

Supplemental Project Notice

UNIFIED GRID CONTROL PLATFORM (UGCP) LABORATORY DEMONSTRATION PROJECT – PHASE II



PROJECT HIGHLIGHTS

- Provides a robust and secure platform, creating a more scalable and adaptable platform to meet current and future requirements.
- Addresses the increasing data and communications demand being placed on field assets.
- Improves resilience of devices through remote management and upgrade capabilities.
- Easily integrates legacy equipment until newer devices are required.

Background, Objectives, and New Learnings

The Unified Grid Control Platform (UGCP) Phase I developed baseline metrics for the following:

- Different architectures of container redundancy solutions and the impact of container and I/O loading on failure recovery.
- Impact of hypervisor and container loading on GOOSE and sample values subscription and utilization.
- Review of the performance and supervision capability of the hardware platform/hypervisor combination being utilized in this demo phase.

In prior related work, EPRI developed functional requirements for the aggregation of multivendor substation functions into a heterogeneous software environment based upon virtualization. The work included a wide variety of methods that could be used to virtualize applications, such as automation, protection, SCADA, and asset management.

The prior work also identified requirements for virtualized protection, control, and monitoring systems since these were expected to be the most challenging. Many of these virtualization methods are new to the electric power industry, and Phase I tested them to see how well they performed the intended function.

The objective of Phase II is to rigorously test the proposed hardware, software, and virtualization technologies and the associated architectures developed through the UGCP.

This project will test the reliability, resiliency, and maintainability of select architectures agreed to by project participants. It will also develop a suitable test plan for future use by implementing utilities. Furthermore, the project will evaluate the test results for each architecture and determine the suitability for actual implementation in the field.

Benefits

The project is expected to provide the following benefits:

- Transform substations into intelligent hubs.
- Integrate legacy equipment into a modern grid architecture.
- Consolidate physical devices, resulting in reduced costs.
- Provide cyber security services for grid modernization field and substation technologies.
- Decrease maintenance and deployment costs with remote upgrade capabilities.
- Improve reliability using virtual computing machines to efficiently operate the required computing environments.

Project Approach and Summary

For each application, or use case, a series of tests will be developed to assess the performance of the architecture and its elements. The complexity of protection, automation, and control functions within a UGCP system, utilizing data collected from intelligent electronic devices, will likely be the most challenging. Features to be tested include:

- Power-up timing: Compare black start, container restart, and application restart against the metrics of current dedicated hardware-based solutions.
- Redundancy: Examine the operational outage times from the different architectures. Consider alternate hardware/hypervisor combinations.
- Maintenance: Architect and document different methodologies to maintain the virtual hardware platform, including the patching of hypervisor, container, and applications.
- Testing: Leveraging IEC 61850 testing methodologies, architect and document different approaches for test isolation in a virtual environment.
- Evaluate architectures for cyber security in a virtual environment. Consider guidance from Instrument Society of America group 99.

Deliverables

The following deliverables are planned for Phase II only.

- Documentation of the proposed test plan of the architectures, hardware, software, and virtualization.
- Documentation of the testing, including plan adjustments and the results of the tests.
- Recommendations for conducting specific field tests.

The non-proprietary results of this work will be incorporated into EPRI's Transmission Operations and Planning R&D program and made available to the public for purchase or otherwise.

Price of Project

Phase II – \$95,000 (A minimum of three utilities are needed to complete this phase). Phase III is contingent on successful completion of Phase II. This project qualifies for Self-Directed Funding (SDF).

Project Status and Schedule

Phase II of the project is expected to commence when the minimum number of participants join and run for two years.

Who Should Join

Utilities that are interested in developing infrastructure that is capable of serving a wide range of field requirements with remote management capability.

Contact Information

For more information, contact the EPRI Customer Assistance Center at 800.313.3774 (<u>askepri@epri.com</u>).

Technical Contact

Paul Myrda at 708.310.0236 (pmyrda@epri.com)

Member Support Contacts

Dan Tavani at 704.595.2714 (<u>dtavani@epri.com</u>) Jeff Hlavac at 402.314.1049 (<u>jhlavac@epri.com</u>) David Welch at to 702.203.4210 (<u>dwelch@epri.com</u>) Brian Long at 704.408.8139 (<u>blong@epri.com</u>)

Product ID: 3002029345

Project ID: 1-119478

August 2024

EPRI

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