

ELECTRA REX

A Researcher Exchange Programme for Smart Grids

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DISTRIBUTED FRAMEWORK FOR PROTOTYPING OF OBSERVABILITY CONCEPTS IN SMART GRIDS

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The ELECTRA Web-of-Cells (WoC) concept [1] defines cells as autonomous balancing and control areas within the grid to which distributed data acquisition and aggregation approaches are applied. Development and testing of according distributed monitoring, visualisation, and decision support concepts for future power systems require appropriate modelling tools that represent both the electrical side of the grid, as well as the communication and logical relations between the acting entities.

The goal of this research exchange was the development of an “Observability Framework” (see Fig. 1) that facilitates the development of these concepts by providing high-level application interfaces and flexible low-level data acquisition mechanisms. A Multi-Agent System [2] platform was chosen for implementation, where agents represent the different electrical and logical grid elements and perform data acquisition, processing, and exchange. The underlying data model represents general grid components (buses, branches, devices), which can be refined on demand.

Development and testing of the framework took place at University of Strathclyde and the Power Networks Demonstration Centre (PNDC). PNDC's MV and LV grid was used for deriving the information model requirements based on its grid topology. The implemented test case using a PNDC simulation model verified the framework's data acquisition, processing and communication abilities. Furthermore, the test case also demonstrated the framework's purpose as a prototyping platform for distributed concepts by means of an exemplary grid topology and state visualisation that is generated without any central topology storage.

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II. REFERENCES

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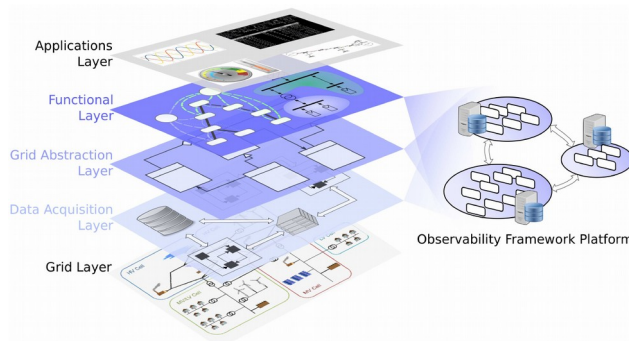


Fig. 1: General framework architecture.