TTCN Productivity Tools, HP E7310A
HP-Itex TTCN Editor, HP E7313A

Technical Specifications

Product Features

- Create custom test suites in TTCN for the HP BSTS, PT Series or for HP workstations.
- Complete telecommunications protocol testing environment for authoring, customizing and executing test scenarios in the TTCN language.
- Runs on either HP or SUN workstations.
- Produces executable test suites for either the HP BSTS broadband tester, the HP PT Series tester or an HP 9000 Series 700 workstation.

The Hewlett-Packard Productivity Tools enable customers to take customized test scenarios in TTCN and make them executable on the HP BSTS and other platforms (PC version of Test Manager shown here).

Tree and Tabular Combined Notation (TTCN) is an internationally standardized notation (ISO 9646-3) used for specifying test scenarios.

The E7310A TTCN Translator and the E7313A HP-ITEX TTCN Editor for abstract test suites (ATS) in TTCN generate executable test suites (ETS) in “C” code that can ultimately be run on a protocol analyzer such as HP’s Broadband Series Test System (BSTS), PT Series, or even an HP workstation.

The TTCN Translator is a workstation-based tool which generates the C-code of an Executable Test Suite (ETS) corresponding to an Abstract Test Suite (ATS) specified in the Machine Processable (MP) for of TTCN (ISO9646 part 3).

The HP-ITEX TTCN Editor is an OEM version of Telelogic’s leading ITEX TTCN Editor. It can be ordered as a stand-alone product (HP E7313A), or as an option of the TTCN Translator (HP E7310A).

These software tools enable faster and more reliable test suite development.

Typically, the first stage in producing an executable test suite (ETS) for any target machine involves editing TTCN in its graphical representation (TTCN-GR) in order to generate a Machine Processable (MP) file that can be used by the TTCN Translator.

Once the TTCN code has been edited, the HP-ITEX environment enables seamless translation of the TTCN file since the HP TTCN Translator is integrated via a menu within the HP-ITEX graphical interface.
**Product Overview**

The HP-ITEX environment offers a very convenient way to create portable TTCN Test Suites, including the option of importing test cases from existing suites.

HP-ITEX includes tools that resolve inconsistencies by comparing the cases you import with the ones in your current suite before they are merged.

With modular TTCN, test suite components can be identified for reuse. This facilitates test component reuse, and provides a language platform for multi-user test development projects.

Concurrent TTCN introduces a parallel architecture for simultaneous execution of several test components, allowing efficient testing of distributed systems. The HP-ITEX Organizer keeps track of your files and handles functions that involve more than one test suite.

For managing individual suites or test cases, HP-ITEX features a browser that is a powerful navigator that displays the relevant parts of the test suite in the required manner. The data dictionary functions of the Table Editor speed up the editing process and ensure correct syntax.

The HP TTCN Translator can be called up from the Organizer, much like an embedded function of the HP-ITEX environment.

**TTCN Productivity Tools**

The E7310A TTCN Productivity Tools software package, which includes the optional HP-ITEX TTCN Editor and the HP TTCN Translator, is more than simply a bundle of the market-leading TTCN editor with the existing HP protocol testing environment for R&D and QA.

The HP-ITEX package is the most comprehensive, streamlined solution for the development of test suites for protocols such as ISDN, Frame Relay and ATM. HP’s expertise in developing high-quality, automated conformance and interoperability test solutions, combined with ITEX’s leadership in TTCN editing software extends the range of integrated “one-stop” solutions for protocol testing in TTCN.

The integrated E7310A TTCN Productivity Tools product becomes a complete solution on which to develop or customize protocol test suites. Customers can get a complete set of tools from HP. At the same time, HP becomes a single entry point for support, education, maintenance, and licensing.

The new TTCN productivity tool is even more useful for validation purposes with the goal of customizing an existing test suite, or to create a brand new test suite.

The E7310A product replaces the previous E5593A/B/C products. The main enhancement that this new version brings is the integration of the HP-ITEX TTCN editor. (See features section on E7313A below).

**Features of E7310A**

The E7310A TTCN Productivity Tool includes the TTCN Translator and the HP-ITEX TTCN Editor (as option ITX).
The current version of the translator, V4.0, supports the following features:

- compatible with the TTCN standard amendment delivery 8.4,
- the ATS can be in DIS (draft international standard) or IS (international standard),
- the PDUs can be defined in TTCN or ASN.1 BER,
- generates the ETS code for each Main/Parallel Test Component in a concurrent TTCN test suite.

