UNLOCKING THE REAL BENEFIT OF IEC 61850

In an industry which is suffering skills shortage, new technologies are in high demand – "work smarter, not harder" the catch cry. In this respect IEC 61850 is rapidly becoming a common buzz word around the industry as organisations seek to implement the latest technology.

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Designing electricity substations is a complex process involving many facets of engineering and technology. Transmission and distribution utilities have already been spending 2-3 times CAPEX over 2005-10 compared to 2000-2005 and the next five years are set to double that again. The generation sector is expanding with renewable generation and the mining/industrial sector is recovering from the financial crisis with increased demands for power.

BRAGGING RIGHTS ARE DULY DESERVED

It is easy enough to buy IEC 61850 devices these days with all the traditional, and some new, relay vendors offering IEC 61850 compliance, even if some buyers don't really understand what compliance really guarantees. We already have more than 30 projects across Australia-New Zealand which claim some level of IEC 61850 implementation to which bragging rights are duly deserved.

However, it is easy to be bamboozled by a complex technology that talks about 'XML files', 'interoperability', 'Logical Nodes' and 'GOOSE Messages'. Certainly IEC 61850 will do what it is designed to do but the question remains "Is this what I really need?" It is perhaps timely then to take a half step back to understand what IEC 61850 really is all about to make sure the bragging rights of your implementation will continue into the future.

REPLACING ALL THE WIRES

Undoubtedly it is about replacing all the wires in the substation – even the CT and VT cables and the trip wires to the circuit breaker. This is an exciting development given that our biggest problem in the power industry with limited engineers is the number of wires we have to deal with. 'Wire based' engineering requires us to start each substation with a blank screen to draw boxes and wires, or at least open a template which we have to manually rename every wire. Then someone replicates this in the panel by installing the wires. Someone then tests that the wires are correctly installed, another tests that the scheme works as required. Then the scheme is taken to site where a whole lot more testing is done. All this because wires by nature must be individually proven.

START ALL OVER AGAIN

In 15 years time, the devices will have to be replaced due to age even if the primary plant is still in service. If not due to age, augmentations of the substation are inevitable with new bays and new facilities. Either way, all that 'wire-based' engineering has to start all over again. New panels, different relays, more functions etc.

RE-USABLE ENGINEERING

Once we realise that a trip signal to the circuit breaker is the same piece of information now as it will be in 15 years, or even 50 years time, the power of IEC 61850 is unlocked. We don't have to be constrained by re-designing a new way to get that piece of information from the protection function to the circuit breaker operating mechanism. We may load the file into a different device in 15 years time but all the settings and all the messages are the same! IEC 61850 is about RE-USABLE engineering.

Along with reusable engineering is increased reliability. We don't have a new bunch of wires to redraw, rename, connect, retest in the factory and on-site and we don't have to recheck if we typed in the setting using this new relay tool as was in the old relay. We can use the same files that have been in use for the past 15 years, assuming of course that IEC 61850 has been applied in its complete process.

INTEGRATE ALL THE DEVICES

To be IEC 61850 compliant means Part 6 as well, which describes the engineering process. Many IEC 61850 systems have been engineered using tools which essentially only replicate the old processes of configuring lots of individual relay setting files – in IEC 61850 jargon, converting ICD templates into individual device CID files. IEC 61850 Part 6 requires the design to start at the System Specification level (SSD file) and integrate all the devices and communication elements into the System Configuration (SCD) file as the full record of how the SAS operates as the source of all individual device configuration subsets. Clearly the reusable interoperable engineering is only created if the SSD/SCD process has been used.

DEVELOPED INTO THE SIX STEPS

To do this though means following a structured program of change management which Rod Hughes Consulting Pty Ltd (rgh@rodhughesconsulting.com) has developed into the six steps of:

1. Concept design,
2. Hardware specification,
3. Tool specification,
4. Process creation,
5. Standard solutions, and
6. Skill development.

CORRECT USE OF THE STANDARD

As organisations embark on their IEC 61850 implementation, it is an opportunity to make sure that real benefits accrue to the organisation, not only in the bragging rights for the first projects, but also in reusable engineering for future projects through correct use of the Standard as an engineering process.