incomplete")
(.) at time point t1 the IUT entity receives a "message"
(.) at time point t2, (!) 3s after t1 : the IUT entity sends an invitation to the ItsNodeD entity
(!) 5s after t1 : the IUT entity receives a confirmation from the ItsNodeD entity

```

6.3.5 EntityReference

Concrete Graphical Notation

There is no shape associated with this element. Instead, it is represented as a label within the context of a 'StructuredTestObjective'.

Formal Description

context EntityReference

```
ENTITYREFERENCELABEL ::= self.comment->first() as context in <ARTICLEQUALIFIER>
    [foreach c:Comment in self.comment c as context in <QUALIFIER> end]
    If self.component.ocIsUndefined() then
        self.entity.name 'entity'
    else
        self.component.name 'component'
    endif
```

```
OPPOSITEENTITYLABEL ::= self.comment->first() as context in <DIRECTIONQUALIFIER>
    self.comment->at(1) as context in <ARTICLEQUALIFIER>
    [foreach c:Comment in self.comment c as context in <QUALIFIER> end]
    If self.component.ocIsUndefined() then
        self.entity.name 'entity'
    else
        self.component.name 'component'
    endif
```

Constraints

There are no constraints specified.

Comments

No comments.

Example

```
the IUT entity
from the ItsNodeB component
in the location service buffer entity, for the ItsNodeB component
```

6.3.6 EventReference

Concrete Graphical Notation

There is no shape associated with this element. Instead, it is represented as a label within the context of a 'StructuredTestObjective'.

Formal Description

context EventReference

```
EVENTREFERENCELABEL ::= [foreach c:Comment in self.comment c as context in <QUALIFIER> end]
    self.event.name
```

Constraints

There are no constraints specified.

Comments

No comments.

Example

```
being in
having automatically received
sends
```

6.4 Data

6.4.1 Value

Concrete Graphical Notation

There is no shape associated with this element as it is abstract.

Formal Description

context Value

```
EVENTARGUMENTLABEL ::= if self.oclIsTypeOf(DataReference) then self as context in <DATAREFERENCEARGUMENTLABEL>
                        else if self.oclIsTypeOf(LiteralValue) then self as context in <LITERALVALUEARGUMENTLABEL>
                        else if self.oclIsTypeOf(LiteralValueReference) then self as context in <LITERALVALUEREFERENCEARGUMENTLABEL>
                        else if self.oclIsTypeOf(ContentReference) then self as context in <CONTENTREFERENCEARGUMENTLABEL>
                        endif
```

Constraints

There are no constraints specified.

Comments

No comments.

Example

Not available.

6.4.2 LiteralValue

Concrete Graphical Notation

There is no shape associated with this element. Instead, it is represented as a label within the context of a 'StructuredTestObjective'.

Formal Description

context LiteralValue

```
LITERALVALUEARGUMENTLABEL ::= self.comment->first() as context in <ARTICLEQUALIFIER>
                               | self.comment->first() as context in <QUANTIFIEDQUALIFIER>
                               if not self.dataType.oclIsUndefined() then
                                 '(typed)'
                               endif
                               [foreach c:Comment in self.comment c as context in <QUALIFIER> end]
                               if self.dataType.oclIsUndefined() then
                                 self.name
                                 ['containing' foreach c:Content in self.content separator(',') c as context in <CONTENTLABEL> end ';']
                               else
                                 self.dataType.name
                                 ['containing' foreach c:Content in self.content separator(',') c as context in <TYPEDCONTENTLABEL> end ';']
                               endif
```

```
LITERALVALUELABEL ::= self.comment->first() as context in <ASSIGNMENTQUALIFIER>
                     [foreach c:Comment in self.comment c as context in <QUALIFIER> end]
                     self.name
                     ['containing' foreach c:Content in self.content separator(',') c as context in <CONTENTLABEL> end ';']
```


Constraints

There are no constraints specified.

Comments

No comments.

Example

```

the "GUC packet"
the (typed) GUC PACKET
a GUC packet
several GUC packets
indicating value itsGnProtocolVersion "MIB parameter" ,
set to itsGnDefaultHopLimit MIB parameter

```

6.4.3 Content

Concrete Graphical Notation

There is no shape associated with this element. Instead, it is represented as a label within the context of a 'StructuredTestObjective'.

Formal Description

context Content

```

CONTENTLABEL ::= [foreach c:Comment in self.comment c as context in <QUALIFIER> end]
    self.name
    if self.value.ocIsUndefined() then
        ['containing' foreach c:Content in self.content separator(',') c as context in <CONTENTLABEL> end ';']
    else
        self.value as context in <VALUE>
    endif

```

