Draft IEEE P2800 Working Group Meeting Minutes, 9/25/19 – 9/26/19

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

Chair: Jens Boemer
Vice Chairs: Kevin Collins, Bob Cummings, Babak Enayati, Ross Guttromson, Chenhui Niu, Manish Patel
Secretary: Wes Baker
Treasurer: Diwakar Tewari

Summary Highlights

This meeting was the third in-person meeting of the IEEE P2800 Working Group. Each of the SubGroups' Draft 1 content was discussed in detail and feedback was provided by the meeting participants.

The meeting slides and the revisions were uploaded after the meeting to iMeetCentral link as Draft 1.1. Refer to the meeting slides for more detail.

Refer to Draft 1.1 for edits, pertinent notes, and key takeaways for each section based on the WG feedback. Link

Items that require follow-up are shown in bold italics.

Day 1: Sep 25, 2019

Call to Order / Welcome

The meeting started at approximately 1 PM MT on September 25, 2019. Facility safety and emergency procedures were reviewed by WECC staff. The meeting goals were:

- Convene Working Group and report on Sub-WGs' progress to date.
- WG and Sub-WG members to get full picture of Draft 1 and Sub-WG Leads to listen to WG feedback and concerns.
- Clarify needs for potential alignment with IEEE Std 1547™-2018 where appropriate – remind Sub-WGs of purpose and use of strawman.

IEEE SA Rules, Standards Classification & Language

The IEEE SA rules, Standards Classification, and Language were presented.

Clarifications on the process of the identification of patents were made. The patent holder determines whether the patent is essential to meet the standard.

Review of WG membership requirements were made. Clarification was made that you do not be a SA membership to be a WG member, but you will need to be a SA member for balloting. The WG membership criteria was reviewed. To obtain member status, one must attend two consecutive WG meetings and maintain regular attendance to WG meetings (i.e., not missing two consecutive WG

meetings). It was also clarified that multiple day WG meetings count as one meeting and that attendance credit is granted to those who attend at least 50% of a meeting's duration.

Introductions

The participants introduced themselves with their name and affiliation(s).

Approval of 5/22-23/19 minutes

The 5/19 kickoff meeting minutes were reviewed. One item that was highlighted was the development of draft 1 did not necessarily follow the strawman. It was stressed that, where applicable, it may be beneficial to stick with 1547 language specifically regarding testing requirements.

On day 1, the WG did not have a quorum. No objections were communicated to the meeting minutes. The minutes are available in iMeetCentral. Link. Formal approval of WG minutes was made on day 2 after a quorum was established.

Note: after the meeting on 9/25, the WG member status of each interested party was reviewed and updated.

Approval of Agenda

The meeting agenda was distributed prior to the meeting. The agenda was reviewed, and no objections were made to the agenda. The agenda was approved on day 2 after a quorum was established.

Review of P2800 Scope, Timeline, and Future Working Group Meetings

The P2800 scope and tentative stretch goal timeline were presented. Some expressed concern with the tentative timeline and emphasized that the main constraint should be the technical content of the standard. One question was presented to the WG regarding whether the WG should prioritize certain requirements leaving some of the more contentious items for a future revision of P2800. It was commented that this standard at a minimum needs to cover the current state of the art to catch up with the rest of world. This will be reviewed after the WG reviews draft 1.

For future WG meetings, the following was decided:

- The WG will not meet formally in December. Instead, we will have a series of conference calls such that the SGs can focus on the content. A calendar invite will be sent in the next few weeks.
- P2800 will not formally meet at the JTCM in January 2020. Instead, SGs can meet there informally and the Chair will ask the organizers to reserve some space.

Overview on plenary discussion of draft 1

An overview of draft 1 was presented as an introduction.

Sub Group1 Discussion

The sections of draft 1 pertaining to SG1 were reviewed.

HVDC-VSC: It was commented that this may be relevant given the influx of offshore wind projects. In general, the offshore wind interfaced with HVDC VSC dc link is covered by P2800. The SG needs to clarify where the standard applies (RPA) for these projects.

Type 3 wind: The WG tends to support exceptions for type 3 wind due to technical limitations and to avoid writing the standard based on the limitations of one IBR technology.

Review of need to coordinate existing standards: One proposal was to only reference standards in normative reference section if it is used with ""shall language. In general, the SG will work on this section throughout the drafting process.

Reference Point of Applicability: It was clarified that at the 5/2019 WG meeting, the RPA was determined to be the POM defined as the high side of the main transformer. One proposal was to add "may" language to allow the TEPS operator the flexibility to move this as they deem necessary (e.g., to the POI). Another suggestion was to use the RPA for all requirements which gives the TEPS operator flexibility. This will be further discussed in SG1.

