The ETSI Test Description Language (TDL) and the TDL Open Source Project (TOP);
History, Present, and Future

**Source**: ETSI MTS TDL Working Group

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# Summary

The Test Description Language (TDL) supports the stepwise transformation from requirements over test purpose specifications to test descriptions. It offers the necessary concepts for modelling tests and expressing these models in textual and graphical syntaxes. Moreover, a TDL specification enables a semi-automatic transformation to executable tests, whether being expressed in TTCN-3 or another programming language.

Complementary to the standardization of TDL, the TDL Open Source Project (TOP) has been created which offers a range of base tools for the creation and visualisation of TDL specifications. They provide a proof-of-concept of all designed TDL concepts and, more importantly, serve as a common platform to accelerate the adoption of TDL and lower the barrier to entry for both, users and tool vendors. Meanwhile, TDL and TOP have reached a level of maturity that enables first applications of this technology within ETSI TBs and elsewhere in industry.

# History

The previous standardisation efforts on TDL (since 2013) and TOP (since 2015) can be briefly summarised as achievements of the following STFs:

* STF 454 (TDL phase 1) laid the foundation of TDL in 2013 in terms of the basic concepts and their semantics. It also experimented with various syntaxes and demonstrated how TDL could be applied to the domain of 3GPP for the specification of User Equipment conformance test descriptions and IMS interoperability testing. Validation activities within the STF showed that the suggested design of TDL is feasible.
* STF 476 (TDL phase 2) added the necessary functionality to integrate TDL test descriptions into test automation frameworks. It also developed a standardized concrete graphical syntax for end-users, a TDL exchange format to be used by tools as well as an extension to test objective specifications.
* STF 492 (TDL phase 3) accelerated the adoption of TDL by providing a reference implementation of TDL to lower the barrier to entry for users and tool vendors. The reference implementation, which has been made publicly available in TOP, comprises graphical viewers, textual editors as well as a UML profile for TDL to enable its interoperability with UML-based environments. STF 492 contributed to the public launch of TDL at UCAAT 2015, a major milestone in the development of TDL.
* STF 522 (TDL phase 4) established the connection between the two standardised ETSI languages TDL and TTCN-3, enabling the semi-automatic generation of executable tests from TDL and allowing the re-use of existing TTCN-3 tools and frameworks for test execution. In addition, continuous language maintenance was performed based on CRs submitted by users, and new features deemed necessary for the mapping of TDL to TTCN-3.

# Present

A new STF will start working in September 2019 and run until June 2020 and is currently in preparation. It will deal mainly around the following topics:

* **Evolution of TDL**: Resolving open CRs for bug fixing and new feature design, if appropriate, e.g. Inheritance support to improve reusability of TDL specifications; Improved separation of globally ordered vs locally ordered test descriptions; Test data specification for parameterised test descriptions; Dependency specification between test descriptions; Mapping of new TDL features to TTCN-3.
* **TOP Maintenance and Enhancements**: Resolving open CRs for bug fixing and new features; Alignment of the TOP implementation to changes of the TDL standard; Infrastructure updates; Improvements of the user experience of TOP tools, e.g. a standard library for data specifications.
* **Validation and User Guidelines**: Validation of the consistency of TDL documents against TOP implementations; User guidelines to work with TOP tools; Updated online documentation.

Besides the activities planned in this STF, the TDL Working Group will also follow the advancements of another upcoming STF on specification and testing of RESTful APIs which will run in parallel with a similar timeframe.

# Future

It is anticipated that future work on TDL and TOP and the associated methodology will be along the following lines:

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| Year | TDL | TOP | Methodology |
| 2020 | Upcoming STF 577 | Upcoming STF 577 | Upcoming STF 577 |
| 2021 | Standardise a default TDL textual syntax to directly support end-users | Support for tabular data values specifications in TDL specifications | Elaborate a defined way to derive test descriptions from test objectives; provide guidelines for a semi-automatic workflow |
| Extensions towards parameterizable test objectives and re-usable events in TDL-TO | Support of existing test execution frameworks besides TTCN-3, e.g. support of Python-based test environments | Methodology for interoperability testing to support a new class of systems, e.g. cloud-based and AI-enabled applications |
| 2022+ | Besides functional tests, test specification support of further testing kinds such as stochastic tests (endurance and performance), adaptive tests (of intelligent systems), security tests (attack patterns) etc. |
| Provide an approach, based on model transformation and meta-modelling, to map TDL specifications to any arbitrary general-purpose language |
| Elaborate on an execution semantics for TDL specifications to provide direct execution of TDL specifications, e.g. within a containerized architecture |