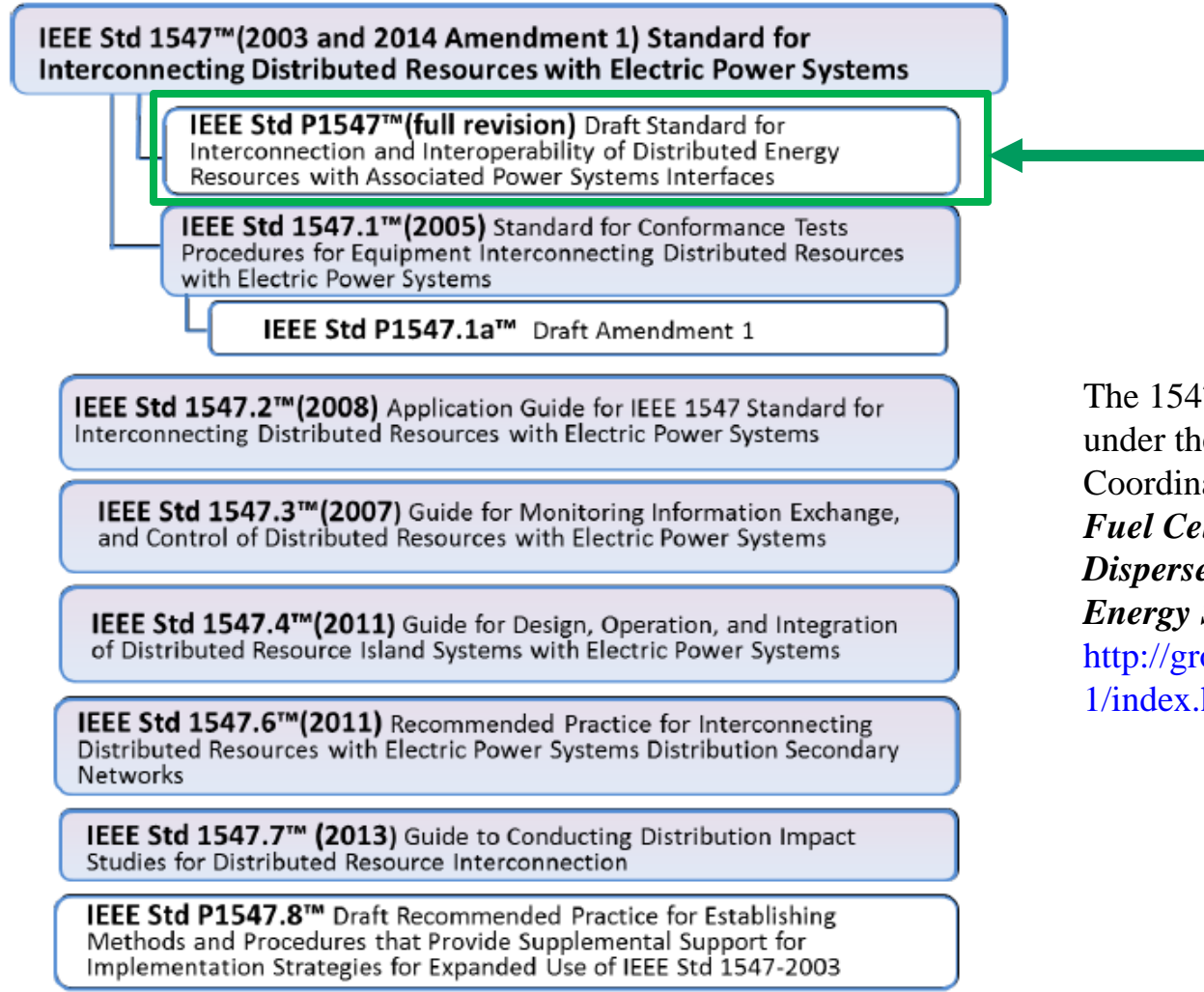




IEEE 1547 Update Presentation

March 7, 2017

IEEE1547 “Family”



The 1547 series are developed under the by IEEE Standards Coordinating Committee 21 on *Fuel Cells, Photovoltaics, Dispersed Generation, and Energy Storage (SCC21)* (see <http://grouper.ieee.org/groups/scc21/index.html>)

Items to Examine in Full Revision

Full revision to IEEE1547 was chartered at SCC21 meeting in Dec 2013.

