Mobile Communications – System and Component Testing – TETRA

Creating an Automated Testing Bench Based on TTworkbench

About Teltronic

For over 35 years, Teltronic has been a world leader in designing and manufacturing mission-critical radio communications equipment and systems. With the combined objectives of innovation and highest quality, Teltronic provides complete wireless communications solutions for a variety of sectors including public safety, public transport, oil & gas, utilities, mining, industry, and others. Our products are marketed around the world, with more than 300 systems in operation in 50 countries.

Products offered by Teltronic include TETRA and P25 network infrastructure, as well as radio terminals and dispatch control centres. Furthermore, Teltronic has extensive experience in product customisation according to the most demanding requirements of our customers, as evidenced by our specialised on-board TETRA equipment for metros and railways. The product portfolio is complemented by a unique offering of wireless broadband technology, completely integrated with our mission-critical voice and data solutions, and based on Mobile WiMAX and LTE platforms.

Project Description

The Specification & Validation team inside R&D department, in charge of identifying cutting edge testing solutions, started a new project in 2010 named ATB (Automated Testing Bench) with following goals:

- Automate testing, to improve the efficiency of our existing internal testing processes, and also of external TCCA (TETRA + Critical Communication Association) official interoperability certifications.
- Full solution testing, to conduct tests checking all the products used by our customers simultaneously.
- End user testing, directing testing efforts to test products from a user point of view.

Main Requirements on a Test Tool

- Open standard
    - TTCN-3, TETRA and P25, are global and open standards, supported by an active community, with a broad range of commercial product providers, assuring the higher return of investments.
- Automatic testing & reliability
    - To save resources, we were looking for a tool that supports test automation. No question, it also had to be well-engineered and reliable. When you let your tests run automatically all weekend, you need to be sure that tests are not interrupted due to a tool bug.
- Suitable for comprehensive testing
    - The tool should be capable of performing conformance, integration, stress, performance, and regression testing. In the professional sector, stress testing is an absolute must. If customers use a function one hundred times, it has to be tested thousands of times, without failing in the process.

Reasons for Choosing Tools of Testing Technologies

Testing Technologies is the company selected by TCCA for automating interoperability sessions between different TETRA manufacturers. Nevertheless, we contacted two other providers during our TTCN-3 evaluation phase. After comparing products and services, we finally realised that Testing Technologies is the suitable TTCN-3 technology partner for us, too.

The main reason for our decision is that Testing Technologies have been mastering TTCN-3 test solutions for many years, with broad customer references. Also, they are actively involved in the TTCN-3 standard maintenance group, and are a dynamic company available for required customisations. Besides, we found that Testing Technologies provides a comprehensive list of plugins for TTworkbench, offering professional maintenance service with two release versions every year containing interesting 'firsts' features.

Kinds of Systems Tested

The automated testing bench has proved itself in our products involved in the official interoperability process, e.g. TCCA IOP sessions between different TETRA manufacturers. This includes following main product groups:

- Radio terminals: handportables, mobiles (normally used inside vehicles or fixed locations) and data terminals.
- System infrastructure providing the radio coverage, and all the features required in a critical communication system.

As new versions are continuously being released, the number of features increases too. Thus, possible combinations soar exponentially, requiring more testing efforts.

Inhouse Creation of Test Cases

After taking part in a three day TTCN-3 training course at Testing Technologies' premises in Berlin, and with their standard support, we were able to create our own customized plugins for our products. Within two years of time, we have created more than 500 test cases including protocol interface testing (PEI, the TETRA standard for terminals, and N2A, our own proprietary infrastructure protocol), regression testing, stress testing, and end user testing.
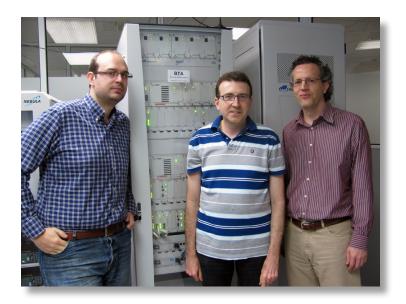
We execute test cases using the TTman command line, which is integrated in our web-based user interface, where testing scenarios can be intuitively defined and programmed. In every scenario, we can select what it is going to be tested (test suites and products) and how many times test shall be repeated (under changing conditions such as product versions, attenuation levels etc.). Finally, all the results are gathered in a database, enabling customized reports.

Testing Technologies' Reaction Time, Support and Quality

We are very satisfied with Testing Technologies' reaction time, which is normally only a few hours. The support team is a professional group providing fast answers or workarounds to help you overcome reported issues. In these two years, our main issue was related to the stability of a new version, which was quickly fixed.

Future Plans

We plan to continue investing in automated solutions to test all of our products. Automation is already a key design requirement for broadband solutions based on LTE and WiMAX.

"TTworkbench has become a key tool in our test automation project. After the initial learning ramp to integrate it in our own testing tools and team, clear benefits started to show. The reduction of the testing time quickly exceeded the cost, with a positive return of investment. Our experience with tools and company is consistently positive, making the investment in this test software definitely worth it."