CIGRE Study Committee C6

PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP (1)

JWG* N° B5/C6.26/CIRED	**Name of Convenor :** Paul Myrda (US) **E-mail address**: PMyrda@EPRI.com
Technical Issues # (2): 1, 6	**Strategic Directions # (3): 1, 2**
The WG applies to distribution networks (4): Yes	
Title of the Group: Protection of Distribution System with Distributed Energy Resources	

Scope, deliverables and proposed time schedule of the Group :

Background:

Already increasing penetration of distributed energy resources (DER) in utilities around the world is expected to increase further with the realization of the smart grid. The distribution systems are generally designed for unidirectional power flow and feeders are tagged-out for any fault within. However, this practice may lead to loss of significant generation in future where each feeder may have significant DER penetration. Also, utilities have started realizing that islanding operation of distribution systems with DER can improve the reliability of power supply. However, the difference between short circuit levels when the distribution system is connected to the grid and while it is islanded, can be huge. This may result in malfunction of over current protection or other protection schemes. In addition, the plug and play DER will continuously change the short circuit level and may again impact the protection schemes. Furthermore, the short circuit power contribution varies with DER technology. Wind turbines contribute less current when their internal protection (crowbar protection) is activated and power electronic interfaced DER do not contribute as much fault current as conventional synchronous generation.
The WG will use TB421 “The impact of Renewable Energy Sources and Distributed Generation on Substation Protection and Automation”, establishe by WG B5.34 as entry document and coordinate with ongoing B5.43 “Coordination of protection and control of future networks”.

Scope: The scope of this WG is to study the impact of DER on distribution system protection taking in account DER characteristics and possibility of islanding operation and provide the guidelines to protect distribution systems with DER. The following topics will be elaborated within the WG.

The review and the recommendations are to be applied to the different types of existing Medium- and Low Voltage Distribution systems.

1. Brief review on current practice for distribution system protection
2. List of the protection relevant characteristics of DER (short-circuit current contribution, fault-ride-through capability, reactive power absorption during and after fault)
3. Review on impact of DER on distribution system protection, specific aspects of inverter-coupled DER units
4. Review on protection of distribution system during islanded condition

5. Recommendation on protection of for distribution system with DER 6. Recommendation on protection of for islanded distribution systems **Deliverables :** Technical brochure with summary in Electra, tutorial material **Time Schedule** : start : August 2012 **Final report** : August 2014
Comments from Chairmen of SCs concerned : The subject is specifically under the scope of SC B5. The scope of the JWG should mainly focus on the protection of distribution networks downstream of the substation
Approval by CIGRE Technical Committee Chairman : Klaus Fröhlich **Date** :20/07/2012
Approval by CIRED Technical Committee Chairman : **Date** :

(1) Joint Working Group (JWG) - (2) See attached table 1 – (3) See attached table 2
(4) Delete as appropriate

Table 1: Technical Issues of the TC project "Network of the Future" (cf. Electra 256 June 2011)

1	Active Distribution Networks resulting in bidirectional flows within distribution level and to the upstream network.
2	The application of advanced metering and resulting massive need for exchange of information.
3	The growth in the application of HVDC and power electronics at all voltage levels and its impact on power quality, system control, and system security, and standardisation.
4	The need for the development and massive installation of energy storage systems, and the impact this can have on the power system development and operation.
5	New concepts for system operation and control to take account of active customer interactions and different generation types.
6	New concepts for protection to respond to the developing grid and different characteristics of generation.
7	New concepts in planning to take into account increasing environmental constraints, and new technology solutions for active and reactive power flow control.
8	New tools for system technical performance assessment, because of new Customer, Generator and Network characteristics.
9	Increase of right of way capacity and use of overhead, underground and subsea infrastructure, and its consequence on the technical performance and reliability of the network.
10	An increasing need for keeping Stakeholders aware of the technical and commercial consequences and keeping them engaged during the development of the network of the future.

Table 2: Strategic directions of the TC (cf. Electra 249 April 2010)

1	The electrical power system of the future
2	Making the best use of the existing system
3	Focus on the environment and sustainability
4	Preparation of material readable for non technical audience