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Webinar Q&A:
Introduction to IEEE 2030.5

On September 15, 2020, QualityLogic held an Introduction to IEEE 2030.5 webinar with Australia's Clean Energy Council and Strategen. These are the questions that were asked by the webinar attendees along with our answers. We've also included Q&A from past webinars

To view the webinar in full, visit:
www.qualitylogic.com/september-2020-webinar-an-introduction-to-ieee-2030-5-for-australia/

Question: **Slide 15 had the same implementation date for Rule 21 phase 2 and phase 3. (June 2020) Is that correct?**

Answer: Yes, that is correct. Phases 1 and 3 have specific DER grid functions that are tested and certified as part of the UL 1741 SA certification of the smart inverters. There are two key certification requirements in CA rule 21: UL 1741 SA based testing performed by NRTLs and IEEE 2030.5/ CSIP certification performed by test labs under the SunSpec Alliance program. As noted, some of the Phase 3 functions are already certified as part of UL 1741 SA; others are certified by new supplements to UL 1741 SA (SA 17 and 18); some functions are certified now by attestation of the vendor until there is a national standard or IEEE 1547.1-2020 conformance testing is available; and some functions are delayed until there is a national standard test like UL 1741 SB (two Phase 3 functions as illustrated in our presentation).

Question: **I understand Rule 21 is Californian law – is that correct?**

Answer: Yes, that is correct. It is actually refined and updated by the CA Public Utility Commission. Their Orders are considered state law. Other states such as Hawaii has Rule 14H which is a regional specific mandate that is very similar to CA Rule 21.

Question: **Is there any CA Rule 21 equivalent emerging in any Australian Jurisdiction? I think I know the answer will be no, but are there any rules in Europe that may be pushing Europe to another set of standards to California?**

Answer: Australia has a cross industry group, including AEMO, named the "DER Technical Working Group". IEEE 2030.5 has been adopted, and an Australian version of CSIP is currently being drafted. There are other states and countries looking at adopting CA Rule 21 like requirements along with CSIP like profile.

Question: **Why did 2030.5 go with XML for data objects instead of JSON?**

Answer: 2030.5 was designed back in 2008 originally and the intent was to adopt technologies that are generally supported. JSON can certainly be another way of representing data but that is currently not supported officially by the standard. JSON was officially standardized in 2013 as ECMA standard which is much later than when 2030.5 was created.

Question: **Device telemetry data ingestions lends itself to event based architectures. Are there standards**

governing event based API's (e.g websockets)? XML is a very heavy protocol – has JSON or AVRO been considered?

Answer: Telemetry data is supported by the HTTP mechanism in the CSIP profile. Technology is always changing and understand if 2030.5 was designed again 12 years later from its original concept back in 2008, other technologies would be part of the consideration. To our knowledge, we are not aware that the 2030.5 architecture has caused problems with any of the actual products in their environments.

Question: **I am surprised that IEEE2030.5 isn't aligned to MQTT? Using Client-server versus publish-subscriber is seemingly a bit of a bloated way to go in the context of IIoT.**

Answer: IEEE 2030.5 and CSIP require use of publish-subscribe (called Subcription/Notification in 2030.5) for Aggregators.

Question: **IEEE 2030.5 aplies the Common Smart Inverter Profile to inverters, any comments of adoptation with other devices such as loads, vehicles etc.**

Answer: 2030.5 as explained in today's webinar supports other smart energy functions such as metering, demand response, messaging, energy flow reservation (EVSE to EVs) and others. We are involved with an SAE working group that will define its set of standards which will require 2030.5 protocol. Hydro Ottowa has been working with an implementation of 2030.5 for DR as well as DER and Korean companies and test labs have completed research projects demonstrating 2030.5 for DR applications – see https://www.qualitylogic.com/industries/smart-energy/ieee-2030-5-conformance-tested-products/

Question: **Just some feedback, 2030.5 mandating XML is really limiting adoption. Please consider a version of the spec for modern communication methods.**

Answer: We are interested in why this is such a limiting factor for Australia. XML is a widely used technology.

