SEAPATH project proposal to LF Energy

V1.0 – 2 October 2020

General information

Name of project

SEAPATH - **S**oftware **E**nabled **A**utomation **P**latform and **A**rtifacts (**TH**erein)

Project description (what it does, why it is valuable, origin and history)

SEAPATH project aims at developing a “reference design” and “industrial grade” open source real-time platform that can run virtualized automation and protection applications (for the power grid industry in the first place and potentially beyond). This platform is intended to host multi-provider applications.

The project will encompass the following activities:

- Specifying the requirements to be fulfilled by the reference platform (see next slide)
- Specifying the test procedures needed to assess the fulfillment of the requirements
- Building the appropriate system(s) architecture(s) for the software platform and specifying requirements for hardware architecture
- Developing code for the specific functions and services to be delivered by the platform
- Defining and implementing APIs to external applications
- Performing the integration of the software platform
- Testing the fulfillment of the requirements after the implementation, as a proof-of-concept, of a realistic protection and automation system on top of the integrated software platform
- Defining guidelines and best practices to integrate, test (including interoperability tests) deploy, and maintain the applications on such platform

The project will take benefit from standardization activities that define requirement references for the use cases targeted by the virtualization platform. Relevant standards could for instance include IEC 60255, IEC 60870, IEC 61850 and IEC 61869. In the case where the requirements and guidance from the standards are not appropriate or still work in progress, the project may have to take different choices. In such case the project will strive to provide feedback to the relevant standardization activities.

Further to a call for collaboration under LF Energy umbrella mid-2019, a Design Team was established to build an initial roadmap for the project. This Design Team collaborated between January and June 2020. In June 2020, Advantech, Alliander, GE, National Grid, RTE, Schneider Electric and Siemens released the initial roadmap for the SEAPATH project under a CC BY 4.0 license.

Project lead

To be decided by the project’s Technical Steering Committee (see below).

Project financial sponsor organization(s)

Alliander, RTE

Names of other key contributing individuals and organizations

The project will initially involve Alliander and RTE.

Technical Steering Meeting (TSC) members

The initial TSC members of the project are:

- Christian Guibout – RTE (christian.guibout@rte-france.com)
- Aurélien Watare – RTE (aurelien.watare@rte-france.com)
  After a master's degree in electrical engineering, Aurelien started to work at RTE in 2008 as a dispatcher at the grid control center. Then he moved to the R&D department to study the impact of renewable energy sources on distance protections. He also worked on LPITs (Low Power Instrument Transformers) and HIL (Hardware in The Loop) simulation. Aurelien is currently working on virtualization/containerization of real-time and non-real-time automatons and leading a project to develop, build, test and maintain a virtualized infrastructure for RTE's next digital substation.
- Name to be provided – Alliander
- Name to be provided – Alliander

Existing community links

- **Repository hosting:** https://github.com/seapath
- **Project website and docs:** none for the time being
- **Mailing lists:** to be set up under lists.lfenergy.org
- **Slack, irc:** to be set up under lfenergy.slack.com
- **Social media accounts:** none
- **Project security plan (TODO - what should this include?):** none
- **Link to code base:** https://github.com/seapath

Open source status

Please describe the project's license

Code developed by the project will be released under the Apache License, Version 2.0.

Documentation will be made available under the Creative Commons Attribution 4.0 International License.

Is this project's code publicly posted? On github or elsewhere?

Code is posted on: https://github.com/seapath

Does this project have ongoing public (or private) technical meetings?

Technical meetings have not started yet.

Do this project's community venues have a code of conduct? If so, what is it?

Yes: https://github.com/seapath/contributing

Describe the project's leadership team and decision-making process.

The project's leadership and governance is documented in the CONTIBUTING file at: https://github.com/seapath/contributing

Does this project have public governance (more than just one organization)?

Yes.

Does this project have a development schedule and/or release schedule?

No. These will be defined later.

Does this project have dependencies on other open source projects? Which ones?

Yes. Main dependencies are:

- Yocto
- KVM
- Open vSwitch
- DPDK

Describe the project's documentation

To date the project's documentation consists in the roadmap document: https://github.com/seapath/contributing/blob/master/roadmap-docs/SEAPATH%20Initial%20Roadmap%20-%20final%20version.pptx?raw=true

Describe any trademarks associated with the project

None.

