IEEE P2800 Working Group Meeting Minutes, 7/13/20 – 7/16/20

IEEE P2800 Standard for Interconnection and Interoperability of Inverter-Based Resources Interconnecting with Associated Transmission Electric Power Systems

Chair: Jens Boemer
Vice Chairs: Mahesh Morjaria, Bob Cummings, Babak Enayati, Ross Guttromson, Chenhui Niu and Manish Patel
Secretary and Treasurer: Diwakar Tewari

Attendees

Please refer to the attachment with attendance report from iMAT.

Administrative Items

The meeting was called to order at approximately noon Eastern on July 13, 2020. This meeting was the ninth meeting of the IEEE P2800 Working Group. The meeting was held virtually due to COVID-19 concerns. Each of the SubGroups' Draft 3 content was discussed in detail and feedback was provided by the meeting participants.

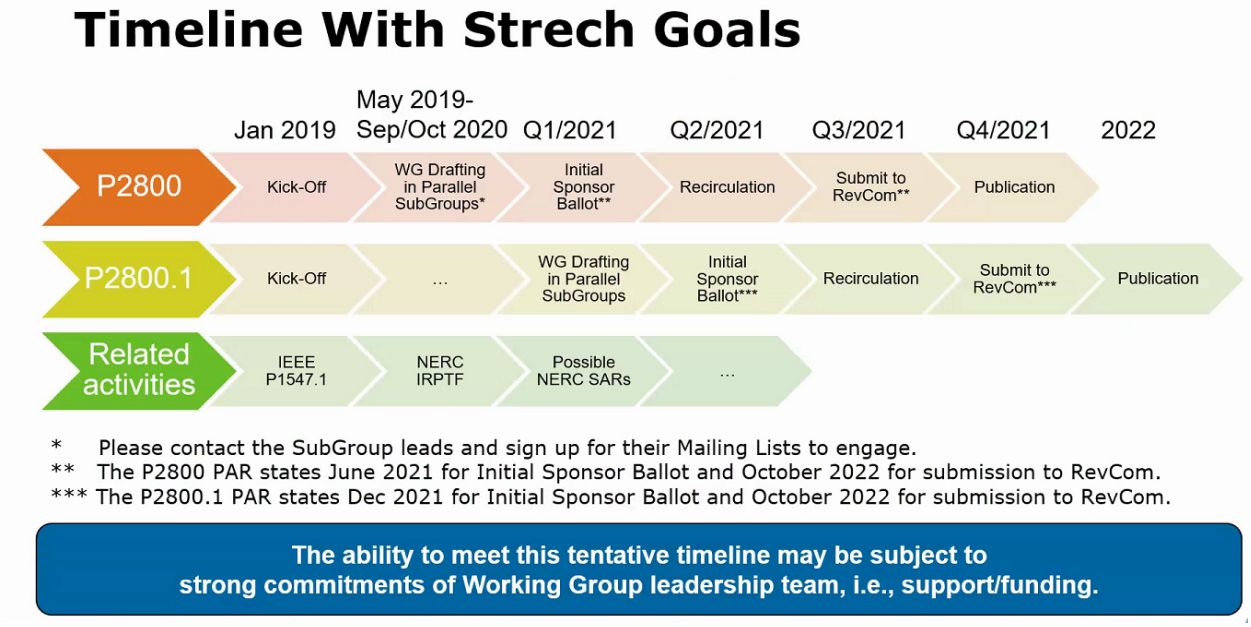
Quorum was achieved early on during the first session with over 90 Voting Members present.

Chair Jens reviewed various administrative items:

- Meeting goals for this week.
- IEEE patent and copyright policies. No patent was brought up by the members.
- IEEE SA's 'Dominance Policy' slides. Malia Zaman from IEEE had presented these slides in detail in the last WG call. Chair emphasized that we would not remove a particular group to strike a balance; we would rather invite additional groups.
- Timeline with stretch goals (see graphics on the next page).
- Chair welcomed Mahesh Morjaria as a new Vice Chair who replaced Kevin Collins
- Meeting Agenda. The meeting agenda was distributed prior to the meeting. The agenda was reviewed, and approved with no objections.
- Meeting minutes from the April virtual WG meeting were reviewed and approved.

