CIGRE Study Committee C4

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

WG N° C4.45	**Name of Convenor :** Dr Shijun Xie (CN) **E-mail address**: sj-xie@163.com
Technical Issues # (2): 3,6,8	**Strategic Directions # (3): 2**
The WG applies to distribution networks (4): Yes	
Title of the Group: Measuring techniques and characteristics of fast and very fast transient overvoltages in substations and converter stations	

Scope, deliverables and proposed time schedule of the Group :

Background :

Recorded electromagnetic transient voltage waveforms appearing on power network plant in substations and converter stations are valuable resources in developing acceptable high-voltage dielectric test methods, economic insulation design schemes, and so on. However, recent years have seen integration of new power equipment and application of new transmission technologies. Hence, fast and very fast transient switching and lightning overvoltage waveforms observed at substations and converter stations are much different from the standard switching and lightning waveforms specified in the existing high-voltage test standards in most cases. Furthermore, there is very little or no information at all on the characteristics of fast and very fast transient overvoltages.

Fast and very fast transient overvoltage waveforms in raw form, prior to grid faults include crucial information and are the key to revealing the causes, and avoiding the same types of faults from happening repeatedly. Unfortunately, performance of the existing voltage recording devices in substations or converter stations are in the majority of cases not able to satisfy the requirements for recording fast and very fast transient overvoltages accurately.

Scope :

It is proposed to establish a working group to produce guidelines on functional specifications, performance requirements and tests of measuring devices for fast and very fast transient overvoltages encountered in substations and converter stations. The main tasks of this WG are as follows:

1. Review measuring techniques for fast and very fast transient overvoltages around the world, and present the technical features and applicability of the state of the art of measuring techniques.
2. Carry out research on novel measuring techniques for fast and very fast transient overvoltages so that functional specification for such measurements can be drawn up.
3. Specify performance requirements for applicable measuring devices along with necessary test methods such that measurements from different devices are comparable. Proposals on the tests will extend to response speed, bandwidth and accuracy of the measuring devices.
4. Monitor the lightning overvoltages appearing on power equipment in substations and converter stations and collect the lightning overvoltage waveforms.
5. Measure the fast and very fast transient switching overvoltages in substations with voltage classes from 110 kV to 1000 kV and in converter stations with voltage classes of ±500 kV and ±800 kV.

Deliverables: A Technical Brochure with a summary in Electra and a tutorial.

Time Schedule: Start March 2017 **Final report** : March 2021

Approval by Technical Committee Chairman :
Date : 06/02/2017

(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