Project status

Do you have a project roadmap? please attach

https://github.com/seapath/contributing/blob/master/roadmap-docs/SEAPATH%20Initial%20Roadmap%20-%20final%20version.pptx?raw=true

Legal entity and/or registered trademarks

None.

Has this project been announced or promoted in any press?

The intention to establish the project has been announced at LF Energy summit and webinars.

Does this project compete with other open source projects or commercial products?

To our knowledge there exists no commercial platform that has been qualified to run real time automation applications for the power industry from various providers.

Moreover, no concurrent open source project with similar power industry applications has been identified.

Project value

Why would this project be a good candidate for inclusion in LF Energy? / Provide a statement on alignment with the mission in the LF Energy charter.

Due to the Energy Transition the use of power transmission and distribution grids is changing. The control architecture of power grids needs to be swiftly adapted to take account of infeed at lower grid levels, higher dynamics in flow patterns and more distributed controls (both internal controls and grid flexibility services from third parties).

In this context TSOs and DSOs require a new generation of Digital Substation Automation Systems (DSAS) allowing for more dynamic protection settings and adaptive automation functions. Moreover, data management gets significant, both for administration of deployed automation and protection functions as well as operational grid data.

Virtualization will be a key feature in order to fulfill the needs since it is expected to generate benefits of various kinds (see motivations in the roadmap document):

- time and cost-efficiency,
- scalability and flexibility,
- innovation.

The design of the new DSAS will have to allow for a drastically higher level of modularity, interoperability and scalability compared to the previous generations. An open source collaboration is essential to meet those requirements in a cost-efficient way by sharing the effort through a leveraged development approach that involves all stakeholders from equipment manufacturers to end-users, fostering vendor-agnostic implementations and convergence of utility practices.

What specific need does this project address?

The project will deliver a “reference design” and “industrial grade” virtualization platform with appropriate real-time performance capabilities for the edge node control level as depicted in the high-level functional architecture of LF Energy.

This platform is intended to run multi-provider automation and protection applications (for the power grid industry in the first place and potentially beyond).

See the project’s roadmap document for details.

Describe how this project impacts the energy industry.

This project will help the industry to:

- keep pace with the changes of grid uses at reasonable cost;
- achieve an “industrial tailor-made” solution;
- integrate new functions and technologies;
- achieve vendor-agnostic implementation and convergence of utility practices.

Describe how this project intersects with other LF Energy projects.

There is currently no major intersection with other LF Energy projects.

And intersection with the RIAPS project was discussed previously however RIAPS has a different positioning (being a framework to build distributed real-time control applications rather than a local virtualization platform).

It is expected that some coordination will have to take place with the CoMPAS project regarding the development of the configuration functionalities of the platform.

Who are the potential benefactors of this project? / What other organizations in the world should be interested in this project?

This project should be interesting for any power utility (grid operator, generation plant) that needs to deploy and manage flexible multi-vendor automation and control systems at the edge of their infrastructures, as well as T&D vendors selling automation systems and integrators of those systems.

Project needs

How would this project benefit from inclusion in LF Energy?

In order to reach the ambition of becoming a reference implementation, a proven and attractive governance framework is needed in order to expand the community and achieve a multi-vendor and multi-end-user collaboration. Additionally, LF Energy will bring visibility to the project.

From a technical perspective, the coordination between the project and the overall architecture works will ensure complementarity and interoperability with other software (e.g. IEC 61850 configuration, central grid control systems).

Please describe any infrastructure needs or requests (e.g., web hosting).

No specific infrastructure needs foreseen in the near term.

Plan for achieving next maturity level (Incubation -> Early Adoption -> Graduated)

The initial roadmap of the project has identified priorities for the development of a Minimum Viable Product. This MVP should be used in production at Alliander and RTE within 2 to 3 years.

Additionally, discussions are ongoing with other parties that may be able to join the project in the course of 2020 (GE, National Grid, Schneider Electric, WindRiver, etc.). This would grow the community and expand the functional scope of developments.