The meeting material utilized for this meeting is located on imeetcentral: https://ieee-sa.imeetcentral.com/p/ZgAAAAAAxgci .

Refer to Draft 3.1 for edits, pertinent notes, and key takeaways for each section based on the WG feedback. https://ieee-sa.imeetcentral.com/p/ZgAAAAAAxlNb



Summary of Sub-Group Level Discussion on Draft 3.0

SubGroup I and II (Overall Document and General Requirements)

Malia Zaman provided guidance that if we make any changes to the Scope and Purpose, that increases the scope, the modified PAR needs to be approved. Minor changes can be accepted without approval.

There was a discussion on Fig 1. If the WG is limiting the applicability of the standard to only IBRs connected behind the AC-DC converter stations. A question was raised what difference it makes to the grid what is behind the DC line. Two scenarios were discussed – i) A DC tie connecting two interconnections (example: Hydro Quebec connection to New England example) and ii) A DC tie within the same interconnection (example: PDCI). Suggestion was to replace IBR in Note 1 with "any isolated resources radially connected". This topic will be further discussed in SG 1.

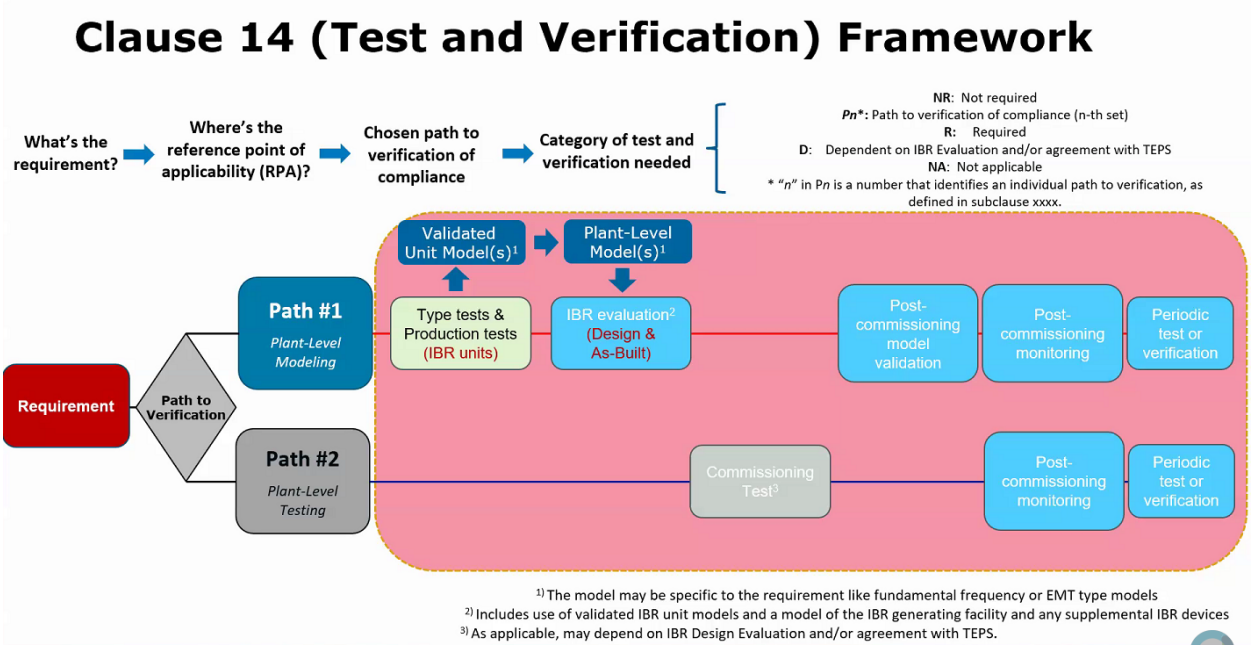
RPA for a Mixed IBR Facility –SG Guidance is that only the IBR should have to comply with P2800 requirements. POM for whole mixed facility may need to be moved. It was suggested that at the POM, the plant could meet P2800 requirements for the IBR only on a pro-rata basis. Concern was raised that it is too complicated with pro rata approach and that method was dismissed. Chair commented that engineering judgment would still be needed.

