

**IEEE SCC21 1547 Standards Development**  
**P1547.7 Draft Guide to Conducting Distribution Impact Studies for**  
**Distributed Resource Interconnection**  
**Working Group Meeting Minutes**  
**October 6-7, 2009 – Atlanta, Georgia**

The meeting of the P1547.7 working group was called to order by Robert (Bob) Saint, chair P1547.7 (**Annex A – Attendees**). The host of the meeting, Georgia Power, welcomed the group to Atlanta and presented a safety briefing. Then, the agenda (**Annex B - Agenda**) for the two-day meeting was presented and the IEEE SA bylaws on patents in standards and other guidelines were reviewed and discussed (see [PDF 311 KB](http://grouper.ieee.org/groups/scc21/1547.7/1547.7_archives.html) at URL [http://grouper.ieee.org/groups/scc21/1547.7/1547.7\\_archives.html](http://grouper.ieee.org/groups/scc21/1547.7/1547.7_archives.html)). The status of other 1547 series working groups was discussed as well as the status of IEEE Std P2030. The group discussed that development of IEEE Std 2030 will draw from the 1547 series of standards and may require updates or new project(s) in the IEEE 1547 series of standards. It was noted that more utility participation is needed for the IEEE Std P2030 development process.

The working group then reviewed the scope and purpose of P1547.7. Secretary T. Basso focused attention on the following excerpts of the scope and purpose.

**This guide describes criteria, scope, and extent for engineering studies ...**

**Distribution system impact study scope and extent are described as:**

- **functions of identifiable characteristics of the distributed resource,**
- **functions the area electric power system, and**
- **functions the interconnection.**

**Criteria are described for determining the necessity of impact mitigation.**

**Establishment of this guide allows ... a described methodology for:**

- **when distribution system impact studies are appropriate,**
- **what data is required,**
- **how they are performed, and**
- **how the study results are evaluated.**

The intended audience and limitations clauses were then reviewed. The group discussed that the limitations clause will need to be reviewed and updated throughout the development process for the guide.

Picking up from the last meeting in San Francisco, the group continued the review of the resource document, starting with Clause 6.3. In the afternoon, the group finished reviewing the document, commenting on the document annexes. The posted P1547.7 Draft 2.1 shows the revisions made at the October meeting. **The Draft 2.1 is the document that should be used in moving forward to Draft 2.2** and beyond. Volunteer

assignments were accepted to develop text for various sections of the document (see assignments below).

On October 7, the group reviewed and commented on the document outline, focusing on the first- and second-level headings. The document outline was re-organized and remains a work in progress (**Annex C – Revised outline/Draft 2.2**). At the end of the meeting, volunteer assignments were accepted to more fully develop the revised outline and text for some of the first-level headings, via webinars/teleconferences (see assignments below).

**The following P1547.7 writing volunteer assignments were identified** (some of these remain from the prior action items considering draft 1.1 to 2.0 update). **The following clause numbers refer to P1547.7 draft 2.0** of the document, which is posted at: <http://grouper.ieee.org/groups/scc21/1547.7/private/stdrafts.html>

**P1547.7 Draft 2.0 Clause numbers follow**

*Basso, Tom*

for screen 7 ask Jim Daley for source of numbers.

*Haggenmiller, Jack*

6.6 Is Starting Voltage Drop within acceptable limits?

*Rogers, Charlie*

4.5 penetration

*Saint, Bob*

Screen 5 - reconcile 519 and 1453

7.3.1 Design Review

7.3.4 PQ study

*Salas, R.*

7.3.1 Design Review

*Sheaffer, Paul*

Annex Z (URLs)

Re-organize all text from the P1547.7 draft 2 document into the revised outline [complete by October 16]

*Siira, Mark*

6.3 (Use of certified or listed DR system)

6.4 Does DR export to Area EPS?

New section - is an impact study needed for less than 100 ms paralleling [will likely be section 6.9] – refer to section 5.1.7 for consistency

*Smith, Mark*

5.4 Screen 6 – technical justification for those values?

6.7 Is the Short-circuit Current Contribution within acceptable limits

*Stec, Wayne*

6.5 Aggregate capacity in relationship to Line section Peak Load as defined by smallest configurable system arrangement and/or nearest automatic protection device

Additional volunteer assignments were accepted to include working on various clauses of the document via webcasts/teleconferences. Clause numbers listed below now refer to the revised outline of Annex C. Note: the outline is a work in progress that was discussed at the meeting mostly only to the first level headings.

**The additional writing assignments are as follows:**

**P1547.7 Draft 2.2 Clause numbers follow**

5. Purpose of Studies

Stec - no webcast required

7. Study Types

Sheaffer, Saint, Haggemiller, Schauder, Tolentino, Omar, Hambrick, Basso

8. Data Requirements

Morton, Steurer, Farmer, Sheaffer

9. Determination of Study Depth & Breadth

Sheaffer, Morton, Omar

Tom Basso will send out emails to each team volunteering to work on a specific clause so those volunteers can submit their desired webcast/teleconference dates to Tom for scheduling.

