CIGRE Study Committee C4

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

JWG* N° C4.42/CIRED	**Name of Convenor:** Igor Papič (Slovenia) **E-mail address**: igor.papic@fe.uni-lj.si
Technical Issues # (2): 8	**Strategic Directions # (3): 2**
The WG applies to distribution networks (4): Yes	
Title of the Group: Continuous assessment of low-order harmonic emissions from customer installations	

Scope, deliverables and proposed time schedule of the Group :

Background :

Harmonic voltage distortion remains an important issue in power networks and utilities are fully aware of the impact this creates on power quality. With the increasing number of power electronic loads, harmonic interactions and inverter based generation, e.g. PV and wind, the issue is likely to become more exacerbated in the future. A proper determination and quantification policy for low-order harmonic emission levels could help restrain harmonic voltage distortion in power networks. For example, an incentive based policy could compel the customers to keep the harmonic emission levels inside required limits, but the assessment of the harmonic emissions remains a challenge. Basic guidelines on the assessment of the harmonic emission levels are provided within the IEC TR 61000-3-6. However, the detailed methods to determine the harmonic emission levels remain complex and highly difficult to be used in practice. The assessment should preferably run continuously with the statistical evaluation of results and not as a single-shot (at certain time instant) or two-step (before and after the connection of installation) procedure. In recent years many techniques were proposed to determine the harmonic emission levels but for various reasons none of them is widely used in practice, i.e. these methods require the knowledge of the actual network data in terms of system impedance. The aim of the work is to review the current industry practice and the new technologies and approaches available in this field and to propose practical guidelines for online monitoring and continuous assessment of low-order harmonic emissions from disturbing customer installations.

Scope:

1. Review of harmonic emission assessment methods with present background distortion based on the IEC approach (basic definition of emission)

2. Evaluation of methods for system harmonic impedance determination (invasive and non-invasive methods, reference impedance) with non-invasive methods being based on natural fluctuation of loads (regression methods)

3. Consideration of technical limitations related to harmonics measurements (CTs and VTs) and sensitivity analysis (measurement errors, system impedance estimation error)

4. Consideration of statistical assessment of results, i.e. 95% value in 1 week, aggregation of results (intervals 200 ms, 3 s, 10 min, …)

5. Recommendation and specification of a clearly defined methodology with clear instructions for practical implementation

Deliverables : Report to be published in Electra or technical brochure with summary in Electra **Time Schedule** : start : May 2015 **Final report** : December 2018
Comments from Chairmen of SCs concerned :
Approval by CIGRE Technical Committee Chairman : **Date** : 10/02/2015
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