Definitions: The WG will use: "IBR Generating Facility" (everything in the plant to the RPA), "IBR units", and "supplemental IBR devices".

Other comments:

Tim Zgonena from UL discussed that the existing IEEE Std 1547.1™-2018 and the UL 1741 test and verification procedures can be used and extended, as necessary, to capture P2800 requirements. At this point the group will keep this item open as further discussions are needed to understand the importance of type tests versus other verification measures. This will be discussed further in SG1 and 11. The comment was made that electromechanical system of wind is tested in the IEC standards.

Sub Group 9 Discussion

Jason Espinosa and Kamal Garg presented an overview of the SG's work since the last meeting. Note Draft 1 content was not discussed, but the content of the slide deck was added to the post-meeting draft 1. The general feedback from the WG is that P2800 should consider not specifying any "shall trip" settings and require that any "may trip" settings implemented by the IBR facility should consider the ride-through capability requirements and be set based on limitations of the equipment. The SG also noted they needed participation from the inverter OEMs.

Commented [BJ1]: Ask Jason and Kamal for the slide deck.

Commented [BJ2]: Remind WG members to participate.

Sub Group 2 Discussion

The sections of draft 1 pertaining to SG2 were reviewed.
Bob Cummings presented the proposed ride-through capability requirements. The discussion clarified that these shall apply at the IBR generating facility level and the RPA, not only at the IBR unit and the PoC. Jens Boemer asked why the proposed requirements are less stringent than those specified in Category III of IEEE Std 1547™-2018 and the answer was that the proposed requirements were coordinated with NERC PRC-024-2. The WG discussed that it may be beneficial to require more capability than defined in PRC-024-2, if inverter vendors and IBR plant developers can agree to this. IEEE 1547-2018 Category III table was added to Draft 1.1 for information and consideration by the SubGroup. But "Momentary Cessation" (blocking) should be replaced with "Permissive Operation". A comparison with international requirements, like those in VDE-AR-N 4120 and 4130 may be beneficial.

Day 2: 9/26/19

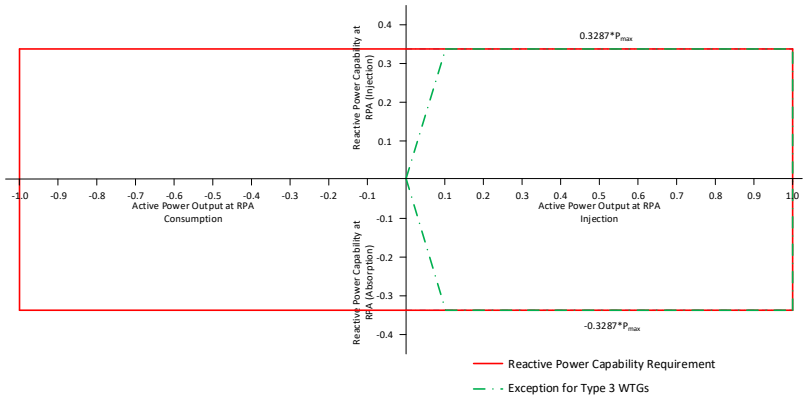
Call to Order

The meeting started at approximately 8 AM MT on 9/26/19. A brief recap of the Day 1 discussion was presented, quorum was established, and the Day 2 agenda was reviewed and approved. The minutes from the 5/2019 WG meeting were also approved.

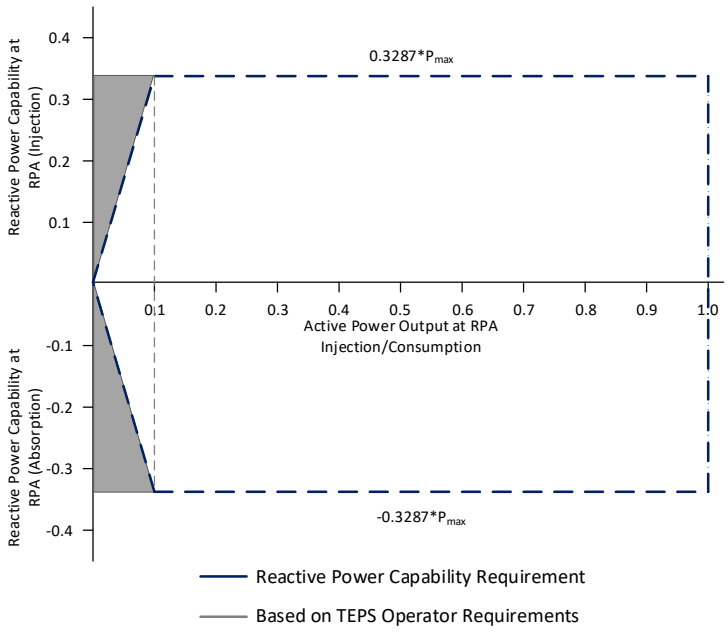
Sub Group 4 Discussion

The sections of draft 1 pertaining to SG4 were reviewed.