- IEEE 1547 addresses interconnection of DR ≤ 10 MVA at the PCC. - Should transmission voltages be in IEEE 1547 (what values)? - Should DR MVA be increased (what value)?
- What changes are needed to allow for high penetration of distributed resources?
- Do we need to expand and include more requirements for islanding (microgrids, etc.) in IEEE 1547?
- What recommendations from P1547.8 do we revise into IEEE 1547?
- Should we expand IEEE 1547 to include IEEE 2030 interoperability, interfaces, communication, cyber, information management, etc., requirements and protocols?
- Would it be more efficient to include the 1547.1 testing procedures (revised) all in one 1547 full revision document?

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IEEE1547 Timeline Draft

Dates, 2017	IEEE 1547 Revision Working Group (WG), Major Tasks and Milestones
Feb 17	Draft 6.1 (D6.1) Completed and posted to P1547 iMeet (limited to WG Members)
Feb 17-27	WG Members review D6.1
Feb 23	Start internal WG Member balloting on D6.1
Feb 28 - Mar1	WG meeting (NERC, Atlanta, GA) - show ballot draft, final WG discussions MILESTONE – WG votes to send to IEEE (3/1/2017) Draft approved with >80% yes vote
March	IEEE-SA start pre-ballot editorial review (To MCE REVIEW), in parallel, IEEE-SA opens invite to join the P1547 ballot pool
March – April	IEEE-SA continues editorial review, Officers refine and complete the document. WG and SA complete ballot pool & get it approved by SA MILESTONE – Ballot pool approval by IEEE-SA, by end of April MILESTONE - MCE Approval that doc is good to go to ballot, by end of April
May – June (cycle 1 – 60 days)	Balloting (assume ballots go out 5/1, assume concurrent with commenting) MILESTONE – IEEE Open Ballot for Revised IEEE 1547 (5/1/2017) Balloters have 30 days for comments Assume 30 days for WG to resolve comments
June WG Meeting	1547 report out only on balloting status (P1547.1 is focus)
July – Aug (if needed, balloting cycle 2 – 60 days)	If needed, balloting cycle 2, balloters submit comments, comment resolution & response
Sep – Oct	When approved, SA and WG prepares doc for final publication (2 month process) MILESTONE – Draft to SA for final publication, Oct
Nov-Dec, 2017	MILESTONE: Revised 1547 Publication, before end of 2017

Key ERCOT Issues related to significant penetration of DERs

- Intermittent generation at the distribution level can have multiple adverse impacts

- Lack of Visibility
- Power Flow and State Estimation errors
- Short-Term and Mid-Term Load forecast errors
- Long Term Load Forecast errors
- Reactive Power and System Response
- Complicates System Restoration and Coordination

- Loss of generation outages at the grid level can result in loss of significant amount of DG due to voltage/frequency issues under current guidelines.

- Less than 59.3 Hz results in trip
- Less than 70% voltage results in trip.

“General Definitions” Updates to IEEE1547

- Standard went from 16 pages to 113 pages.
 - DER/DG Size limit (10 MW) removed
 - Doesn't impact Texas—previously defined by PUCT.
 - DER defined as sources of electric power
 - Does not include demand response
 - Different Settings/classifications based on equipment performance and application
 - Class I - Synchronous machines
 - Class II- Inverters
 - Class III- Inverters in High penetration areas
 - Considers Different Interconnections for DERs
 - Stand alone
 - Part of a local EPS (see next page)