```

TYPEDCONTENTLABEL ::= [foreach c:Comment in self.comment c as context in <QUALIFIER> end]
    self.member.name
    if self.value.ocIsUndefined() then
        ['containing' foreach c:Content in self.content separator(',') c as context in <TYPEDCONTENTLABEL> end ';']
    else
        self.value as context in <VALUE>
    endif

```

Constraints

There are no constraints specified.

Comments

No comments.

Example

```

a "GUC packet" containing
  BasicHeader containing
    "version field" indicating value "itsGnProtocolVersion MIB parameter" ,
    "RHL field" indicating value "itsGnDefaultHopLimit MIB parameter"
;
;

```

6.4.4 LiteralValueReference

Concrete Graphical Notation

There is no shape associated with this element. Instead, it is represented as a label within the context of a 'StructuredTestObjective'.

Formal Description

context LiteralValueReference

```
LITERALVALUEREFERENCEARGUMENTLABEL ::= 'the' 'value' 'of'
                                     [foreach c:Comment in self.comment c as context in <QUALIFIER> end]
                                     self.content.name
```

```
LITERALVALUEREFERENCELABEL ::= self.comment->first() as context in <REFERENCEQUALIFIER>
                              'the' 'value' 'of'
                              [foreach c:Comment in self.comment c as context in <QUALIFIER> end]
                              self.content.name
```

Constraints

There are no constraints specified.

Comments

No comments.

Example

```
the value of itsGnDefaultHopLimit MIB parameter
corresponding to the value of itsGnDefaultHopLimit MIB parameter
derived from the value of itsGnDefaultHopLimit MIB parameter
```

6.4.5 ContentReference

Concrete Graphical Notation

There is no shape associated with this element. Instead, it is represented as a label within the context of a 'StructuredTestObjective'.

Formal Description

context ContentReference

```
CONTENTREFERENCEARGUMENTLABEL ::= 'the' 'value' 'contained' 'in'
                                   [foreach c:Comment in self.comment c as context in <QUALIFIER> end]
                                   self.content.name
```

```
CONTENTREFERENCELABEL ::= self.comment ->first() as context in <REFERENCEQUALIFIER>
                          'the' 'value' 'contained' 'in'
                          [foreach c:Comment in self.comment c as context in <QUALIFIER> end]
                          self.content.name
```

Constraints

There are no constraints specified.

Comments

No comments.

Example

```
the value contained in "RHL field"
corresponding to the value contained in "version field"
derived from the value contained in "BasicHeader"
```

6.4.6 DataReference

Concrete Graphical Notation

There is no shape associated with this element. Instead, it is represented as a label within the context of a 'StructuredTestObjective'.

Formal Description

context DataReference

```
DATAREFERENCEARGUMENTLABEL ::= self.comment->first() as context in <ARTICLEQUALIFIER>
| self.comment->first() as context in <QUANTIFIEDQUALIFIER>
'(predefined)'
[foreach c:Comment in self.comment c as context in <QUALIFIER> end]
self.content as context in <STATICDATAUSELABEL>
```

```
DATAREFERENCELABEL ::= [self.name]
self.comment->first() as context in <REFERENCEQUALIFIER>
[foreach c:Comment in self.comment c as context in <QUALIFIER> end]
self.content as context in <STATICDATAUSELABEL>
```

Constraints

There are no constraints specified.

Comments

No comments.

Example

```
the (predefined) FullHeader
the (predefined) FullHeader containing
RHLField indicating value itGnDefaultHopLimit
;
```

6.4.7 StaticDataUse

Concrete Graphical Notation

Inherited from ETSI ES 203 119-2 [2] for 'StaticDataUse's not contained in a 'StructuredTestObjective', overridden for 'StaticDataUse's directly or indirectly contained in a 'StructuredTestObjective'.

Formal Description

context StaticDataUse

```
STATICDATAUSELABEL ::= if self.ocIsTypeOf(DataInstanceUse) then self as context in <DATAINSTANCEUSELABEL>
else if self.ocIsTypeOf(AnyValue) then self as context in <ANYVALUELABEL>
else if self.ocIsTypeOf(AnyValueOrOmitValue) then self as context in <ANYVALUEOROMITLABEL>
else if self.ocIsTypeOf(OmitValue) then self as context in <OMITVALUELABEL>
endif
```

Constraints

There are no constraints specified.

Comments

No comments.

Example

```
FullHeader
any Header
any or omitted
omitted
```

6.4.8 AnyValue

Concrete Graphical Notation

Inherited from ETSI ES 203 119-2 [2] for 'AnyValue's not contained in a 'StructuredTestObjective', overridden for 'AnyValue's directly or indirectly contained in a 'StructuredTestObjective'.

Formal Description

context AnyValue

ANYVALUELABEL ::= 'any' self.dataType.name

Constraints

There are no constraints specified.

Comments

No comments.

Example