Question: **For distribution business to aggregator communication, is OpenADR more or less applicable?**

Answer: OpenADR has been adopted by the IEC and is being used worldwide for aggregation of demand-response resources, including battery storage and EV charging when used as an energy DR resource. In fact, the design of OpenADR is very supportive or an aggregation model. For DERs, OpenADR is not being used as much and the current profile and certification program do not support advanced inverter functions. The OpenADR Alliance has published a draft DER Addendum that does address how OpenADR can be used for DER management similar to CA Rule 21 CSIP.

ADDITIONAL QUESTIONS FROM PAST WEBINARS

Question: **What do the 1,2,3 in circles on the arrows in slide 9 represent?**

Answer: The diagram in slide 9 is originally from one of the SIWG's Rule 21 related documents. In reviewing the diagram again in the original document, the best conclusion we can make regarding these 1,2,3 circles relate to IEC 61850 data objects over SEP2 as shown in the legend in the lower right part of the diagram.

Question: **Is this protocol also used for other than inverter communications, for example with CTA 2045 modules for heat pump water heaters (DR commands from slide 10)?**

Answer: IEEE 2030.5 supports various smart energy functions beyond just DER including Demand Response, Pricing, Energy Flow Reservation (for EVSEs) and others. CTA 2045 module is able to support 2030.5 communication pass through.

Question: **Best presentation about DER Rule 21 and IEEE2030.5 I have seen to date!**

Answer: Thank you. To dive deeper into both topics, we offer a multi-day live training class where the attendees have an opportunity to discuss any 2030.5 questions they have with our expert.

Question: **What's the main difference between a DER gateway and a certified inverter?**

Answer: From CSIP/2030.5 communication, both a CSIP certified DER gateway and CSIP certified inverter must both support the same 2030.5 communication protocol. Gateway can be connected to other types of inverters that do not directly support 2030.5 by using modbus or other protocols. CSIP certified inverter must also act upon the grid functions that the utility DERMS server assigns to the device whereas the DER gateway does not perform the grid functions but communicates to the target inverter to do so.

Question: **Is the 3 day class delivered online and what does it cost?**

Answer: The 3-day training class is delivered online "live" by our leading expert. In the past, we have done these classes on-site face-to-face, but due to COVID-19 restrictions, we are delivering the same training class live remotely. For pricing, please contact us at info@qualitylogic.com. The class is also available as a recorded video, either as a standalone or with 3 hours of instructor support. See https://qualitylogic.thinkific.com/ for more information..

Question: **Is 2030.5 independent from OpenADR or can OpenADR communication be used by 2030.5 devices?**

Answer: Yes, both protocols are independent from each other. Although there is some overlap as far as supporting Demand Response functions, they do not share any protocol details between them. QualityLogic partners with the OpenADR Alliance to offer the official OpenADR test tool and is a SunSpec Authorized SW Test provider for 2030.5. We offer training classes for both technologies.

Question: **To your best knowledge, what is the common DER gateway (IEEE 2030.5 appliance) you see in practice, edge computing, cloud application or hardened rack mounted servers?**

Answer: Typically, a DER gateway can take the form of a small hardware box like a network gateway or switch. The functionality of a gateway can also take the form of a cloud application or other edge devices where it's responsible for communication to the utility DERMs server and translate downstream to other protocols. We see vendors doing both forms of gateways.

Question: **Where does OCPP potentially overlap with 2030.5?**

Answer: A recent SEPA report titled "Guidelines for Selecting a Communications Protocol for VGI", August, 2020, includes a discussion of OCPP and Table 5 compares the use of IEEE 2030.5 and OCPP in EV applications. You can obtain the report from the SEPA EV Protocols Paper, which is available for download at https://sepapower.org/guidelines-for-selecting-a-communications-protocol-for-vehicle-grid-integration/.