Different DER Interconnections

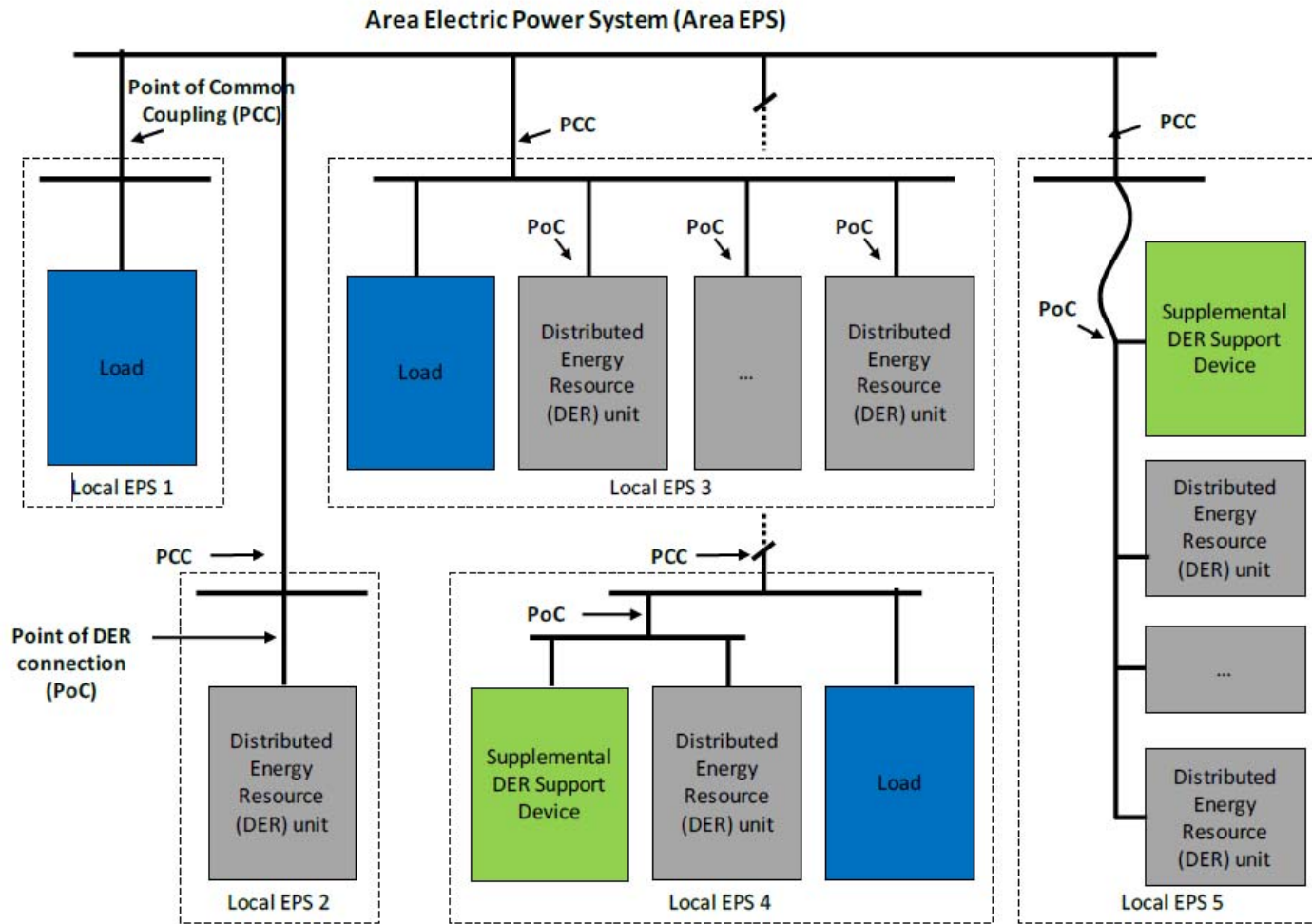


Figure 1—Relationship of interconnection terms

“Stability” Updates to IEEE1547

- BES stability features (New “Smart Inverter” functions)
 - Voltage Regulation/Reactive power capability
 - absorb or inject VARs
 - Volt/VAR function
 - power factor modes
 - Voltage Regulation/Active power control
 - Volt/watt function
 - Wider operating voltage/freq. window
 - Mandates Voltage/frequency ride through functions
- Other stability features
 - Soft start reconnect
 - ramping function
 - random times

“Other” Updates to IEEE1547

➤ Special Interconnections

- Distribution Secondary Networks – (Downtown areas)
 - Area Networks now defined similar to Spot Networks
- Energy Storage
- Microgrids/Islanding
 - How DERs connect to a microgrid

➤ Interoperability

- Bidirectional Communications “capable”
- Protocols defined
- Cyber security to be considered



Questions?