The **TTCN Translator executes on:**

- an HP9000 series 700 workstation, with HP-UX 9.x or later.
- a SUN workstation, with Solaris 2.5 or later.

Depending on the option selected, the generated ETS runs on:

- a PT series tester, if option #PTS is selected
- a Broadband Series Test System if option #BST is selected.
- an HP9000 series 700 workstation, with HP-UX 9.x or later, if option #HPW is selected.

It automatically generates the code for:

- Test Manager, the graphical User Environment for the control of the test suite execution (the PT series has its own manager, the Common Control)
- the test suite loader file,
- the PICS/PIXIT menus,
- the test selection mechanisms,
- report generation (execution trace) with the insertion of TTCN statements in the traces, for option #HPW, code for the connection with:
  - TCP Sockets,
  - UNIX pipes,
  - software API,
  - timer management.

The code generated is ready-to-run, each test suite PCO being connected to a socket port (for option #HPW only).

**NOTE:** For Options BST and PTS, some machine-dependant and protocol-specific support code must be completed in supplied templates by the user.

The files generated by the Translator are compiled using a standard ANSI C compiler (not provided).

**TTCN Tool for the BSTS**

The C-code generated by the Translator makes use of routines defined in the TTCN library and Broadband Test Manager library. The TTCN library and the user-defined routines provide an interface between the C executable test suite environment and the broadband user programming environment.

The Broadband Tool generates code for the ETS and automatically generates input to the Test Manager for browsing the test suite structure and filling out the PICS/PIXIT menus.

Test suites that are implemented using the Translator are capable of generating a detailed event log. The event trace supplements the conformance log that is generated by the BSTS.

**Specific Features**

- Translates an Abstract Test Suite (ATS) specified in TTCN MP into an Executable Test Suite in C. The ETS can then be compiled with any standard C compiler.
- Generates input to the Test Manager for browsing the test suite structure and filling PICS/PIXIT questions.
- PDUs can be defined in TTCN or ASN.1 BER.
- Generates the ETS code for each Main/Parallel test component in a concurrent TTCN test suite.
• ETSs are targeted to run on HP9000 Series 700 workstations.

**TTCN Tool for the PT**

The C-code generated by the Translator makes use of routines defined in the TTCN library, a standard C library and user-defined routines.

Protocol libraries are available to minimize the amount of coding that the user must provide.

The executable test suite environment is provided by the PT-Series Common Control software which is used to select test cases, specify PICS/PIXIT values, produce conformance test reports, etc.

Included with the product is a tool targeted at the PT that generates PICS/PIXIT menus automatically.

**Specific Features**

- Provides additional libraries for testing the following protocols: ISDN, X.25.
- ETSs can execute on any HP PT-Series Protocol Tester (PT500, PT502, PT540 and RTA).

**Applications**

There are several cases where the use of a dedicated protocol tester is not useful or possible or may not make sense. The TTCN Productivity Tool addresses those situations.

This version does not require a formal protocol tester. A UNIX workstation acts as the tester, and it is well suited for testing high layer protocols. The implementation to validate may be a software application that runs on a workstation.

**TTCN Tool for HP 9000 Series 700**

This version produces ETSs that can be executed on a HP9000 Series 700 workstation, through the standard communications devices within UNIX applications: sockets, pipes and application programming interfaces.

**Test Suite Development - TTCN Translator for WS**

<table>
<thead>
<tr>
<th>TTCN-MP File</th>
<th>TTCN Translator for Workstations</th>
<th>Executable Test Suite</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstract Test Suite in TTCN</td>
<td>E5593C</td>
<td>Execution on a Workstation, through the Test Manager</td>
</tr>
</tbody>
</table>

Included with the product is a tool targeted at the PT that generates PICS/PIXIT menus automatically.
It makes sense to execute the ETS alongside it on the same or on another workstation. More and more state-oriented applications are being tested with TTCN test suites, although they have nothing to do with telecom protocols.

A Reference Implementation (RI) can be tested as a test suite “mirror” of the ATS. Running the ETS against the RI is a common way to certify an ETS. Both the ETS and the RI can run on the same workstation and they communicate through sockets. The translator can generate the code for both the ETS and the RI.