Question: **Is there a way to chain, or child-parent, more than one gateway, if there are multiple at one location?**

Answer: The 2030.5 protocol specification does not require any specific architecture for 2030.5 devices. Whether there can be chain of gateways will depend on what your deployment model is, what your vendor product supports and other factors. CSIP does require that the three types of clients (Direct DER, Facility EMS or Aggregator) need to receive the 2030.5 messages from the utility DERMs server and the targeted inverter(s) need to act upon these 2030.5 signals/commands. The deployment model that you select does need to support this requirement.

Question: **Does the aggregator control all inverters as a single resource or must the aggregator also contain geographic location data on all inverters to control them according to region?**

Answer: In CSIP, the aggregator controls it's inverters as discrete end-devices. The utility DERMS knows where each inverter is located, its capabilities and restraints through its commissioning process. The aggregator's role is to collect status, monitoring (metering) and settings information for each inverter and communicate that to the DERMS. It also gets 2030.5 instructions for each inverter from the DERMS and passes them on to each inverter. Inverters are likely to be assigned to groups for easier management by the DERMS so that DERMS-Aggregator management interactions can be about groups of inverters instead of each individual one.

Question: **What does the Aggregator certification process currently look like? For example, how many devices will the Aggregator need to aggregate during testing, and where will those devices need to be physically located/installed? How are phases 1 and 3 tested for Aggregators?**

Answer: While the Aggregation certification requirements are focused on the message exchanges between it and a simulated utility DERMS or communications server, there is a need to simulate or have a small number of inverters connected to the aggregator platform to complete the testing. Some of the tests ask for information on the managed inverters. How the actual test set-up is implemented is between the certification lab and the aggregator vendor.

Question: **How are phases 1 and 3 tested for Aggregators?**

Answer: Phase 1 are autonomous inverter functions which can be modified by communications and Phase 3 functions all need communications from the utility DERMS. In the Aggregator CSIP testing, messages about the Phase 1 and 3 functions are used to test that the Aggregator properly communicates these functions and responses are sent by the Aggregator (for its inverters) that confirm the actions for these Phase 1/3 based DER events. However, there is no actual inverter electrical testing required in the CSIP certification tests.

Question: **Is an Aggregator permitted to fulfill a control targeted towards several devices in aggregate, rather than ensuring that each individual device fulfills the control as specified? For example, if a server uses "Set Active Power Mode" (opModFixedW) to tell 10 identical devices to charge at 50% of their max charge rate, would an aggregator be allowed to instruct 5 devices to charge at 100% power and 5 to do nothing, in order to for example achieve better inverter efficiency?**

Answer: If the Utility DERMs server is assigning to each inverter specific opmodFixedW with specific values, it is expected that the 2030.5 responses sent acknowledge the device is acting upon those included commands. However, there is no end to end verification included in CSIP certification that validates that the inverters are applying those specific instructions. Facility EMS model allows the EMS to make decision similar to the scenario described in the question.

Question: **For an Aggregator, do we need to perform electrical tests for end inverter during the certification?**

Answer: No. CSIP is a communications test only. There are no electrical tests defined in any of the CSIP IEEE 2030.5 certification tests unless the inverters are going through UL1741 SA tests with the NRTL.

Question: **Can we convert 2030.5 to DNP?**

Answer: For DER management, the new DNP3 Application Note 2018-001 defines all of the IEEE 1547.1 functions for DNP3 management so there is a one-for-one mapping between IEEE 2030.5 DER functions and DNP3 DER functions. Beyond the DER functions, there are other messages included in 2030.5 that also need to be handled. The full 2030.5 technical workshop reviews all of the 2030.5 messages and features that are part of the CSIP specification and would be helpful in understanding what needs to be translated.