```
any Header
```

6.4.9 AnyValueOrOmit

Concrete Graphical Notation

Inherited from ETSI ES 203 119-2 [2] for 'AnyValueOrOmit's not contained in a 'StructuredTestObjective', overridden for 'AnyValueOrOmit's directly or indirectly contained in a 'StructuredTestObjective'.

Formal Description

context AnyValueOrOmit

ANYVALUEOROMITLABEL ::= 'any' 'or' 'omitted'

Constraints

There are no constraints specified.

Comments

No comments.

Example

```
any or omitted
```

6.4.10 OmitValue

Concrete Graphical Notation

Inherited from ETSI ES 203 119-2 [2] for 'OmitValue's not contained in a 'StructuredTestObjective', overridden for 'OmitValue's directly or indirectly contained in a 'StructuredTestObjective'.

Formal Description

```
context OmitValue
OMITVALUELABEL ::= 'omitted'
```

Constraints

There are no constraints specified.

Comments

No comments.

Example

```
omitted
```

6.4.11 DataInstanceUse

Concrete Graphical Notation

Inherited from ETSI ES 203 119-2 [2] for 'DataInstanceUse's not contained in a 'StructuredTestObjective', overridden for 'DataInstanceUse's directly or indirectly contained in a 'StructuredTestObjective'.

Formal Description

```
context DataInstanceUse
DATAINSTANCEUSELABEL ::= self.dataInstance.name
                        ['containing'
                        foreach a:ArgumentSpecification in self.argument separator(', ') c as context in <ARGUMENTSPECIFICATIONLABEL> end
                        ;']
```

Constraints

There are no constraints specified.

Comments

No comments.

Example

```
FullHeader
FullHeader containing
  RHLField indicating value itGnDefaultHopLimit
;
```

6.4.12 ArgumentSpecification

Concrete Graphical Notation

Inherited from ETSI ES 203 119-2 [2] for 'ArgumentSpecification's not contained in a 'StructuredTestObjective', overridden for 'ArgumentSpecification's directly or indirectly contained in a 'StructuredTestObjective'.

Formal Description

context ArgumentSpecification

```

ARGUMENTSPECIFICATIONLABEL ::=
    self.member.name
    self.comment->first() as context in <ASSIGNMENTQUALIFIER>
    [foreach c:Comment in self.comment c as context in <QUALIFIER> end]
    self.dataUse as context in <STATICDATAUSELABEL>
  
```

Constraints

There are no constraints specified.

Comments

No comments.

Example

```

RHLField indicating value itGnDefaultHopLimit
RHLField indicating value itGnDefaultHopLimit containing
  VersionField indicating value baseVersion
;
  
```

6.5 Time

6.5.1 TimeLabel

Concrete Graphical Notation

Inherited from ETSI ES 203 119-2 [2] for 'TimeLabel's not contained in a 'StructuredTestObjective', overridden for 'TimeLabel's directly or indirectly contained in a 'StructuredTestObjective'.

Formal Description

context TimeLabel

```

TIMELABELLABEL ::= '(.)' 'at' 'time' 'point' self.name
  
```

Constraints

There are no constraints specified.

Comments

No comments.

Example

```

(.) at time point t
  
```

6.5.2 TimeConstraint

Concrete Graphical Notation

Inherited from ETSI ES 203 119-2 [2] for 'TimeConstraint's not contained in a 'StructuredTestObjective', overridden for 'TimeConstraint 's directly or indirectly contained in a 'StructuredTestObjective'.

Formal Description

context TimeConstraint

```

TIMECONSTRAINTLABEL ::= '{!}'
    [foreach c:Comment in self.comment as context in <QUALIFIER> end]
    self.comment as context in <TIMECONSTRAINTQUALIFIER>
    [foreach c:Comment in self.comment c as context in <QUALIFIER|COMMONWORDQUALIFIER|ARTICLEQUALIFIER> end]
    self.timeConstraintExpression.dataInstance.name
  
```

Constraints

There are no constraints specified.

Comments

No comments.

Example

```

(!) 30s after t
(!) within 5s of t
(!) during the 5s after t
  
```

6.6 Event Templates

6.6.1 EventSpecificationTemplate

Concrete Graphical Notation

| |
|--|
| Event Occurrence Template EVENTOCCURRENCETEMPLATELABEL |
| Event EVENTOCCURRENCETEMPLATESPECIFICATIONLABEL |

Formal Description

context EventSpecificationTemplate