The main discussion point was regarding the reactive power requirements depicted in figure 1 of draft 1. The question posed to the WG for feedback was whether the reactive power requirements should be the same across all technologies (in which case it would likely result in the alternative figure) or if exceptions should be allowed for type 3 wind such that we do not limit the requirements to the technical limitations of type 3 wind (existing figure). An informal vote was taken which showed a slight preference for the alternative figure. Link. Later in the meeting, a general vote was taken which showed a large preference for setting ambitious technical minimum requirements adding exceptions for certain technologies as needed. Link. Taking this direction, SG 4 will continue with the existing figure 1 in draft 1.



Existing Figure 1.

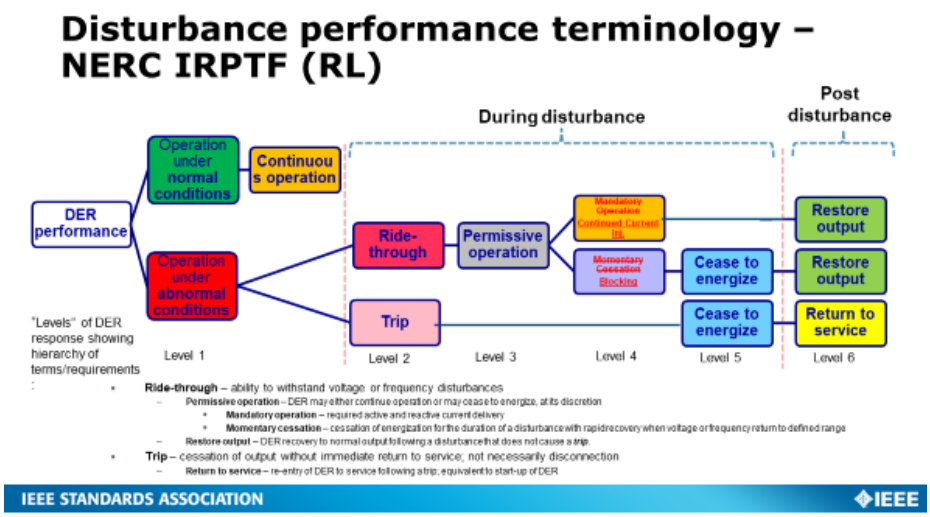


Alternative Figure 1.

Sub Group 7 Discussion

The sections of draft 1 pertaining to SG7 were reviewed.

There appeared to be some confusion among the WG regarding disturbance performance technology. Jens presented the definitions from IEEE Std 1547™-2018 to help focus the conversation.



It was noted that some in the WG prefer permissive operation for very low voltages. This results in the question: what is the threshold for permissive operation (which allows momentary cessation)? NERC disagrees with allowing permissive operation for any voltages specifically for faults at the POM or outside of the IBR facility. For example, NERC PRC-024-3 (currently out for ballot) requires current injection for faults within the No Trip Zone. Link.

It was generally agreed from all WTG OEM's present that a WTG can sustain zero voltage at the terminal for 150ms. However, what would the current be as there is no voltage reference? It was noted in this context that in IEEE Std 1547™-2018 mandatory operation is considered a "controlled" current response whereas in permissive operation it could be an "uncontrolled" current.

Proposal: A definition for what current injection means, specifically if there is voltage to synchronize to, is needed. Another example was provided that for type 3 wind in crowbar mode, you will get non fundamental frequency currents at the rotational speed. This is really not beneficial to the grid, but could be deemed current injection without a definition.

A proposal to start with category three requirements from IEEE Std 1547™-2018 was made. Refer to table 13 of IEEE Std 1547™-2018 for more detail. The WG decided to let the SG discuss this in future calls and report back.

Sub Group 8 Discussion

The sections of draft 1 pertaining to SG8 were reviewed.
Ride-through performance requirements were discussed. Negative sequence current injection during voltage ride-through will be required but not specified in great detail.

Sub Group 5 Discussion

The sections of draft 1 pertaining to SG5 were reviewed.
Only guidance will be given to low short circuit power and control interaction issues in an informative annex to P2800.

Sub Group 11 Discussion

A brief presentation was made by Daniel Du representing SG 11. The general feedback from the WG was to use IEEE Std 1547™-2018 chapter 11 as a framework.

