A new mathematical formalism for the TTCN 3 core language

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Testing is one of the most important things in our life. This process can be found everywhere. The brain of the human continually checks our movement and our body's working mechanism. The researchers can not build such a complex testing system yet, but this process has started. A simple example gives why this topic is important for everybody. The test cost is half of the whole planning and construction charge in the telecommunication. So a cheaper product would be created with the help of a better and more effective procedure. Therefore it is really important to establish a mathematical formalism for testing and test languages.

Only one standardized test language is used in the area of the telecommunication. The first version of the TTCN was published by ISO at 1992. The full name of TTCN was Tree and Tabular Combined Notation till 2000. The third version of this tool was published at that time including a lot of new test methods and system structures. It has got a new name on account of many changing. This name is Test and Test Control Notations. The main part of this system is the core language. It works similar to an object oriented programming language. Of course it uses a very special order notation. This system is a flexible tool, because modules can be connected to the core language. For example the type of value can be given from a module. The name of the most used this kind of module is ASN.1 (Abstract Syntax Notation Number One) for this functionality. Programming interfaces can be connected to the core with the help of the module structures. The most popular programming surfaces are the following: the tabular and the graphical format, but of course other programming modules can be linked.

The other important component of my work is the CSP. The full name of CSP is Communicating Sequential Processes and it is a useful mathematical tool for processes. Working flow of the communication systems can be described with the help of this mathematical technology. So this tool can be used in the telecommunication and the work of protocols can be described. A test system was created in CSP, that is able to generate automatically simple normal test cases. This is build up by three main parts: The tested machine, the channel and the tester. It was tested with SLP (Service Location Protocol) and it worked. So the first results were good and this fact proved the following: this research way is promising. The next step was to create a connection between the CSP and the TTCN 3. The idea was the following: CSP module would be created to the TTCN 3 to control the core language with the help of a mathematical formalism. It would be a simple module like the graphical or the tabular format. First of all the base of the system was built. The principles are the following:

- Has some basic element (like the definition in math)

- Build complex working flow with the help of them

- Control signal based process flow

The functions of TTCN core language are described in CSP by the previous basic rules. The final goal is to prove the equivalence between the TTCN and this formalism. Than a totally self adaptive system would be created in CSP and this system will create TTCN code without human help. Money and time will be saved with the help of this. So final price of the product will be cheaper and everybody will win with the help of this new technology.