Using a fully programmable LAN tester to validate a custom application which uses a TCP/IP/Ethernet protocol stack (assuming the tester has a programmable protocol emulation of the entire stack, which is very rare) may not be feasible or cost-effective. A workstation would be more than sufficient for the job. The same could apply to upper layers of SS#7 for testing SSCP, TCAP, INAP, etc.

In other applications, it may not be desirable or possible to validate a protocol implementation after it has been physically installed in its target equipment. For example, the system under test may not provide a good interface to access the implementation to test. This may be the case with mobile radio terminals (GSM, etc.). One possible solution is to validate the protocol implementation on a workstation before its transfer into the mobile unit.

**Applications**

This tool is designed for developers of Abstract Test Suites, and for customers who implement the corresponding ETS to validate their protocol software. More specifically, the need for the TTCN translator has most often been expressed by the test labs at telecom operators, and network manufacturers (NEM) who are involved in designing protocol implementations.

The TTCN productivity tool is intended to take the guesswork out of making TTCN executable and is expected to accelerate development time during all phases of product development.

Contrary to the tester-specific versions of the TTCN Productivity Tool, this version targets a broader range of applications.

In fact, it will provide added value to customers who need to specify validation tests in TTCN and who want to execute such tests directly on a workstation instead of on a dedicated tester.
Features of the HP-ITEX TTCN Editor, E7310A Opt ITX or E7313A

Optionally, the HP-ITEX can be included in the E7310A TTCN Productivity Tools. It can also be ordered separately as the E7313A product.

HP-ITEX provides a set of highly integrated tools for the development and maintenance of Abstract Test Suites (ATS) written in TTCN. When combined with the HP TTCN Translator, HP-ITEX supports all the phases of test suite development: editing, checking, and generation.

HP-ITEX includes the following tools and features:

- **The Organizer** is the main window. It integrates and coordinates the individual tools as required. Several tools may be used simultaneously through the Organizer. For instance, one part of a design may be analyzed at the same time as another is edited.

  The Organizer features a graphical view of all the diagrams and documents you are working with, making them an integrated part of your development process.

- **The Browser** is your view of the overall structure of a test suite. There are two kinds of Browsers: the main Browser and sub-Browsers that provide alternative views of the test suite.

  The structure of the test suite is indicated in a browser by indentation. By using Edit commands such as Add and Delete, you can modify the Browser structure to build a complete test suite. The amount of information actually displayed in a Browser can be controlled by using the Collapse and Expand commands.

  The HP-ITEX tools are applied to items, or selections of items, in a Browser. Selections may be made manually or by using the Selector or Compare tools.

- **The Selector Tool** will create a selection in a Browser Tool by applying various predicates. They could be name or content patterns, cross reference predicates, type information, or the results of the Analyzer.

- **The Table Editor** is a graphical editor for the TTCN tables in the TTCN.GR format. It is a WYSIWYG tool where the editing is performed in the fields of the tables. The creation of Send and Receive statements is simplified by Data Dictionary Dialogues.

- **The Field Help mechanism** in the Table Editor will prompt you with the allowed language constructs for each field in the table.

- **The Analyzer** performs a full syntax check of the complete test suite (TTCN and ASN.1). It also checks for the static semantics of TTCN that
accompany the grammar of TTCN. The result of the Analyzer is fed to the Browser Tool and to the Table Editor to provide a user-friendly error annotation.

- **The Import Tool** allows the import of a test suite in the standardized text format (TTCN.MP) with a high tolerance for errors. Thus any error correction can be done in the HP-ITEX environment rather than in the original MP file.

- **The Export Tool** will produce a TTCN.MP file either from the complete test suite or from a selected subset, e.g. a set of test cases combined with all the objects they use (recursively).

- **The Merge Tool** and the Compare Tool form an environment which supports distributed development of a test suite. The Compare tool resolves any existing conflicts due to duplicate objects or name collisions. The Merge Tool merges selections from one Test Suite into another.

- **The Print Tool** provides a hard copy representation of the TTCN Test Suite. It supports configurable headers/footers, double or single sided printing and partial prints. The output format is Postscript.

- **The Reporter** will produce a configurable textual report on a Test Suite. The format can be customized for further processing in spreadsheet applications, or UNIX filter programs such as “awk”.

- **The Replace Tool** allows Search/Replace operations on the Test Suite. The search pattern is expressed with “Regular Expressions”.

- **The Help Tool** provides a structured and user friendly environment for viewing the on-line help documentation.