```

EVENTOCCURRENCETEMPLATELABEL ::= self.name
EVENTOCCURRENCETEMPLATESPECIFICATIONLABEL ::= [self.entityReference as context in <ENTITYREFERENCELABEL>]
    self.eventReference as context in <EVENTREFERENCELABEL>
    [self.eventArgument as context in <EVENTARGUMENTLABEL>]
    [foreach e:EntityReference in self.oppositeEntityReference separator(',') e as context in <OppositeENTITYLABEL> end]
    [foreach c:Comment in self.comment separator(',') e as context in <NOTELABEL> end]
  
```

Constraints

There are no constraints specified.

Comments

No comments.

Example

| Event Occurrence Template ReceiveBeacon |
|--|
| Event the IUT entity having received a "Beacon information" from the ItsNodeB entity |

6.6.2 EventTemplateOccurrence

Concrete Graphical Notation

There is no shape associated with this element. Instead, it is represented as a label within the context of a 'StructuredTestObjective'.

Formal Description

context EventTemplateOccurrence

```

EVENTTEMPLATEOCCURRENCELABEL ::= [self.comment->first() as context in <ANDORQUALIFIER>]
    if self.timeLabel.oclIsUndefined() then
        if not self.timeConstraint.oclIsUndefined() then
            self.timeConstraint as context in <TIMECONSTRAINTLABEL>
        endif
    else
        self.timeLabel as context in <TIMELABELLABEL>
        if self.timeConstraint.oclIsUndefined() then
            ':'
        else
            ':' self.timeConstraint as context in <TIMECONSTRAINTLABEL>
        endif
    endif
    'event'
    self.eventTemplate.name
    'occurs'
    ['with' '{'
        [foreach b:EntityBinding in self.entityBinding separator(',') b as context in <ENTITYBINDINGLABEL> end]
        ['argument' 'replaced' 'by' self.occurrenceArgument as context in <EVENTARGUMENTLABEL> end]
    '}]'
    [foreach c:Comment in self.comment separator(',') e as context in <NOTELABEL> end]

```

Constraints

There are no constraints specified.

Comments

Optionally, an 'EventTemplateOccurrence' may be visually represented as the content of the referenced 'EventSpecificationTemplate's 'EventOccurrenceSpecification', where bound 'EntityReference's from the 'EventOccurrenceSpecification' in the 'EventSpecificationTemplate' shall be substituted by the 'EntityReference's provided in the 'EventTemplateOccurrence'. Similarly, the argument from the 'EventOccurrenceSpecification' in the 'EventSpecificationTemplate' shall substituted by the argument provided in the 'EventTemplateOccurrence'.

Example

```

event ReceiveBeacon occurs
(.) at time point t1 : event ReceiveBeacon occurs
(!) 30s after t1 : event ReceiveBeacon occurs
event ReceiveBeacon occurs with {
    the ItsNodeB entity replaced by an ItsNodeC entity
}

```



```

event ReceiveBeacon occurs with {
  argument replaced by a "Beacon confirmation"
}
event ReceiveBeacon occurs with {
  the ItsNodeB entity replaced by an ItsNodeC entity
  argument replaced by a "Beacon confirmation"
}

```

6.6.3 EntityBinding

Concrete Graphical Notation

There is no shape associated with this element. Instead, it is represented as a label within the context of a 'StructuredTestObjective'.

Formal Description

context EntityBinding

```

ENTITYBINDINGLABEL ::= self.templateEntity as context in <ENTITYREFERENCELABEL>
    'replaced' 'by'
    self.occurrenceEntity as context in <ENTITYREFERENCELABEL>

```

Constraints

There are no constraints specified.

Comments

No comments.

Example

```

the ItsNodeB entity replaced by an ItsNodeC entity
the ITS_B component replaced by an ITS_C component

```

7 Exchange Format Extensions

The exchange format for the extension is fully governed by the exchange format for TDL as specified in ETSI ES 203 119-3 [3]. No additional specification is provided.

Annex A (informative): Textual Syntax

A.0 Overview

This annex specifies a textual syntax for the additional concepts and the minimal set of required TDL concepts to facilitate the specification and representation of 'StructuredTestObjective's in pure text. The syntax for the constituents of the 'StructuredTestObjective's, such as 'InitialConditions', 'ExpectedBehaviour', and 'FinalConditions' is identical to the corresponding compartment specifications in clause 6.1. The complete BNF production rules are specified in annex B.

A.1 A 3GPP Test Objective in Textual Syntax

This example describes one possible way to translate the test objectives in clause 7.1.3.1 from ETSI TS 136 523-1 [i.2] into the proposed textual syntax for the structured test objective specification with TDL, by mapping the concepts from the representation in the source document to the corresponding concepts for the structured test objective specification with TDL described in the present document. The example has been reformulated and interpolated where applicable to fit into the framework of the present document.

