Innovation type:
Methods and tools

TRL: 3

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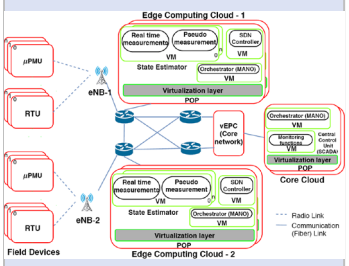
Target group:

Actor/ purpose	x
DSO, TSO	X
Technology provider	X
Member organisation	
Market operator	
Research/ Consultancy	X
Teaching	



A 5G based WAMS architecture, with monitoring and control logic virtualized and moved into an edge cloud, is analysed to assess the impact of failures on a distribution system state estimation

Method for analysing communication failures in smart grids

A new modelling approach is proposed for analyzing the impact of 5G communication failures in a smart grids.

Challenge

- The high dependence of power system on Information and Communication Technologies establish new interdependencies and vulnerabilities that need to be properly analyzed.
- New sources of failures may have a crucial impact on Smart Grid Monitoring.

Solution

- A novel dependability analysis method which combines Stochastic Activity Network (SAN) modelling and numerical analysis is proposed and implemented in a specific software.
- The method is tested on a Wide Area Measurement System (WAMS) architecture based on 5G-URLLC radio channel and data processing virtualization.
- The method application returns a set of metrics that assess the impact of ICT architecture vulnerabilities, cyber-physical system interdependencies and dependency on environmental conditions on WAMS data accuracy.

Potential

- The software represents a valuable tool to assess ICT architecture capability to reliably deliver data for correct monitoring. The method can be extended to perform similar analysis in control and protection scenarios.
- The results of the test enforce the prospect of adoption of 5G technology for smart grid monitoring applications.

References in CINELDI

- T. A. Zerihun, M. Garau and B. E. Helvik, "Effect of Communication Failures on State Estimation of 5G-Enabled Smart Grid," in IEEE Access, vol. 8, 2020
- T. A. Zerihun, M. Garau and B. E. Helvik. Dependability Modeling and Analysis of 5G Based Monitoring System in Distribution Grids. In Proceedings of the 12th EAI International Conference on Performance Evaluation Methodologies and Tools (VALUETOOLS 2019).