



Webinar Q&A:

Selecting the Right DER Protocol



A critical issue for utilities planning to integrate DER resources into grid operations is how to manage these resources. As the leading developer of the test tools and training for implementing grid-edge protocols, QualityLogic has a unique perspective on this challenge and we shared that information during a recent webinar.

To view the webinar in full, visit www.qualitylogic.com/webinar-selecting-the-right-der-protocol/

Question: Due to verification delays, Coronavirus, and impact on the economy, has California extended the Rule 21 Ph2/3 deadline from March 22?

Answer: Last week, after receiving multiple requests and as a response to the COVID-19 pandemic, the California Public Utilities Commission extended the compliance deadline June 22, 2020.

Question: Can you speak to the communication pathway & how latency is accounted for in each (through substations to WAN network or direct to control center), and cybersecurity aspects of the DER protocols?

Answer: Latency issues are a function of how real-time the messaging must be. For large, SCADA controlled systems, the latency of more than 1 second could be problematic. For non-SCADA DER, CA Rule 21 has defined requirements for messages to be implemented in DERs in seconds. For DR applications, latency is generally not an issue because of the timeframes. See the slides and listen to the recording for more on cybersecurity.

Question: With customers interacting and responding to the grid, are we making the grid vulnerable by using protocols like Modbus or Telnet at the end devices?

Answer: Potentially. OpenADR and IEEE 2030.5 have strong built-in security as part of the implementations. DNP3 has a security application when needed for public networks. IEC 61850 also has companion IEC security standards. The challenges will likely be more in traditional compromising of individual passwords and access as well as the non-standard interfaces between aggregators/EMS/Gateway systems and DERs themselves.

Question: DER curves fall under SCADA controls and DER Control Operations. Could you draw a distinction between then two?

Answer: UL 1741 SA requires some of these capabilities to be in all interconnected inverters. IEEE 1547 will require even more such curves and control capabilities. These are expected to be used in behind-the-meter DER and we suspect that their use under direct SCADA control will evolve.

Question: What about the latency of resources?

Answer: This is not really specified in the standards to our knowledge except for IEEE 1547-2018 functions. Latency would be a function of class of product and vendor design.

Question: What about ICCP protocol?

Answer: Inter Control Center Protocol is seeing renewed use in many utilities, but as it is not designed for device-level communications, it was not included in this DER presentation. ICCP could be used for communications from a utility control center to an aggregator's control center in place of IEEE 2030.5, but it would have to be a custom application. Mark Osborn did this for a research demonstration between Portland General's GenOnSys DER aggregation control center and BPA's test control center to demonstrate that DER could be monitored/controlled in that manner.

Question: IEEE 2030.5 includes Prices/Events "bucket"?

Answer: Yes, but these functions are not included in CA Rule 21 CSIP requirements.

Question: Can you provide a use case comparison of DNP3 vs DNP3-SA?

Answer: DNP3 and DNP3-SA are functionally the same. The only difference is a cybersecurity layer when public networks are used.

Question: The IEC 61968-5 is not listed here? Even though it is a standard for application-2-application integration?

Answer: IEC 61968-5 is included under the Grid Requirements messaging bucket. It is not yet a completed standard and it is an information model rather than a messaging protocol. Like IEC 61850-4-720, the information model can be used with any of the messaging protocols.

Question: For an inverter manufacturer, to pass the UL 1741 SA certification the IEEE 2030.5 is required?

Answer: No. UL 1741 SA does not require any communications protocol testing. The next update to UL 1741 will incorporate the new Interop requirements of IEEE 1547-2018 and will require demonstration of correct behaviors based on messages in one of three standard communications protocols: DNP3, IEEE 2030.5 or SunSpec Modbus.

Question: Do you envision any feedback loops in the future to let DERs moderate or enhance their response in real-time? If so, how might this be implemented in a secure network? Portland General may have insights from HPWH pilots?

Answer: We have sent an e-mail to our Portland General contacts to understand what was done for heat pump water heaters and when we get a response, we will let you know. Other than some PID control loops used in some generator functions, we don't know of any specific cases for DER.

Question: What are the advantages of using other protocols (DNP3, IEEE, etc.) instead of IEC 61850?

Answer: This was the topic of the webinar and white paper and requires significant discussion and analysis. Since most utilities in the US use DNP-3 for substation communications, the advantage is easier to extend what you already know to DER than implementing a newer protocol. IEC 61850 is an excellent protocol and system, however, it has a steep learning curve and unfortunately is not a topic covered in many US engineering universities.

Question: Broadly, which protocols are adopted to manage feeders across microgrids, especially for managing islanding events?

Answer: Generally, any of the high speed protocols used for SCADA should work well for microgrids. So, DNP-3 and IEC 61850 should work. I know for

the microgrid we put in at Portland General for the Salem Smart Project, in addition to DNP-3, we used Schweitzer Engineering Labs (SEL) Mirrored-Bits protocol. Although we would have preferred a standard protocol, the proprietary SEL protocol was used for very high-speed communications to detect if there was a grid failure issue so the battery system could provide power to the microgrid before a grid collapse.

Question: Spectrum S7 of Siemens is very used in those applications?

Answer: Spectrum and S7 refer to Siemens products that appear to be profibus. Google “siemens Spectrum S7” doesn’t seem to point to any particular thing... Spectrum is a pretty broad “Grid control systems platform”. The Spectrum platform most likely can use many protocols.

Question: For a larger MW scale battery storage project what protocol is typically used between the local BES EMS and the inverters distributed inside each of the Li-Ion battery storage containers?

Answer: As mentioned on the Webinar, there are mostly proprietary communications between the battery management system and the batteries. What we learned as part of the PNW Smart Grid Demonstration Project, that trying to control battery functions such as a smooth ramp to a set kW and other functions were challenging. It is highly recommended that BMS and Battery be purchased as a package to make the supplier responsible for the control sequences. As a result of this, most protocols will be proprietary. However, due to developments in the EV world, CAN bus is frequently used.

Question: Do you know any use case of implementation of the autonomous decision system to the edge control units like the bidirectional inverters?

Answer: Nothing specific. We suspect that there may be R&D efforts in this area, but don’t know any applications.

Question: IEC 61850 includes a dedicated protocol variant for DER defined in Part 8-2 (2018), in short using XML encoded MMS messages which are sent over XMPP, with cybersecurity within XMPP and also as end-to-end. But this is on paper. Do you see a chance that this standard option becomes applied in DER systems?

Answer: Yes, when a utility or regulator mandates the use of 8-2 or a vendor decides to implement it. Unless there is an industry defined certification profile and program, interoperability will be a challenge.

Question: Will there be a follow session to cover other DER protocols? Such as CCS ISO 15118, OCPP 2.0 and or OCPI?

Answer: Possibly. James Mater gave an EV protocol presentation to the SEPA EV WG Thursday, March 19, 2020.

Question: Given the comments on 61850, could it (and DNP3) be used over the Internet to consumer devices?

Answer: Yes but to achieve an interoperable eco-system would require the development of an application profile and test/certification program for that profile.

Question: How do you send power curtailment commands to the DER using the comm protocols that were included in 1545.1-2020? Can you give me a specific example with one of the three?

Answer: Take a look at Function 2: DER Disconnect and Reconnect in the QL Guide to Phase 3, Functions 2/3 testing. It walks through the actual testing to validate that an inverter can do these functions based on a 2030.5 command.