**The inputs from the writing volunteers are due no later than December 16, 2009** so we may include them in an updated draft to post prior to the next P1547.7 meeting. If others submit inputs we'll include those. The next draft will be arranged under the revised outline headings. Send your inputs to the following:

Thomas.Basso@NREL.gov

Sheaffer@rdcnet.com

[Robert.Saint@NRECA.coop](mailto:Robert.Saint@NRECA.coop)

Please send your inputs (in a separate word file external to the posted P1547.7 draft 2.2 file). Please clearly indicate that you are submitting inputs with the draft 2.2 revised outline clause numbers shown in Annex C. We would appreciate if you can provide as

complete text and figures as possible so we may easily drop them into the next version. However, please include “considerations,” e.g., bulleted items if you don’t fully complete your inputs as detailed as you would have liked to. Contributors are responsible for providing copyright release as applicable and full citation when submitting documents, references, or Web links.

**There are a number of clauses without information or a writing volunteer** – if you would like to submit information for one of these clauses, please send a note to the listserv and submit the information per the instructions above.

**The next P1547.7 meeting is being arranged for the first week of February, 2010** in Las Vegas, Nevada – this is tentative until we contract with a hotel and send a notice out. It was requested that the P1547.7 group meet Thursday and Friday and the P1547.6 group meet Tuesday and Wednesday of February 2-5, 2010.

Respectfully submitted,

Bob Saint, P1547.7 chair, and Tom Basso, P1547.7 secretary

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**Annex A – Attendees**  
**P1547.7 Working Group Meeting, October 6-7, 2009, Atlanta, GA**

<b>Name</b>	<b>Company</b>
Jay Anderson	ComEd
Tom Basso	National Renewable Energy Laboratory
Kenneth Brunkenhoefer	OncorElectric Delivery
Jeffrey Duff	Duke Energy
Jiyuan Fan	GE Energy
David Farmer	UC Synergetic
John Gajda	Progress Energy
Omar Fasquar	Florida State University
Jack Haggemiller	Southern California Edison
Joshua Hambrick	National Renewable Energy Laboratory
Keith Harley	Georgia Power
Connie Komomua	National Renewable Energy Laboratory
BeeZin Morton	Pepco Holdings
Dan Mungoven	National Grid
Arun Narang	Hydro One Networks
Bob Saint	National Rural Electric Cooperative
Colin Schauder	Satcon Technology Corp.
Paul Sheaffer	Resource Dynamics Corporation
Mark Siira	Kohler Corporation
Mark Smith	American Electric Power
Wayne Stec	Distregen, LLC
Michael Steurer	Florida State University
Brandon Tolentino	Southern California Edison
Sylvester Toe	Georgia Power
Todd Wall	Southern Co.

**Annex B – Agenda**  
**P1547.7 Working Group Meeting, October 6-7, 2009, Atlanta, GA**

**Tuesday, October 6, 2009 (8 AM – 5 PM)**

8:00 AM	8:30 AM	Check-in and registration
8:30 AM	8:45 AM	Opening of meeting
		<ul style="list-style-type: none"><li>• Welcoming of attendees</li><li>• Housekeeping issues</li><li>• Review of IEEE required pre-meeting statements</li></ul>
8:45 PM	9:00 AM	Review of agenda, changes if needed, and motion to approve Review and approve last meeting minutes
9:00 AM	10:00 AM	Review draft IEEE P1547.7 – Clause 6-7
10:00 AM	10:20 AM	Break - refreshments
10:20 AM	12:00 Noon	Continue reviewing draft of IEEE P1547.7 – Clause 6-7
12:00 Noon	1:15 PM	Lunch on your own
1:15 PM	3:00 PM	Continue reviewing draft of IEEE P1547.7 – Clause 8 and brief overview of annexes
3:00 PM	3:15 PM	Refreshments
3:15 PM	5:00 PM	Review of document structure

**Wednesday, October 7, 2009 (8 AM – 3:30 PM)**

8:00 AM	8:30 AM	Check-in and registration
8:30 AM	9:45 AM	Continue review of document structure
9:45 AM	10:00 AM	Break - refreshments
10:00 AM	12:00 Noon	Gap analysis – review of incomplete sections and assignments
12:00 Noon	1:15 PM	Lunch on your own
1:15 PM	3:00 PM	Gap analysis – review of incomplete sections and assignments
3:00 PM	3:30 PM	Summary of meeting and volunteer assignments; adjournment

**Annex C – P1547.7 Document Revised Outline**  
**P1547.7 Working Group Meeting, October 6-7, 2009, Atlanta, GA**

*Italics = section from draft 2.1 to be moved – NOTE: all moved material needs to be revised by writing volunteers to address the outline, e.g., redundant material; move details to document annexes and revise; etc.*