It was decided that SG-2 will come up with specific examples for hybrid (IBR & conventional generation), and mixed IBR facilities (multiple IBR, perhaps of differing types) with appropriate definitions. Examples could be included in Annex B.

Harmonization of terminology with IEC – Compared the terms in draft 3 with that in IEC 8A/57/CD. Also, discussed harmonizing terminology with NERC and FERC.

It was proposed to change TEPS to transmission system operator. The 1547 terminology doesn't apply here (EPS). North America uses different terminology so the WG needs to be careful. Need to be selective where to harmonize terminology.

SubGroup XI (Tests and verification requirements) Shazreen Meor Daniel reviewed Clause 14 (Test and Verification) Framework.



This was a primer for the WG but the details would be covered in SG 11 timeslot. An example of VRT requirement was walked through this framework.

Comment - Path 1 – It should be Post commission model calibration, not validation as at the time of the test grid impedance is not available. WG greed with the suggestion. For post-commissioning model validation, commissioning test results are required first. WG agreed that model validation/calibration would need output of the test.

Wes Baker clarified that the idea is not necessarily to do commissioning test especially for a requirement but learn from other tests that were done.

Chair Jens reviewed P2882 PAR. It would be a guideline not a standard. It is an individual process. Malia Zaman commented that this PAR will be led by the Analytic Methods in Power Systems (IEEE/PES/AMPS) committee so we will have to follow their policy. It is very similar to EDP&G policy. Still checking if EDPG can jointly sponsor it. *(post-meeting note: EDP&G and EMC decided to jointly sponsor)*

Concern raised that they are not doing model validation under P2882 and the name is very confusing. They are looking to model performance in software. Malia commented that it took a while for the

committee to approve this PAR. She suggested that any concerns should be brought up in the first meeting to address them at the WG level. *(post-meeting note: feedback was provided to AMPS and the PAR was revised accordingly, Approved PAR is available at https://development.standards.ieee.org/myproject-web/app#viewpar/11610/8282)*

SubGroup III (Active Power – Frequency Control):

There was considerable discussion on the Primary Frequency Response Chart. It was concluded that there is no step type response for frequency outside deadband since the equation deducts deadband from the measured frequency. Distinction between frequency response and frequency control was clarified. Frequency control is continuous movement to clamp frequency between the deadband. Whereas frequency response is related to response of a resource to abnormal conditions. Discussion on the minimum value for deadband concluded that below 10-15 mHz measurement accuracy may not be sufficient.

SubGroup IV (Reactive Power – Voltage Control):

The P-Q chart was discussed in detail. It was confirmed that P2800 Draft 3.1 does not require capability for night time VAR production for PV and in no-wind situation for Wind. There is some cost associated with providing that capability. The issue of collector system charging at zero output power was brought up for further discussion. It was suggested that a footnote be added to cover conditions such as maintenance conditions, lack of resource availability etc. On a suggestion it was pointed out that Q requirement for transition conditions was already covered.

SubGroup V (Low Short-Circuit Power):

Presented an informative annex with minimal comments. The existing version presented did not have substantial changes from the previous version, although there were some minor corrections. A comment was made that requested the authors to survey definitions regarding inverter-based resource stability and to use commonly agreed upon definitions and terms, to the extent possible. A suggestion was also made to reduce the amount of text explaining the different variations of short circuit ratio. In response to the former it was suggested that the text be shorted and replaced with appropriate references.

SubGroup VI (Power Quality): Section 8, Power Quality was reviewed.

Presented both normative text and an informative annex. Since the last draft, little changed on voltage fluctuation requirements or current harmonic requirements. Discussion was raised regarding the definition of background harmonics for current harmonic limits. Since the requirements are for absolute current harmonic limits, the text was agreed to be clarified to avoid the use of background harmonics terminology. Additional comments were raised regarding subjective language in a normative standard, such as the use of the word 'harmful' and will be addressed in the next edit. The relationship between harmonic content and imbalance limits was raised and requested to be addressed in the next revision. A discussion was held that coordination should be made between the PQ over voltage contribution limits

and the voltage ride-through limits (withstand). The informative annex was presented by Eugen Starschich with no comments or inquiries.

