CIGRE Study Committee C2

PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP[1]

WG N° C2.40	**Name of Convenor:** Michael Power (Ireland) **E-mail address**: michael.power@ucd.ie
Strategic Directions #[2]: 1	**Technical Issues #[3]: 1, 3, 5**
The WG applies to distribution networks[4]: Yes	
Potential Benefit of WG work #[6]: 2, 4	
Title of the Group: TSO-DSO Co-Operation – Control Centre Tools Requirements	

Scope, deliverables and proposed time schedule of the Group:

Background:

The paradigm shift in the configuration of the power system with a high penetration of distributed renewable generation connected at the distribution system operator (DSO) level creates a new dimension in TSO-DSO coordination practices and procedures. Solar and wind energy production fluctuates due to its direct dependency on weather conditions. Furthermore, the steady increase of renewable energy (RE) together with the shift away from fossil fuels has led to the withdrawal of conventional synchronous power plants from operation. Hence, the onus is now on RE to provide the system services no longer provided by conventional plants. This creates a need for a new level of interaction and coordination between transmission system operators (TSOs), DSOs and dispersed energy resources and aggregators (DER/aggregators).

Since in most countries the TSO is solely responsible for global demand-generation balance through the procurement of balancing services and activation of balancing energy bids, frequency control and balancing requires co-operation between all parties involved i.e. TSOs, DSOs and DER/Aggregators. This is because large numbers of generators together with storage systems and demand side management (DSM) units are connected to the distribution system. Reactive power management and voltage control also requires a coordinated approach throughout the whole system to avoid voltage violations, and potentially, voltage collapse scenarios.

The role of this new CIGRE WG is to specify a set of control centre tools and related IT platforms for both the TSO and DSO to manage and operate this newly evolved power system. The critical aspect that must be addressed is that the tools must enable a very high level of co-operation between the TSO and DSO so that they can efficiently address system issues at the different levels. Ideally, the same tools would be used in both control centres or, at the very least, the tools should be interoperable. The interoperability between the tools should be developed taking into account different time-horizons (at least real-time and short-term operational planning) and different services.

Scope:

The purpose of this WG is to produce a document detailing the tools required to jointly operate the newly evolved power system including operational planning aspects for a defined market model. To facilitate the work of this group it may be necessary to define a generic market model under which TSO, DSO and DER/Aggregators will operate.

The WG will:

1. Review how the TSO (including independent system operators and regional transmission organisations) and DSO operators coordinate their existing operational procedures. The working group must know how operators coordinate their work before tools can be designed to facilitate this coordination. Existing TSO-DSO agreements related to ancillary services, observability and controllability, DER dispatch/control and the management of emergencies are of particular interest.
2. Review work completed in the area of TSO-DSO co-operation and system operation challenges currently being faced by TSOs and DSOs.
3. Define the existing and future operational challenges for TSOs and DSOs and outline how these requirements will be satisfied. Among the challenges that will be considered are: congestion management (which includes power flow control), ancillary services (which includes services for frequency and reactive power control) and the impact of physical restrictions on generators such as high speed cutout, ice dropout, noise limitations and bird protection.
4. Review data and information exchange between TSOs and DSOs and also with other market players such as DER/Aggregators. For TSOs and DSOs planning to work together this review should examine the data requirements of TSO and DSO control centres, their existing database structures and what might be done to improve interoperability in the future and the impact of different CIM standards (IEC 61970, 61968). Resulting from this, a standard gap analysis could be submitted to standard development organizations such as the IEEE and IEC.
5. List the types of tools required (including existing, those that can be modified and new) in both the TSO and DSO control centres to meet the challenges resulting from steps 1, 2, 3 and 4 above. Depending on the outcome of this step, the working group may only focus on a selected set of common tools.
6. Define outline requirements for each tool selected in step 5 from both a TSO and DSO control centre perspective. Where possible, also consider DER/Aggregators' requirements. Review each tool's requirements and see if they can be merged into a common set of tool requirements which will be used by both control centres and possibly the DER/Aggregators.
7. Define a road map for the integration of these tools into system operation.

Deliverables:

☒ Technical Brochure and Executive summary in Electra

☒ Electra report

☒ Tutorial[5]

Time Schedule: start: October 2018 **Final Report**: October 2020

Approval by Technical Committee Chairman: M. Wald

Date: 01/06/2018

Notes: [1] or Joint Working Group (JWG), [2] See attached Table 2, [3]See attached Table 1, [4] Delete as appropriate, [5] Presentation of the work done by the WG, [6] See attached table 3

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
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 (ref. 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

Table 3: Potential benefit of work

1	Commercial, business or economic benefit for industry or the community can be identified as a direct result of this work
2	Existing or future high interest in the work from a wide range of stakeholders
3	Work is likely to contribute to new or revised industry standards or with other long term interest for the Electric Power Industry
4	State-of-the-art or innovative solutions or new technical direction
5	Guide or survey related to existing techniques. Or an update on past work or previous Technical Brochures
6	Work likely to have a safety or environmental benefit