1. Overview
  - 1.1 Scope
  - 1.2 Purpose
  - 1.3 Intended Audience
  - 1.4 Limitations
  - 1.5 Document Structure
  
2. References
  
3. Definitions, acronyms and abbreviations
  - 3.1 Definitions
  - 3.2 Acronyms and abbreviations
  
4. General Considerations (revisit to add more description)
  - 4.1 Potential System Impacts of DR
    - 4.1.1 General System Impacts
    - 4.1.2 Penetration Concerns
      - 4.5 Penetration Concerns
  - 4.2 Classes of impact studies
  - 4.3 Classes of tools for studying impacts
  - 4.4 Reliability Perspectives Related to EPS and DR
    - 4.4.1 DR Impacts on Reliability
  - 4.5 DR owner perspective
  
5. Purpose of Studies (Why, What are we looking for)
  - Discuss purpose of operation, program (regulatory), tariff (gather the parameters that constrain/define the ...)
  - Identify impacts of operation in parallel
  - Introduce study levels
  - Different operating characteristics of the DR
  - Different characteristics of the area EPS
  - Different characteristics of the interconnection system
  
6. Assessment Methodology (Description of assessment Strategy)
  - 6.1 Assessment Sequence
    5. Assessment Sequence
  - 6.1.1 Assessment Information
    - 5.1 Assessment Information (needed for DR and the area EPS interconnection evaluation)

- 6.1.2 Screens
  - 5.3 Screens Conduct an interconnection feasibility evaluation (screens; is an impact study necessary?).
- 6.1.3 Supplemental Review
  - 5.4 Supplemental Review
    - 5.4.1 Discuss by prime energy source, DR technology and interconnection type (inverter/induction/synchronous)
- 6.1.4 Detailed impact study
  - 5.5 Detailed impact study
- 7. Study Types (all below needs to be consolidated)
  - 5? Directory of Impact Studies
  - 5.2 Provide a “directory” of what studies may need to be done, based on a variety of considerations (DR type, EPS system configuration, etc)
  - 5.5 Detailed Impact Study
    - 7.2.2 Modeling the DR installation
  - 7.3 Types of Studies
  - 7.4 Analysis methods
  - 7.5 Sample Outlines of Detailed Impact Studies (Annex Material?)
- 8. Data Requirements
  - 5.1 Application Information Required to Facilitate Studies
  - 6.4 Does DR Export to Area EPS
  - 6.5 Aggregate capacity in Relationship to Line Section Arrangement
  - 7.1 EPS Internal Data Requirements for Impact Studies
  - 7.2 System Modeling
  - Basic Information Screening Studies
  - By Study Type
  - Modeling Considerations
    - 5.1.1 General Interconnection Applicant Information – [remove “business”-type information]
    - 5.1.2 Generator Qualifications
    - 5.1.3 Generator Technical Information
    - 5.1.4 Interconnecting Equipment Technical Data Information
    - 5.1.5 General Information
    - 5.1.6 Interconnection Area EPS Operator Information
    - 5.1.7 Intended operational use of DR [Zen Morton and James Cleary]
- 9. Determination of Study Depth & Breadth
  - 5.2 Provide a Directory of what studies may need to be done
  - 5.3 Screens
  - 5.4 Supplemental Review
  - 5.5 Detailed Impact Study
  - 6.1 Technical Basis for Screens in California Rule 21

- 6.1.1 Is the aggregate capacity less than a pre-determined value (California uses 11 kVA gross name plate)
  - 6.2 Screens in Other Regions
  - 6.3 Use of certified or listed DR system
  - 6.4 Does DR export to Area EPS?
  - 6.5 Aggregate capacity in relationship to Line section Peak Load as defined by smallest configurable system arrangement and/or nearest automatic protection device (Michigan and California use 15%)
    - 6.5.1 Ability to create an undetected and unintended island
    - 6.5.2 Propensity to cause the area EPS to operate in excess of its ratings under normal conditions.
  - 6.6 Is Starting Voltage Drop within acceptable limits?
    - 6.6.1 Propensity to adversely affect power quality on the area EPS
  - 6.7 Is the Short-circuit Current Contribution within acceptable limits (Michigan uses 25% or less of utility contribution)?
    - 6.7.1 Propensity to adversely affect protection on the area EPS
    - 6.7.2 Propensity to cause the area EPS to operate in excess of its ratings under fault conditions.
  - 6.8 Is the interconnection compatible with the EPS configuration
    - 6.8.1 Unfaulted phase voltages are limited to acceptable levels
  - 7.5 Sample outlines of detailed impact studies (Annex material?)
    - 7.5.1 Outline of a system protection study
    - 7.5.2 Outline of a steady-state performance study
    - 7.5.3 Outline of a power quality study
    - 7.5.4 Outline of a system stability study
- Determination of More Detailed Study Needs  
Study Iteration

10. Using the results of impact studies

- 8 Using the results of impact studies
  - 8.1.1 Mitigation of system protection concerns
  - 8.1.2 Mitigation of steady-state performance concerns
  - 8.1.3 Mitigation of power quality concerns
  - 8.1.4 Mitigation of system stability concerns

Annexes – to be determined, e.g., Bibliography, etc.