

Fig. 1 – OPC Server test environment

## Part 6 of 8:

# OPC UA Compliance Test

***The fifth article of the OPC UA Series (SPS-Magazin, Issue 6) outlined the OPC UA Companion Standards. In the sixth part we will take a look at the OPC Compliance Tests and Certifications.***

Open standards such as the OPC specifications are created with the aim of permitting interoperability between products from different manufacturers. In order to ensure that a product actually complies with the specification it must undergo a series of tests that certifies the compliance of the product with the specification. Users need to feel confidence that OPC products they purchase from different manufacturers will work properly when connected to one another. The user can gain this confidence by selecting certified products. The non-compliance of a product typically stems from either an incorrect interpretation of the specification or because of an incomplete or incorrect implementation of the specification. Compliance testing is designed to assist the manufacturer in finding and correcting non-compliances before a user encounters them in the field. Manufacturers can choose between self-certification for their products or certification by an independent Certification Test Lab.

## Compliance Test Tools

The OPC Foundation provides *Compliance Test Tools* (CTT) for server products, which OPC Server manufacturers can download and execute. For Classic OPC, the Compliance Test Tools are divided into Data Access, Historical Data Access, XML-DA and Alarms & Events. For OPC UA Servers, they are grouped by profiles. The tests are provided in the form of an OPC client application which has been designed to automatically execute a series of verification tests by interoperating with the server under test. The Compliance Test Client generates a test result that the vendor uploads to the OPC Foundation for publication within the online catalog. To ensure the integrity of the test report it is encoded by the test client as it is created.

The *Self Certification* tests are designed to fully verify that the interfaces of the server under test respond to client requests in compliance with the specification. Despite the thoroughness of the tests the internal behavior of the server can only be verified to a certain extent.

The test cases are designed to verify the behavior of the server using both valid parameters when making calls as well as invalid parameters. It is important to not only verify that a server is compliant under normal conditions but also when a client is not as well behaved as it should be. The results are recorded in a file and can be issued as a summary.

For clients, the OPC Foundation offers *Compliance Test Tools* (CTT) that are provided in the form of an OPC server application. This application has been designed to automatically execute a series of verification tests by interacting with the client under test. The test server cannot track the behavior of the client being tested, thus to confirm compliance, operation of the Client Test must be witnessed by an OPC observer. The OPC Foundation provides observers – the *Certification Test Lab* personnel – for the remote observation of client behavior.

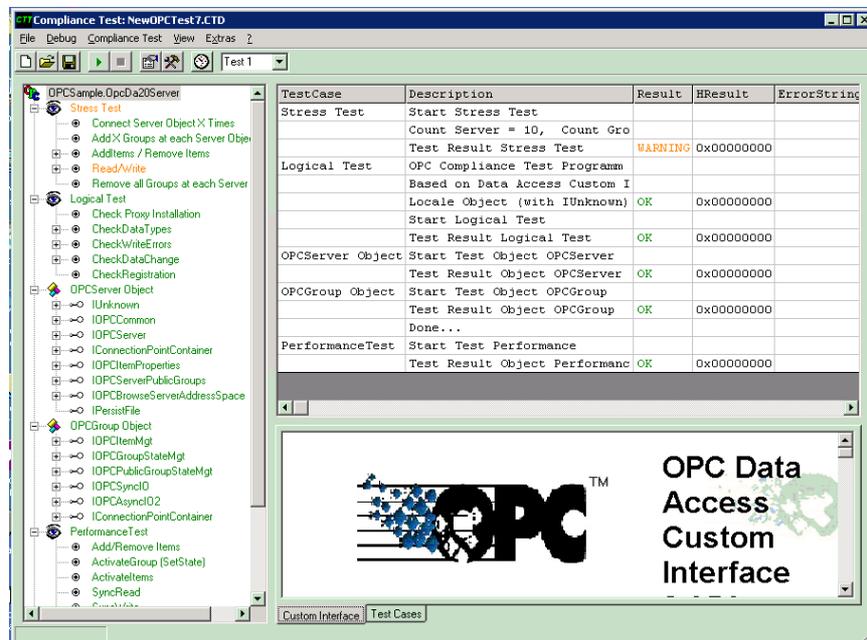


Fig. 2 – Summary of the results of the DA test cases

## Interoperability Workshops

The OPC Foundation conducts *Interoperability (IOP) workshops* three times a year (once in Europe, the US and Japan). These IOP workshops provide a client vendor with the opportunity to check their implementation against standard server vendors in a semi-structured manner. Attendance at the interoperability session is strictly voluntary. The interoperability test process requires that OPC vendors run a series of standard tests for each combination of an OPC Client and an OPC Server product. It does have some limitations, in that the subset of the interface under test is limited and the testing of the interfaces is limited. It is not a full coverage test. The Environment changes every session, since different vendors participate. As the servers provided by vendors have usually passed compliance tests prior to an IOP, they are well behaved and clients are not tested for ability to handle even simple errors.