SubGroup VII and VIII (Ride-Through Capability and Performance Requirements): Manish Patel and Bob Cummings presented and discussed drafted requirements for voltage ride-through capability and performance. Discussion and feedback received is noted below:

Voltage ride-through capability: High voltage threshold for continuous operating region is set to 110% of nominal voltage. Most equipment built based on various IEEE standards is rated for continuous operation at 105% of nominal voltage, except for a few voltage classes, i.e., 500kV. How can one assure compliance with P2800 requirements with use of standard equipment? SGs 7 & 8 to discuss further and review other grid codes. Few options: limit operation between 105-110% to 30 minutes or some other appropriate time duration, seek feedback from PES switchgear and transformer committees, review other grid codes, etc.

Transient over-voltage ride through capability: The drafted requirements present a good compromise as industry is still learning about this subject.

Successive voltage dips – The subgroup has put together a structure for requirements but further discussion is necessary.

Performance requirements – Briefly discussed if type III WTGs are able to inject negative sequence current which leads the terminal negative sequence voltage by 90 degrees during unbalanced faults. Manish Patel to entertain further discussion with OEMs and a small group from IEEE PSRCC.

Test & Verification – Briefly reviewed the framework put together by SG 11. The framework was well received. SGs will revise table 16 as appropriate during regular conference calls.

SubGroup IX (IBR Protection): Babak Enayati and Mike Jenson facilitated the discussion on SG IX.

It was suggested to consider Protection coordination aspects in this SG.

There was a discussion if ROCOF requirement is too prescriptive. ROCOF should not lead to tripping. An interconnection cannot physically have a steep ROCOF. Original thought was that ROCOF could be miscalculated and inadvertently trip IBR. It was suggested to rather consider it as a performance requirement. It was also suggested to provide ROCOF requirement in Ride Through section. ROCOCF, if used, protection should be designed to not trip on mismeasurement and should not conflict with the ROCOF ride through requirements.

There was a discussion on Unintentional islanding. WG discussed issues related to island definitions, comparison with distribution connected DERs, Short circuit ratio and grid forming vs grid following IBR behavior under islanding condition etc.

SubGroup X (Modeling & Validation, Measurement Data, and Performance Monitoring): Manish Patel presented drafted requirements for modelling data and measurement data for performance monitoring and validation. In general, edits since draft 2.1 is mostly minor with intent of improving clarity of requirements. WG provided some feedback regarding requirements for measurement data in table 15, which is noted in draft 3.1. SG will discuss and make changes as appropriate. Few WG members expressed concerns about requirements in table 15 being too burdensome for small facilities connected to sub-transmission system. Manish Patel noted that for smaller facilities IBR owners should discuss scope of measurement data requirements with TEPS. Manish Patel briefly reviewed Annex J. Reigh Walling expressed concerns about a couple of items related to PQ modeling. Manish to coordinate with PQ sub-group. The guidance for short circuit modeling to reference appropriate technical reports developed by IEEE PSRCC.

SubGroup XI (Tests and verification requirements)

Shazreen clarified that the objective for 2800 is to specify what type of verification tests are required for each of the described requirement in Table 16. Procedure for IBR evaluation (how to execute those steps) could be deferred to 2800.1. As an example, Shazreen reviewed 1547-2018 and 1547.1-2020 to clarify the distinction between the two.
Chair Jens reminded that 2800.1 is an entity std so it has a different process. Any draft, before it goes to initial ballot will be shared with 2800 SMEs and all liaisons. Interim drafts when become available will be shared as well.
Wes Baker explained that in this proposal (Table 16) they recognized that all corner cases cannot be tested via commissioning. It should be supplemented by engineering design analysis to verify the requirement.
Shazreen reviewed Table 16 in detail with each SG in the morning and afternoon sessions on Thursday.

Open Discussion, Timeline, Future Drafts and Wrap-up

- Chair posed some polling questions to ask for preference for the fall working group meeting.
- Conflict on Oct 5th week for P1547.x meetings
- Goal is to post next fully revised draft to iMeet two weeks prior to the next WG meeting. Draft 3.1 will be posted on Monday after this WG meeting with redlined edits.
- Suggestion to push meeting out to 2nd half of October so we get more time to get the draft ready.
- IEEE PES committees that are meeting in GM - Chair requested to let us know if P2800 update is required.

The meeting adjourned at approximately 5:00 PM Eastern.