Sub Group 3 Discussion

The sections of draft 1 pertaining to SG3 were reviewed.

The following topics will be added to SG3 meeting agendas based on comments from the Working Group.

- Reconsider PFR only for Under-Frequency events, not FFR
- Clarify the FFR is a temporary response as opposed to PFR which is sustained
- Address the Type 3 WTG "payback" after under-frequency event
- Address type 3 WTG operational power limits associated with extreme frequencies
- Need to define frequency limits in the <0.1 sec region
- Review 1547 frequency ride-thru Cat III for inclusion in P2800
- Incorporate 1547 ride-thru terminology

Sub Group 10 Discussion

The sections of draft 1 pertaining to SG10 were reviewed.

The SG will rely on ongoing work in the PRSR C24 WG for the short circuit modeling data requirements.

It was commented that there needs for a clear requirement that the TEPS operator shall communicate what type of model is necessary (e.g., RMS, EMT, etc.).

There was discussion regarding the validation of models. It was concluded that the validation of the modeling data is in the scope of SG11 and not SG10.

Sub Group 6 Discussion

The sections of draft 1 pertaining to SG6 were reviewed.

It was noted that currently IEEE Std 519 is going through a revision. There is some concern about having multiple standards with different harmonic limits. David Zech presented on the ideas discussed in the last IEEE 519 meeting summarized as:

- For facilities that have harmonic loads only, apply 519 ***current*** distortion limits at the PCC.
- For facilities that have a mix of harmonic loads and IBR, apply 519 ***current*** distortion limits at the PCC.
- For facilities connected to medium voltage (distribution) with IBR only, apply 1547 ***current*** distortion limits at the POI.

- For facilities connected to high voltage and extra high voltage (transmission) with IBR only, apply ***P2800 current and/or voltage*** distortion limits at the POI.

It was noted that continuous imbalance withstand was addressed in IEEE Std 1547-2018 clause 6.4.2.2.

Clause 7.3 of draft one was discussed in detail. There were opposing views expressed as to whether the harmonic limits in P2800 should be based on current distortion, differential voltage distortion, or a combination of both current and voltage distortion. Following this discussion, a general vote was taken to provide guidance to the SG which showed a preference for differential harmonic voltage distortion limits. Link.

General Discussion

Eddy Lim voiced concerns about writing this standard based on the technical limitations of type three wind. Following this discussion, a general vote was taken which showed a large preference for setting ambitious technical minimum requirements adding exceptions for certain technologies such as type 3 wind as needed. Link.

IEEE P2800 Detailed Schedule

Refer to the following table for changes in the P2800 schedule.

(subject to change)

Deliverable	Due date for SubGroup submissions	Publication date
WG ConfCall (Informal Kick-Off)	11/5/2018	
WG Meeting (Kick-Off)	@IEEE JTCM, Orange County, CA, USA, January 2019	
Draft SubGroup Scopes		5/1/2019
WG ConfCall (Pre-WG Mtg)	5/16/2019	
WG Meeting	Atlanta, GA (NERC), May 22-23, 2019	
Draft 0 (Strawman)		5/23/2019
SubGroup Revisions to Scopes	6/30/2019	
Draft 1 – available on iMeet	8/31/2019 (extended to 9/9/2019)	9/18/2019
WG Meeting	Salt Lake City, UT (WECC), September 25-26, 2019	
~~Draft 2~~	~~11/8/2019~~	~~11/27/2019~~
~~WG Meeting~~	~~Tempe, AZ (FirstSolar), December 4-5, 2019~~	
WG ConfCall	11/21/2019 – discuss & vote on important decisions*	
WG ConfCall	12/6/2019 – discuss & vote on important decisions*	
WG ConfCall	12/17/2019 – discuss & vote on important decisions*	
~~Draft 2 (Incomplete)~~	~~12/20/2019*~~	~~1/6/2020*~~

Informal WG Meeting & Sub-WG in-person meetings	@IEEE JTCM, 2020	
WG ConfCall	1/23/2019 – discuss & vote on important decisions*	
Draft 2 (Complete)	1/30/2020*	2/15/2020*
WG Meeting	TBD, February/March/April* 2020	
WG Vote on Draft	TBD, March/April* 2020	
Initial Ballot	May 2020*	
Recirculation	October 2020*	
Submission to RevCom	February 2021*	
Publication	May 2021*	

* tentative/TBD

Patents

The chair received a disclosure of patents from Shuhui Li (University of Alabama) potentially related to topics in the scope of SubGroup V on inverter controls when approaching current limits.

The meeting adjourned at approximately 4:30 PM MT.