## Third Party Certification

*Third Party Certification* by an independent test lab expands both the breadth and depth of the test coverage provided by self certification testing. The OPC Foundation *Independent Certification Test Lab* has developed and maintains a standard test procedure that includes both automated as well as manually executed tests. Test lab accreditation procedures have been developed as part of the initiative. The OPC Foundation has already established an *Independent Certification Test Lab* in Germany and in the United States. The OPC Foundation will expand test labs to other parts of the world as needed.

Figure 2 shows the environment for testing an OPC Server product in a test lab. The OPC Server vendor provides the test candidate and a list of the server's functionality (what specifications and what optional interfaces). Based on this list the test cases which have dependencies to the supported functionality will be executed, e.g. OPC methods provided by the server. The disabled test cases (not supported) and the result of the executed test cases are documented in the test report.

After passing the tests of the independent lab the product is marked as "OPC Certified". The certificate is published on the OPC Foundation's web site ([www.opcfoundation.org](http://www.opcfoundation.org)). The online catalog presents users and potential users of OPC products with descriptions of the various vendors' offerings. In addition to the descriptions of the products the compliance status of the products is also made available. Default filters are provided to help user focus in on products that are certified.

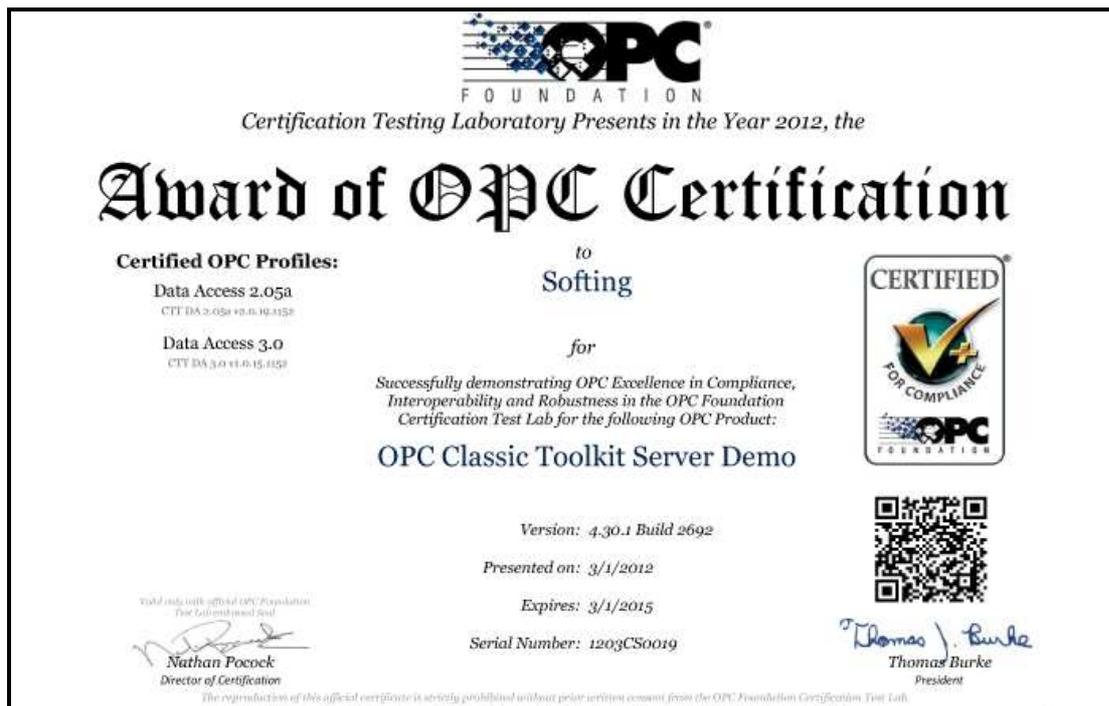


Fig. 3 – Example of an OPC Certificate

In Part 7 of the OPC UA Series we will look at the OPC UA Toolkits in detail.

<http://industrial.softing.com>

Authors:

Peter Seeberg, Product Marketing Manager, Softing Industrial Automation GmbH

Jürgen Lange, Area Account Manager Embedded Technology Products, Softing Industrial Automation GmbH

Series of Articles in SPS-MAGAZIN		
Issue	Date of Publication	Topic
3	24.02.2012	OPC UA Status
4	16.03.2012	OPC UA: Origin, Development and Objectives
HMI Special	13.04.2012	Ten Reasons for OPC UA
5	10.05.2012	OPC UA Specifications
6	01.06.2012	OPC UA Companion Standards
7	30.06.2012	OPC UA Compliance Test
8	27.07.2012	OPC UA Toolkits
9	31.08.2012	OPC UA Outlook