



How to test your SAS?

Introducing IEC 61850 in your substation will certainly have an impact on your organization. Experts claim it makes life easier. Being responsible for a substation, you may be worried – is this really true?

HOW CAN I PERFORM THE DIFFERENT TESTS of a substation automation system (SAS) in the future? Does IEC 61850 help me or does it make life more difficult? What if I have a process bus connecting the breakers and sensors with the protection relay?

This is one of the topics we try to clarify with Edition 2 of the standard. Already Edition 1 had many features intended to support testing, like the test mode of a logical node or a logical device, the test flag as part of the quality information, the test bit in a GOOSE message or as part of an operate command. However, the usage of these different features was not yet defined with enough details to guarantee interoperability.

In Edition 2 of the standard, we provide some additional features and - most importantly, we will describe the different scenarios - how to use these features.

A testing scenario may be to verify the control operation implemented in a bay controller including the timing, while the bay controller is physically connected to the substation automation system and to the switchgear. However, the switchgear shall not be operated. With the new features proposed for Edition 2, that scenario can be handled as follows: The bay controller is put in mode TEST-BLOCKED. As a consequence, no outputs will be generated towards the switchgear.

An operate command is sent to the bay controller that is flagged as a test command. Mirror data attributes that are proposed to be introduced in Edition 2 will be sent back with reports as a result of the command. These attributes reflect the output signal that would have been activated when the bay controller became active. The performance can be verified with the time stamps associated to these attributes.

Other scenarios cover the important aspect of isolating a protection relay while doing routine testing of the protection function. If the substation automation system is using a process bus connection towards the sensors and the switchgear, such a test can be done while the system is running without the need to physically disconnect the relay from the system. It is sufficient to connect the test equipment that simulates the faults to the communication network and put the protection relay into test mode.

Other examples include the possibility to test a function with simulated inputs. This can be very useful, for example to verify the interlocking logic.

During the next working group meeting in June, a task force will address the different scenarios related to testing and IEC 61850. On one hand, these scenarios address the testing of IEC 61850 products like conformance tests, performance

tests or interoperability tests. On the other hand they will address the testing of a configured substation automation system including system performance tests or testing of distributed functions. The deliverable of the task force is, to identify areas that require further standardization by IEC or the preparation of guidelines by the UCA International Users Group.

If you have input on these topics and are not a member of the IEC working group, *please forward your input* to the experts from your country who are members, or *provide feedback* on this article.

Other topics that will be discussed at that meeting are:

- condition monitoring
- guidelines for Ethernet networks and IEC 61850
- modeling of statistical information
- web based access to the definition of the IEC 61850 logical node classes and common data classes.

And finally, we expect to release the FDIS for part 6 and the different parts 7.

We are not short of work in the IEC working groups dealing with IEC 61850. I will continue to report about our activities, new features and other industry trends related to IEC 61850. If there is a specific topic you would like me to address – please drop a note to the editor of PAC world. ■

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