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Automated Power Test

Hardware testing of power consumption


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Introduction

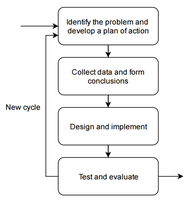
The aim of this thesis was to simplify and improve the process for power consumption hardware testing at the company Axis communications. The result was one semi-automated and one fully automated solution. Another key component was that the system should have high flexibility, everything from the choice of instruments to the test sequence.

Main Objectives

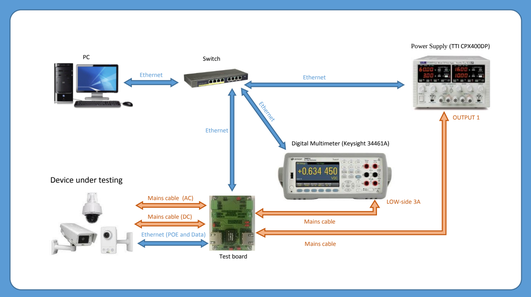
- Optimize the testing time by improving the hardware tool and creating a software.
- Improve the reliability and get more accurate result by standardizing the tests process.
- Minimize the need for human participation without losing flexibility.

Method

The working method used during this thesis, for hardware as well as software development, have been a combination between an action research methodology and an agile development methodology. Each part of the project was divided into small cycles in which the method was applied.



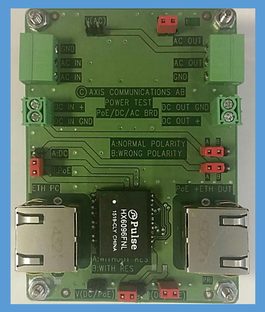
Semi-automated hardware
Board configuration



Results

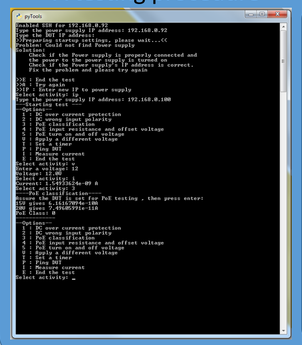
The semi-automated solution consists of a hardware and a software. The ***hardware*** allows the user to easy change between different power types (PoE, DC and AC) and additional functionality used in the diagnostic testing. It also gives the user a good overview between the connection of the instruments and the device under testing.

Semi-automated hardware

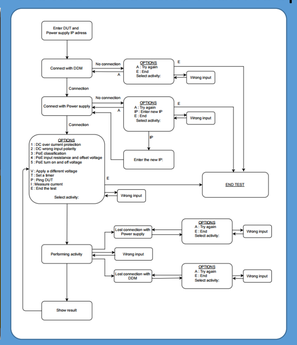


Semi-automated software

A testing procedure



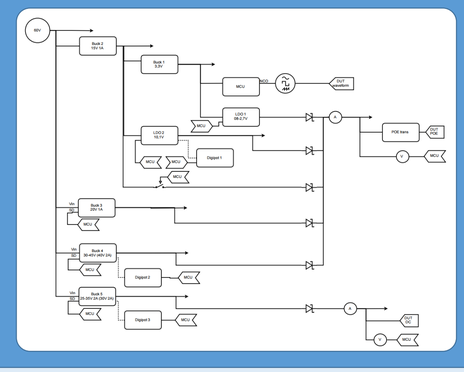
Flowchart of the main loop



The ***semi-automated software*** is based on the idea of controlling the instrument from PC. The software has five predetermined test cases and the ability to manually interact with the instruments. Another function is the possibility to set a timer and ping the device under testing. The manual interaction is a way of including the hardware tests that are not yet automated or to be of assistance when troubleshooting. It is recommended that the company develops a graphical user interface to improve the interaction with the program.

The fully automated solution is a conceptual model of a device that by itself will regulate voltage, conduct measurements and change the test setup. The difficulty was to find an automated solution for adjusting the voltage.
Since the voltage is regulated within the device and the current is likewise conducted in the device there is no need for a PC-controlled instruments.

Fully automated *hardware*
Electric block diagram



Conclusions

In the semi-automated hardware the design of the board and the introduction of measuring points for voltage and current gives the user a good overview between the connection of the instruments and the device under testing. The set up time for each test will be reduced by allowing the user to easy change between PoE and DC, perform polarity swap and add a resistance, without any need of switching wires. The board can be used with both manual and PC controlled instruments.

Since the semi-automated software is based on the idea of controlling the instrument from PC it will require the PC-controlled instruments. However the software is not dependent on the semi-automated hardware and can be used without any assistance board at all. In some of the test cases different values need to be entered by the user, such as max input voltage for DUT. This restrain the streamlining process but maintains the capability of testing a variation of devices.

The fully automated solution is supposedly the most time efficient procedure. Since the solution is a conceptual model and have not yet been implemented, this cannot be verified. By allowing a MCU to switch between the different power types and regulate the voltage the test device becomes more independent and requires less human involvement. This will help to reduce the time and remove any potential errors made by the user. Since the input voltage on the board is at a fixed level there is no need for a PC-controlled power supply. As these power supply are more expensive to purchase the entire implementation is less expensive compared with the semi-automated, on the other hand if one only compare the actual cards, the fully automated board will come at a higher cost.