```

Package "3GPP, clause 7.1.3.1" {
  //a possible specification of the test objectives from clause 7.1.3.1 in [i.2]
  //some interpolation has been applied to fit into the overall framework and concrete syntax
  //of the present document

  Domain{
    entities:
    - UE
    ;
    events :
    - "in"
    - sends
    - receives
    - performs
    - send
    ;
  }

  Test Purpose {
    TP Id TP_7_1_3_1_1
    Test objective ""
    Reference "3GPP TS 36.321 clause 5.3.1"
    Initial conditions
    with {
      the UE entity "in" the "E-UTRA RRC_CONNECTED state"
    }
    Expected behaviour
    ensure that {
      when {
        the UE entity receives a "downlink assignment on the PDCCH for the UE's C-RNTI" and
        the UE entity receives a "data in the associated subframe" and
        the UE entity performs a HARQ operation
      }
      then {
        the UE entity sends a "HARQ feedback on the HARQ process"
      }
    }
  }

  Test Purpose {
    TP Id TP_7_1_3_1_2
    Test objective ""
    Reference "3GPP TS 36.321 clause 5.3.1"
    Initial conditions
    with {
      the UE entity "in" the "E-UTRA RRC_CONNECTED state"
    }
  }

```

```

Expected behaviour
ensure that {
  when {
    the UE entity receives a "downlink assignment on the PDCCH unknown by the UE" and
    the UE entity receives a "data in the associated subframe"
  }
  then {
    the UE entity does not send any "HARQ feedback on the HARQ process"
  }
}
}
}

```

A.2 An IMS Test Objective in Textual Syntax

This example describes one possible way to translate the test objective clause 4.5.1 from ETSI TS 186 011-2 [i.3] into the proposed textual syntax for the structured test objective specification with TDL, by mapping the concepts from the representation in the source document to the corresponding concepts for the structured test objective specification with TDL described in the present document. The example has been reformulated and interpolated where applicable to fit into the framework of the present document.

```

Package "IMS, clause 4.5.1" {
  //a possible specification of the test objectives from clause 4.5.1 in [i.3]
  //some interpolation has been applied to fit into the overall framework and concrete syntax
  //of the present document

  Domain{
    entities:
    - UE_A
    - UE_B
    - IMS_B
    ;
    events :
    - sends
    - receives
    ;
  }

  Test Purpose {
    TP Id TP_IMS_4002_1
    Test objective ""
    Reference "ETSI TS 124 229 [1], clause 4.2A, paragraph 1",
              "ts_18601102v030101p.pdf::4.5.1.1 (CC 1)"
    Expected behaviour
    ensure that {
      when {
        the UE_A entity sends a MESSAGE
          containing Message_Body_Size indicating value greater than 1 300 bytes;
        to the UE_B entity
      }
      then {
        the IMS_B entity receives the MESSAGE
          containing Message_Body_Size indicating value greater than 1 300 bytes;
      }
    }
  }
}
}
}

```

Annex B (informative): Textual Syntax BNF Production Rules

B.0 Overview

This annex describes the grammar for the representation of structured test objectives in pure text. It covers the additional concepts and the minimal set of required TDL concepts to facilitate the specification and representation of 'StructuredTestObjective's.

B.1 Conventions

The notations is based on the Extended Backus-Naur Form (EBNF) notation. The EBNF representation may be used either as a concrete syntax reference for Structured Test Objective Specification with TDL for end users or as input to a parser generator tool. Table B.1 defines the syntactic conventions that are to be applied when reading the EBNF rules.

Table B.1: Syntax definition conventions used

| | |
|-----------|-----------------------------|
| ::= | is defined to be |
| abc | the non-terminal symbol abc |
| abc xyz | abc followed by xyz |
| abc xyz | alternative (abc or xyz) |
| [abc] | 0 or 1 instance of abc |
| {abc}+ | 1 or more instances of abc |
| {abc} | 0 or more instances of abc |
| 'a'-z' | all characters from a to z |
| (...) | denotes a textual grouping |
| 'abc' | the terminal symbol abc |
| ; | production terminator |
| \ | the escape character |

B.2 Production Rules

