CIGRE Study Committee D2

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

JWG* N° D2/B2.39	**Name of Convenor :** Carlos Di Palma (AR) **E-mail address**: cdipalma@tranelsa.com
Technical Issues # (2): 9	**Strategic Directions # (3): 2**
The WG applies to distribution networks (4): No	
Title of the Group: Design, deployment and maintenance of Optical Cables associated to Overhead HV Transmission Lines	

Scope, deliverables and proposed time schedule of the Group :

Background :

Optical cables running along power transmission lines constitute the main vehicle for exchanging operational information required for the reliable operation of the HV Power Systems. Their reliability and communication performance is therefore of great importance to the Electrical Power Utility, conditioning the proper operation of such applications as power system protection, SCADA, site surveillance, remote monitoring and access to substation assets as well as corporate enterprise networking applications.

The installation of HV transmission systems incorporating optical fibres (OPGW) requires precautions which are somehow different from those for conventional ground wires with no fibre. Neglecting these precautions may cause irreversible damage to the fibre either in terms of immediate propagation performance or in terms of expected life-time and reliability. Some recurrent situations encountered in this respect are as follows:

- Partitioning of roles and responsibilities between HV transmission line and communication activities in the Utility organization, or in project delivery scope (contractors, priorities, specifications, tests and controls) leaves some cable issues untreated and anomalies undetected till too late in the process
- Lack of expert knowledge in optical cable design, engineering, installation and control often results in inadequate choices based on cost and convenience rather than on requirements. Similarly, the frequent lack of skilled and qualified maintenance technicians equipped with high precision and often costly tools and measuring instruments result in poor installation quality and inadequate commissioning after cable installation. Moreover, previously encountered cable problems may be masked by the usage of multiple and cascaded sub-contracting teams.

Scope :

This Working group aims to produce practical guidelines through the experiences of different power utilities in the deployment of HV line Optical cables and their life-cycle management aspects. It shall cover the complete process including cable design and assessment, cable engineering, cable pulling and installation, cable commissioning, cable asset condition monitoring and cable maintenance.

Some major issues to be treated by the working group are as follows:

- Optical cable design assessment – geometry, materials and parameters
- Cable system design and mounting accessories
    - Electrical and mechanical behaviour of cable systems and impact on embedded fibres
    - External factors (wind, ice load, temperature variation, lightning discharge, …)

- Implicit factors - short circuit current in the cable and impact on fibres, grounding of towers
- Macro- and micro-bendings
- Splicing boxes, junction boxes, and cable section termination accessories

- Type testing and factory acceptance testing for cables and accessories,
- Cable system installation process from contracting to site acceptance tests
  - Factors impacting a cable project
  - Skills assessment and certification process
  - Cable system documentation, procedures and methods
  - Fibre splicing techniques and prevention of anomalies
  - Testing and measurements along the deployment process
- Cable monitoring and maintenance
  - Remote condition monitoring of fibres, failure detection and cable fault localization
  - Preventive and proactive maintenance – reducing repair costs and unplanned outages
  - Cable disaster recovery – service restoration and temporary deployment
- Cable life-cycle – ageing processes, assuring correct behaviour over long periods of time
- Return of Experience and Best Practices from public and private works

Deliverables : Technical brochure with summary in Electra

Time Schedule : start : December 2014 **Final report** : December 2016

Comments from Chairmen of SCs concerned :

Approval by Technical Committee Chairman :

Date : 22/01/2015

(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