



IEC 61850 – a protocol?

The variety of topics in my column is frequently triggered by a discussion at a conference or at a standardization meeting. For this edition, it was initiated by a comment of a PAC World reader.

THE LAST ISSUE OF PAC WORLD included the following comment: "IEC 61850 is becoming the standard communications protocol in substations." The reader suggested that IEC 61850 should not be inferred as being "just" a protocol on the basis that IEC 61850 is a definition of objects and commands that communicate using TCP/IP protocol. Declaring IEC 61850 as just a protocol does not underline the essential aspect, that IEC 61850 is much more than just another SCADA protocol.

Looking to IEC 61850 as a comparison to SCADA protocols is definitely not the right approach – I fully agree here with the reader. If IEC 61850 is just introduced to change from one protocol to another, there is no benefit. So it is important, that the casual readers of these types of summary description are not misled as to the importance, significance and effort associated with a change in engineering process and the change from wires to fiber which happens to include communication protocols as part of the mix.

Let's first have a look at "What is a protocol?" A commonly accepted generic definition is: "a set of rules used by computers to communicate with each other across a network". Rules may be required related to the physical aspects of the communication network. But rules are also required for error detection, addressing a device or to establish a

communication. The OSI 7-layer model was created to classify the different protocols in terms of functionality with the application layer as the highest layer.

The definitions of IEC 61850 start at the application layer or above. IEC 61850 does not define protocols for any OSI layer, it refers to existing protocols like MMS on the application layer or TCP on the transport layer and of course Ethernet on the data link layer. Parts of the ACSI can be considered as a high level application protocol defining (e.g. with GOOSE) a sophisticated information exchange service.

Are the definitions of the common data classes a protocol? Labels are defined to identify elements of a data structure including the data type. These labels are part of the addressing for this information. That can be considered as a protocol. However, with the logical nodes and data objects and all the associated semantic that is defined, the Standard goes beyond the scope of a protocol.

IEC 61850 compliance also means implementing Part 6 of the Standard, which defines the entire engineering process of the Substation Automation System including the SCL. Most utilities and system integrators are now realizing that the real benefits, and hence justifications, of IEC 61850 are coming in the form of reduced effort in the total SAS design and

testing processes where a "mere protocol" is lacking.

If we compare IEC 61850 with a SCADA protocol, it is certainly all that is above the protocol level that makes the difference. SCADA protocols like IEC 60870-5-101/-104 and the derivative DNP3 support the standardized exchange of data like a double point or an analog value with quality information and time stamp. IEC 61850, while supporting that as well, does much more. As an example, it supports the standardized exchange of information with a well defined semantic like a position of a circuit breaker or the three phase current measurement.

So back to the question: I tend to think that IEC 61850 is not a protocol. It is a standard that defines a protocol stack consisting of existing protocols and some high level protocols defined within the standard.

In addition that standard defines object models for the power utility automation and defines how devices implementing these models and exchanging information using the communication stack are configured.

Hence stating that IEC 61850 is a protocol would be like stating, that a car is a wheel.

I am sure you, as a reader of our magazine, also have an opinion on this topic. I look forward to your comments! ■

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