```

Package ::= 'Package' Identifier '{'
          { ElementImport }
          [ 'Domain' '{'
            [ 'pics' ':' { PICS }+ ';' ]
            [ 'entity' 'types' ':' { EntityType }+ ';' ]
            [ 'entities' ':' { Entity }+ ';' ]
            [ 'event' 'types' ':' { EventType }+ ';' ]
            [ 'events' ':' { Event }+ ';' ]
            [ 'event' 'templates' ':'
              { EventOccurrenceTemplate }+ ';' ] ]
          [ 'Data' '{'
            { DataElement }
            }' ]
          [ 'Configuration' '{'
            { GateType }
            { ComponentType }
            { TestConfiguration } ]
          { StructuredTestObjective }
          { Group } }' ;

DataElement ::= DataType | DataInstance
DataType ::= SimpleDataType | StructuredDataType
DataInstance ::= SimpleDataInstance | StructuredDataInstance

ElementImport ::= 'import'
                ( 'all' | ( Identifier | { ',' Identifier } ) )
                'from' Identifier ';' ;

Group ::= 'Group' Identifier '{'
         { ElementImport }
         { StructuredTestObjective }
  
```

```

    { Group } '}' ;
PICS ::= '-' Identifier [ '(' Qualifier ')' ] ;
FirstPICSReference ::= [ NotQualifier ] Identifier ;
PICSReference ::= [ AndOrQualifier ] [ NotQualifier ] Identifier ;
EntityType ::= '-' Identifier ;
Entity ::= '-' Identifier
    [ '(' Annotation { ',' Annotation } ')' ] ;
EventType ::= '-' Identifier ;
Annotation ::= Identifier ;
Event ::= '-' Identifier
    [ '(' Annotation { ',' Annotation } ')' ] ;
EventOccurrenceTemplate ::= '-' Identifier '{' EventSpecification '}' ;
EventSpecification ::= EntityReference
    EventReference
    Argument
    [ OppositeEntityReference
    { ',' OppositeEntityReference } ] ;
StructuredTestObjective ::= 'Test Purpose' '{'
    'TP Id' Identifier
    ['Test objective' Identifier ]
    [ 'Reference' Identifier { ',' Identifier } ]
    [ 'Config Id' Identifier ]
    [ 'PICS Selection' FirstPICSReference { PICSReference }
    ]
    [ InitialConditions ]
    [ ExpectedBehaviour ]
    [ FinalConditions ] '}' ;
InitialConditions ::= 'Initial conditions'
    'with' '{' EventSequence '}' ;
ExpectedBehaviour ::= FullExpectedBehaviour | PartialExpectedBehaviour ;
FullExpectedBehaviour ::= 'Expected behaviour'
    'ensure that' '{'
        'when' '{' EventSequence '}'
        'then' '{' EventSequence '}'
    '}' ;
PartialExpectedBehaviour ::= 'Expected behaviour'
    'ensure that' '{' EventSequence '}' ;
FinalConditions ::= 'Final conditions'
    'with' '{' EventSequence '}' ;
EventSequence ::= RepeatedEventSequence | SimpleEventSequence ;
SimpleEventSequence ::= FirstEventOccurrence { EventOccurrence } ;
RepeatedEventSequence ::= 'repeat'
    [ ( 'every' | IterationValue ) | ( IterationValue |
    'times' ) ]
    '{' FirstEventOccurrence { EventOccurrence } '}' ;
FirstEventOccurrence ::= FirstEventOccurrenceSpecification |
    FirstEventTemplateOccurrence ;
EventOccurrence ::= EventOccurrenceSpecification | EventTemplateOccurrence ;
FirstEventOccurrenceSpecification ::= [ ( TimeLabel
    | ( ( ',' | TimeConstraint ) | ':' ) )
    | TimeConstraint ]
    EntityReference
    EventReference
    Argument
    [ OppositeEntityReference
    { ',' OppositeEntityReference } ]
    { Note } ;
FirstEventTemplateOccurrence ::= [ ( TimeLabel
    | ( ( ',' | TimeConstraint ) | ':' ) )
    | TimeConstraint ]
    'event' Identifier 'occurs'
    [ 'with' '{'
        [ EntityBinding { ',' EntityBinding } ]
        [ 'argument' 'replaced' 'by' Argument ] '}' ]
    { Note } ;
EntityBinding ::= EntityReference 'replaced' 'by' EntityReference ;
Note ::= ( 'Note' NumberAsIdentifier ':' Identifier ) ;
EventOccurrenceSpecification ::= AndOrQualifier [ ( TimeLabel
    | ( ( ',' | TimeConstraint ) | ':' ) )
    | TimeConstraint ]
    EntityReference
    EventReference
    Argument
    [ OppositeEntityReference
    { ',' OppositeEntityReference } ]
    { Note } ;
EventTemplateOccurrence ::= AndOrQualifier [ ( TimeLabel
    | ( ( ',' | TimeConstraint ) | ':' ) )

```

