



PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP¹

WG N°D2.42	Name of Convenor : Roel de Vries (Netherlands) E-mail address : roel.devries@arbitersystems.eu	
Strategic Directions #² : 1 and 2		Technical Issues #³ : 1
The WG applies to distribution networks⁴ : Yes		
Potential Benefit of WG work #⁶ : 2,3 and 4		
Title of the Group : Synchronization and time distribution in communication networks for time-sensitive distributed operational applications in the power grid		

Scope, deliverables and proposed time schedule of the Group:

Background:

Modern automation applications in the power System require accurate time coherence between the constituents of the System which are increasingly distributed across the grid and still need to operate synchronously as if they were concentrated at one point. The communication network is on the other hand increasingly migrating towards packets switched and store-and-forward operation, introducing uncertainty into the behavior of the data exchange. Achieving an adequate distribution of time information across the communication network without introducing an inappropriate absolute delay remains a major task in the design of telecommunication networks for operational usage.

This working group aims to assess time distribution and frequency synchronization requirements and solutions for synchronizing power System automation applications.

Scope :

The scope of the working group shall include but is not limited to the following:

1. Required timing accuracies and reliability levels in advanced protection & control schemes
2. Different standards and current approaches to synchronization and time distribution in circuit- and packet-based communications: Physical layer synchronization, Synchronous Ethernet, etc.
3. Principles for reliable time synchronization and distribution, multiple clock sources and redundancy mechanisms
4. Comparison of network-based master-slave clock distribution and local synchronization (e.g. GPS)
5. Delay measurement using echo principles for time setting in device or for adjusting time distribution in the network, IEEE 1588v2
6. Impact of protocol, of anomalies, of data loss, and of traffic queuing, on timing precision and different mitigation techniques

Deliverables:

- Technical Brochure and Executive summary in Electra
- Electra report
- Tutorial⁵

Time Schedule: start: September 2017

Final Report: December 2019

Approval by Technical Committee Chairman:

Date: 02/08/2017



Notes: ¹ or Joint Working Group (JWG), ² See attached Table 2, ³See attached Table 1,
⁴Delete 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