Question: **Which protocol is the most used with inverter? IEEE 2030.5, OpenADR 2.0b or OCCP 1.6?**

Answer: IEEE 2030.5 is the only protocol that is officially mandated for inverter communications anywhere. The two other most popular open protocols for inverter communications are DNP3 and SunSpec Modbus. All three are named in IEEE 1547-2018. Outside the US, IEC 61850 is also used for inverter communications. OpenADR has defined messages that can communicate with inverters but outside of one demonstration project we know of (CA Solar Initiative 4), it has not been used for directly managing inverters. If the inverter is in an EV charging station, then OCPP is the most popular communications protocol but it does not have specific smart inverter control functions.

Question: ***What utilities are buying DERMS that are 2030.5 certified?***

Answer: The CA IOUs are mandated to use IEEE 2030.5 and are developing DERMS with 2030.5 communications servers. Some of the utilities in Australia are also implementing IEEE 2030.5 for DER management and we know of at least two major US utilities also implementing DERMS with 2030.5 communications. Hydro Ottawa has a program called MyGen that uses IEEE 2030.5 for DER and DR communications.

Question: **Is 2030.5 only required in CA? What's the plan to promote this requirement to other states? Why not widely adopted by other part of the country?**

Answer: First, very few utilities outside of CA have the immediate problem of significant DER penetration and have the luxury of observing the CA rule 21 experience before having to make a commitment to a communications standard (if they even decide to do so). There is adoption in other states and countries. If you think about the fundamental DER functions that are required in CA Rule 21 and supported by IEEE 2030.5, they are common and not a California specific need. These DER functions are derived from IEEE 1547 standard which also has influenced updates of other DER communication protocols. There is an IEEE 2030.5 Ecosystem Steering Committee Chaired by Tom Tansey (Exec Dir of SunSpec) that has a mission to promote the IEEE 2030.5 standard beyond CA.

Question: ***Where is the decision made that specifies the actual monitored data that client needs to send to the server?***

Answer: CSIP includes number of examples of monitored data that are required to be sent by DER clients to the Utility DERM server. The utility can expand or specify additional specific requirements for the monitored data through its Interconnection Handbook.

Question: **Is there a specific inverter response time limits defined in the 2030.5, for example the Vol-Var control?**

Answer: If the DERM server requires Response messages for its DER events, the DER client (such as an inverter) must send these response message within a specific time frame. Beyond that, since the CSIP certification testing is not end to end, there is no requirement in CSIP that requires the inverter to perform them at the electrical power level. 1547.1 is expected to have this type of response time at the electrical level.

Question: **I would like to just understand whether the IEEE 2030.5 limited to inverter in the utility or does it help control other devices in a similar way as a Data Acquisition System does?**

Answer: The IEEE 2030.5 standard was designed to directly communicate with and manage any system or device behind the meter on the electrical system. This includes water heaters, thermostats, electric vehicle charging, battery storage, etc. It is a very broad protocol that covers other smart energy functions beyond DER such as Demand Response, Pricing, Messaging, Energy Flow Reservation, etc. CA Rule 21 CSIP has specified which specific function sets in IEEE 2030.5 are need to meet the CA Rule 21 requirements.

Question: **Does it cover all the requirement of IEEE 1547.1-2020?**

Answer: IEEE 2030.5 can communicate about all of the IEEE 1547 functions for which communications makes sense. For instance, 2030.5 can communicate IEEE 1547 required settings for Volt-Var curves but it would not communicate about environmental requirements such as temperature and moisture.

Question: **Are there other states/ISOs planning on using 2030.5 in the near term?**

Answer: Yes. However, it is not clear which of these is public knowledge at this time outside of Hydro Ottawa. The need to manage smart inverters goes well beyond California and this is the reason why other states/countries would adopt such standard.

Question: **Do you have the phase III test plan to share?**

Answer: Assuming this means CA SIWG Phase 3 Advanced Inverter Functions, most of these are covered in IEEE 1547.1-2020. The exceptions are Functions 8 (Scheduling Power Values and Modes) is not defined in IEEE 1547-2018. There is no nationally defined test for this function. However, CSIP tests that the messaging about schedules can be successfully communicated in the CSIP certification tests but does not validate that the schedules are implemented in the inverters.