```

| TimeConstraint ]
'event' Identifier 'occurs'
[ 'with' '{'
  [ EntityBinding { ',' EntityBinding } ]
  [ 'argument' 'replaced' 'by' Argument ] '}' ]
{ Note } ;
TimeLabel ::= '(.)' 'at' 'time' 'point' Identifier ;
TimeConstraint ::= '(!)' { Qualifier }
                TimeConstraintQualifier
                { Qualifier | CommonWordQualifier | ArticleQualifier }
                TimeConstraintExpression ':' ;
TimeConstraintExpression ::= ConstraintTimeLabelUse | ConstraintDataInstanceUse ;
ConstraintDataInstanceUse ::= Identifier | NumberAsIdentifier ;
ConstraintTimeLabelUse ::= Identifier ;
TimeConstraintQualifier ::= ( 'before' | 'after' | 'during' | 'within' ) ;
EntityReference ::= ArticleQualifier
                  { Qualifier }
                  ( ( Identifier 'entity' )
                    | ( Identifier 'component' ) ) ;
OppositeEntityReference ::= DirectionQualifier
                            ArticleQualifier
                            { Qualifier }
                            ( ( Identifier 'entity' )
                              | ( Identifier 'component' ) ) ;
EventReference ::= { Qualifier | CommonWordQualifier | NotQualifier }
                  Identifier ;
Argument ::= LiteralValueAsArgument
            | TypedLiteralValueAsArgument
            | DataReferenceAsArgument
            | ContentReferenceAsArgument
            | LiteralValueReferenceArgument ;
Value ::= LiteralValue
         | DataReference
         | ContentReference
         | LiteralValueReference ;
TypedValue ::= TypedLiteralValue
             | DataReference
             | ContentReference
             | LiteralValueReference ;
IterationValue ::= IterationLiteralValue | IterationDataReference ;
TypedLiteralValueAsArgument ::= ( ArticleQualifier | QuantifiedQualifier )
                               '(typed)'
                               { Qualifier }
                               ( Identifier | NumberAsIdentifier )
                               Identifier
                               [ 'containing'
                                 TypedDataContent { ',' TypedDataContent } ';' ] ;
TypedLiteralValue ::= [ NotQualifier ]
                     AssignmentQualifier
                     { Qualifier }
                     ( Identifier | NumberAsIdentifier )
                     [ 'containing'
                       TypedDataContent { ',' TypedDataContent } ';' ] ;
TypedDataContent ::= [ NotQualifier ]
                    { Qualifier }
                    Identifier
                    [ ( 'containing'
                      TypedDataContent { ',' TypedDataContent } ';' )
                      | TypedValue ] ;
LiteralValueAsArgument ::= ( ArticleQualifier | QuantifiedQualifier )
                           { Qualifier }
                           ( Identifier | NumberAsIdentifier )
                           [ 'containing' DataContent { ',' DataContent } ';' ] ;
LiteralValue ::= [ NotQualifier ]
                AssignmentQualifier
                { Qualifier }
                ( Identifier | NumberAsIdentifier )
                [ 'containing' DataContent { ',' DataContent } ';' ] ;
IterationLiteralValue ::= ( Identifier | NumberAsIdentifier ) ;
IterationDataReference ::= RepetitionDataInstanceUse ;
DataContent ::= [ NotQualifier ]
               { Qualifier }
               ( Identifier | NumberAsIdentifier )
               [ ( 'containing'
                 DataContent { ',' DataContent } ';' )
                 | Value ] ;
Identifier ::= STRING | ID ;
Qualifier ::= Identifier | NumberAsIdentifier ;

```

