RFP for PDC-WAMS project

RFP requirements

National Control Center

Summary	This document contains an introduction to the RFP requirements for a PDC-WAMS solution.	
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1. Project Introduction

1.1 General description of the project

The National Control Center department of ELIA Transmission Belgium is looking to deploy a PDC-WAMS system (Phasor Data Concentrator – Wide Area Monitoring System) - which has a successful proven track record- to collect, store, post process analyze and visualize data coming from PMU's installed in the ELIA grid in real time and on historical data.

The solution shall support power system experts during investigation of the normal behavior of the Belgian grid and post incident (or almost incident) analysis. Power system experts must be able to use the tool that is being procured to perform analysis for phenomena (e.g. interactions, oscillations, ...) happening at a broad range of frequencies from (very) low frequencies up to just below 50Hz (sub synchronous range), in real-time and post-process. Additionally, power systems experts would have to investigate even higher frequency ranges up some kHz (super-synchronous range) using data coming from the waveform recorders installed on the Elia grid.

Therefore, the offered solution shall include features like oscillation detection, oscillation source location, damping estimation and monitoring plus other analysis functionalities that would allow the experts to ease the detection of interaction between electrical assets and clients (e.g. wind parks, HVDC systems, synchronous generators, large loads, ...).

Next to support power system experts, the solution must also support real-time operators by offering detailed insights on the actual behavior of the grid. This must allow detection and the resolution of potential issues on the grid in an early stage. The solution being procured will have to offer communication (via standard protocol) with the existing ELIA SCADA/EMS system to exchange selected data, analysis results and alarms to the operators.

The tender will have one lot, including:

- PDC-WAMS tool selection: product and licenses
  - In the tender it will be requested that ELIA will be the owner of the licenses
- Technical implementation within ELIA Transmission Belgium
- Key User Training
- Maintenance, Support and SLA contract

1.2 Who will use the application?

Elia will follow the following implementation strategy:

1) During the first part the project, the PDC-WAMS application will be used in operational environment by "power system experts".
2) During the second part of the project, when power system experts are (based on the output of the PDC-WAMS solution) able to define correct operational guidelines to operate the grid, the solution will also be implemented 24/7 to support real-time operators.

The solution has to support performant real-time monitoring and historical data consultation. Multiple users must be able to use the solution simultaneously.

2. Requirements

2.1 General Requirements

Elia expects the offered solution:

- Is integrable, operable, maintainable in a secure Elia environment
    - The solution will possible be installed in an orange or red network zone with Elia Transmission Belgium. This will be cleared out during project phase. The Tenderer will take this information into account with its tender.
- Is cyber secure
- Real-time treatment of data
- 24/7 High available and redundant solution
- Is future proof, investment in the future evolution of the product is guaranteed
- Modern state of the art user-friendly experience, fast responding

2.2 Volume Requirements

The solution will be scalable.

The Tenderer will explain how the solution can grow from the volume requirements as defined in the “pricing grid” to the maximum volume requirements as defined in the business requirements while respecting the good performance of the application.

2.3 Data acquisition and forwarding

The solution must able for forward the PMU data

- to the EAS system (European Awareness System) in the format as defined by ENTSO-E
- To one or multiple other TSO’s in a standard protocol commonly used to share PMU data among ENTSO-E TSO’s

2.4 Functional Requirements

In this chapter are introduced the definition of some terms related to the functional requirements used in the response template.

Realtime Power Oscillation Monitoring and Detection system is an algorithm or a process to determine if a power oscillation is taking place. This functionality is able to estimate online (in realtime) and on historical data the following parameters of the main oscillation modes:

- Oscillation amplitudes
- Oscillation frequencies
- Damping coefficient
- Modes energies
- Participation factors and mode shapes

The Power Oscillation Monitoring and detection system shall use any inputs (e.g. voltage, frequency) or combination of the latter (e.g. sum of active power from different PMUs or synchrophasors).

The power oscillation shall be able to determine the oscillation modes for a broad range of frequency, at least [~0Hz – 25Hz], from lowest electromechanical frequencies (i.e. ~0Hz) to sub-synchronous frequencies (i.e. 25Hz) considering the maximum refresh rate of the synchrophasor measurements (i.e. 50fps) rate and the relative Nyquist frequency. Larger frequency range is considered a plus.

Realtime Power oscillation locator is an algorithm or a process that is able to determine in real time and on historical data the source(s) (i.e. the physical devices that cause the oscillation) of a power system oscillation based on the modes detected by the real time power oscillation monitoring and detection system.
The real time power oscillation locator uses as input, for each detected oscillation mode, a list of synchrophasors or composed inputs (e.g. sum of active flow phasor from different PMUs).
It gives as output a representation and ranking of the sources/sinks of the oscillation. It is able to represent the direction of the oscillation (using for example dissipation energy flow method) and suggests the user which of the inputs are sources and sinks of an oscillation mode.

Ring-down event is an oscillation that results from a large disturbance in the power system.

Background oscillation and forced oscillations event is a power system oscillation happening during a steady-state condition where the primary excitation of the oscillation is the natural evolution of the power systems dynamics (e.g. variation of loads, generation…).

The power oscillation monitoring and detection system and the power oscillation locator shall be able to detect ring-down events, background oscillations and forced oscillations events.
Rate of change of frequency (**RoCoF**) is the time derivative of the power system frequency (df/dt): it is an important quantity that qualifies as the robustness of an electrical grid.

2.5 Key Functional Requirements

Elia emphasizes the key functional requirements Elia is looking for are:

- Realtime Power Oscillation Monitoring and Detection system
- Realtime Power Oscillation Locator
- RoCoF Calculation

It is expected that the Tenderer offers a solution in which these functional requirements are operational in other TSO‘s and have a successful proven track record.

3. Tender Phase

The tender phase will consist of 3 phases:

- PQQ phase
- Request for proposal phase
- Demo phase: during this phase, the Tenderer has to prove its offered product meets Elia's requirements. A description of demonstrations will be communicated to the Tenderer.

After the tender phase, before full rollout an MVP will have to be set up.

4. Project Plan

Elia expects from the Tenderer a detailed implementation plan that is realistic, taking into account the solution will first be evaluated and taking into operation by power system experts.
The Tenderer has to take into account Elia will follow the strategy only when power system experts are (based on the output of the PDC-WAMS solution) able to define correct operational guidelines to operate the grid, the solution will also be implemented to support real-time operators 24/7.

Together with a detailed implementation plan, a detailed invoice planning will be proposed by the tenderer.

Elia expects as well a detailed description how the collaboration between the Tenderer and Elia will be kept established once the project is rolled out and in operation:

- General, technical, business, … support
- Training plan
- Resolution of bugs, process to raise bugs, …
- Influence on the product roadmap, process to raise Elia needs and how they will be taken into account during the definition of the product roadmap, …
- …

5. Competences

Elia likes to understand the Tenderer's domain knowledge, experience at other European TSO's, the collaboration with European TSO's and qualifications for implementing the proposed solution at Elia.

Considered very important for Elia are

- the overall Tenderer's European TSO experience,
- the long term strategy (product roadmap, release approach (innovations, bug resolution, …), emergency release approach (urgent bugs), input of clients, ...), ... to collaborate with European TSO
- the experience of the proposed staffing team
- ...