```

CommonWordQualifier ::= 'before'
                       | 'after'
                       | 'from'
                       | 'to'
                       | 'of' ;
ArticleQualifier ::= 'a'
                    | 'an'
                    | 'the' ;
QuantifiedQualifier ::= 'all'
                       | 'any'
                       | 'few'
                       | 'multiple'
                       | 'no'
                       | 'only'
                       | 'several'
                       | 'some' ;
AssignmentQualifier ::= 'indicating value' | 'set to' ;
NotQualifier ::= 'not' ;
AndOrQualifier ::= 'and' | 'or' ;
DirectionQualifier ::= 'by'
                      | 'in'
                      | 'into'
                      | 'for'
                      | 'from'
                      | 'to' ;
ReferenceQualifier ::= 'corresponding to'
                     | 'derived from'
                     | 'carrying'
                     | 'contained in'
                     | 'associated with' ;
DataInstanceUse ::= ( Identifier | NumberAsIdentifier )
                   [ 'containing'
                     ParameterBinding { ',' ParameterBinding } ';' ] ;
RepetitionDataInstanceUse ::= Identifier | NumberAsIdentifier ;
StaticDataUse ::= DataInstanceUse
                | AnyValue
                | AnyValueOrOmit
                | OmitValue ;
AnyValue ::= 'any' Identifier ;
AnyValueOrOmit ::= 'any' 'or' 'omitted' ;
OmitValue ::= 'omitted' ;
ParameterBinding ::= Identifier
                  [ NotQualifier ]
                  AssignmentQualifier
                  { Qualifier }
                  StaticDataUse ;
ContentReference ::= [ NotQualifier ]
                   ReferenceQualifier
                   'the' 'value' 'contained in'
                   { Qualifier }
                   Identifier ;
LiteralValueReference ::= [ NotQualifier ]
                        ReferenceQualifier
                        'the' 'value' 'of'
                        { Qualifier }
                        Identifier ;
ContentReferenceAsArgument ::= 'the' 'value' 'contained in'
                              { Qualifier }
                              Identifier ;
LiteralValueReferenceArgument ::= 'the' 'value' 'of'
                                  { Qualifier }
                                  Identifier ;
DataReference ::= Identifier
               [ NotQualifier ]
               ReferenceQualifier
               { Qualifier }
               StaticDataUse ;
DataReferenceAsArgument ::= ( ArticleQualifier | QuantifiedQualifier )
                           '(predefined)'
                           { Qualifier }
                           StaticDataUse ;
NumberAsIdentifier ::= [ '-' ] INT [ '.' INT ] ;
SimpleDataType ::= 'type' Identifier ';' ;
StructuredDataType ::= 'type' Identifier
                     'with' Member { ',' Member } ';' ;
Member ::= [ Optional ] Identifier 'of' 'type' Identifier ;
Optional ::= 'optional' ;
SimpleDataInstance ::= Identifier

```

```

StructuredDataInstance ::= ( Identifier | NumberAsIdentifier ) ';' ;
MemberAssignment      ::= Identifier [ NotQualifier ]
                          'containing'
                          MemberAssignment { ',' MemberAssignment } ';' ;
TestConfiguration     ::= 'Test Configuration'
                          Identifier
                          'containing'
                          ComponentInstance { ComponentInstance }
                          Connection { Connection } ';' ;
ComponentInstance     ::= ComponentInstanceRole
                          'component' Identifier 'of' 'type' Identifier ;
Connection            ::= 'connection' 'between' GateReference
                          'and' GateReference ;
GateReference         ::= Identifier '.' Identifier ;
GateType              ::= 'interface' 'Type' Identifier
                          'accepts' Identifier { ',' Identifier } ';' ;
ComponentType         ::= 'Component' 'Type' Identifier
                          'with' { Timer } { Variable } { GateInstance } ';' ;
Timer                 ::= 'timer' Identifier ;
Variable              ::= 'variable' Identifier 'of' 'type' Identifier ;
GateInstance          ::= 'gate' Identifier 'of' 'type' Identifier ;
ComponentInstanceRole ::= ( 'SUT' | 'Tester' ) ;
ID                    ::= ( [ '^' ]
                          ( 'a'-'z' | 'A'-'Z' | '_' )
                          { 'a'-'z' | 'A'-'Z' | '_' | '0'-'9' | '/' } ) ;
INT                   ::= { '0'-'9' }+ ;
DQ                    ::= '"' ;
SQ                    ::= "'" ;
STRING                ::= ( ( DQ
                          | { ( '\\
                          | ( 'b' | 't' | 'n' | 'f' | 'r' | 'u' | '
                          | " | '\ ' ) )
                          | ( '\\ | DQ ) }
                          | DQ )
                          | ( SQ
                          | { ( '\\ | ( 'b' | 't' | 'n' | 'f' | 'r' | 'u'
                          | " | '\ ' ) )
                          | ( '\\ | SQ ) }
                          | SQ ) ) ;
ML_COMMENT            ::= ( /*' */ ) ;
SL_COMMENT            ::= ( '//' ( '\\n' | '\\r' ) [ [ '\\r' ] '\\n' ] ) ;
WS                    ::= { ' '
                          | '\\t'
                          | '\\r'
                          | '\\n' }+ ;

```

History

| Document history | | |
|-------------------------|----------------|--|
| V1.1.1 | June 2015 | Publication |
| V1.2.1 | September 2016 | Publication |
| V1.3.1 | May 2018 | Publication |
| V1.4.1 | June 2020 | Membership Approval Procedure MV 20200823: 2020-06-24 to 2020-08-24 |
| V1.4.1 | August 2020 | Publication |