Energy Networks Innovation Process

Annual Project Progress Report Document

The voice of the networks

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Notes on Completion: Please refer to the NIA Governance Document to assist in the completion of this form. Please use the default font (Calibri font size 10) in your submission. Please ensure all content is contained within the boundaries of the text areas.

Project Title (*This cannot be changed once registered*) Technical Interfaces to Scale as a DSO	Project Reference NIA_SSEN_0040
Funding Licensee(s) Scottish Hydro Electric Power Distribution, Southern Electric Power Distribution	Project Start Date September 2019
Project Duration 24 months	Year 2021
Nominated Project Contact(s) SSEN NIA Programme Delivery Manager – Colin Mathieson	

1. Scope

The project is reviewing international interfaces however the output is focused on solutions which are applicable to the GB. To inform this work, all investigated interfaces must be broad enough to cover a representative spread of currently deployed solutions as well as trialled future options. A subset of these interfaces and a number of their combinations, are then trialled to create a detailed specification that covers the hardware, software, communication and cyber security requirements of such an interface.

2. Objective(s)

This project will deliver:
1. A review of interfaces and end-point devices from international trials and deployments
2. A review of cyber security risks and impacts
3. A functional specification document in phase 1 to inform trial in phase 2
4. A trial at the PNDC to garner practical experience with the most promising interfaces
5. A detailed specification document for DSO interfaces built up from all the learning trials.

3. Success Criteria

A thorough investigation of interfaces that have been trialled and deployed to understand their applicability to networks in the GB, in order to produce a shortlist of interfaces to trial.
Understand the cyber security implications of these interfaces.
A practical trial of the selected interfaces to understand the detailed implications of using them.
Creation of a specification for DSO interfaces for use in future use in BAU scenarios.

4. Performance compared to the original project aims, objectives and success criteria

Details of how the Project is investigating/solving the issue described in the NIA Project Registration Pro-forma. Details of how the Project is performing/performed relative to its aims, objectives and success criteria.

Project Background

This project aims to understand the requirements to safely and securely communicate with customer end point devices, such as a domestic solar panels which can connect to and communicate with the network to increase or decrease their power input, enabling customers to benefit from local energy flexibility markets. This will enable more sources of energy at a localised level to offer their energy via flexible connections and flexibility services, thus enabling traditional energy customers to trade energy i.e. supply & demand. This will be at a smaller scale and a lower cost due to the project utilising products that are off-the-shelf, logic boards rather than typical full-sized Remote Terminal Unit (RTU) cabinets.

Project Progress

Between April 2020 and the end of March 2021 the following progress has been made against the deliverables:

1. **A review of interfaces and end-point devices from international trials and deployments**
   This has been completed through an investigation by Wipro who produced a report outlining possible communications protocols and architectures. This was reviewed and used to inform the trials that will be carried out by Smarter Grid Solutions (SGS) and the Power Networks Demonstration Centre (PNDC).

   Based upon the Wipro report several solutions were further assessed and analysed, focusing on the cyber security strength of the protocols. This has led to the selection of the following protocols being taken forward for trial:
   OpenFMB Standard: Secure, open, scalable and interoperable protocol already in use by utilities and can be used via the public internet as well.
   OpenADR: One of the front running demand response standards for use via the public internet or through a VPN.
   DNP3: Other utility protocols are available, but DNP3 has been selected as the most expedient method to connect SGS's STRATA platform to the PNDC's instance of General Electric's PowerOn.

2. **A review of cyber security risks and impacts**
   Presently ongoing as it will involve a series of tests looking at the End Devices, SGS's STRATA platform user interface and STRATA platform back end tests. SGS's STRATA platform is a DERMS (Distributed Energy Resource Management System) which is being used as our test environment to simulate DER (Distributed Energy Resource) connections & communications to the test devices in the trials. The testing has been informed by following the NIST (US National Institute of Standards and Technology) Cybersecurity Framework; which is one of the preferred international frameworks.

3. **A functional specification document in phase 1 to inform trial in phase 2**
   This has been completed through an investigation by Wipro which produced a report outlining possible communications protocols and architectures. The report was reviewed and used to inform the trials that will be carried out by SGS and the PNDC.

4. **A trial at the PNDC to garner practical experience with the most promising interfaces**
   This has only just started and currently no significant learning has been generated.

5. **A detailed specification document for DSO interfaces built up from all the learning trials.**
   Trials are still progressing, so this is not complete yet.

5. Required modifications to the planned approach during the course of the project

The Network Licensee should state any changes to its planned methodology and describe why the planned approach proved to be inappropriate. Please confirm if no changes are required.

N/A

6. Lessons learnt for future projects

Recommendations on how the learning from the Project could be exploited further. This may include recommendations on what form of trialling will be required to move the Method to the next TRL. The Network Licensee should also state if the Project discovered significant problems with the trialled Methods. The Network Licensee should comment on the likelihood that the Method will be deployed on a large scale in future. The Network Licensee should discuss the effectiveness of any Research, Development or Demonstration undertaken.

The lessons learnt so far are:

1. Negotiating a contract with three suppliers is complex and challenging, particularly when two of them are participating in live trials. When forming a collaborative project, leave plenty of time for negotiations and possibly consolidate the number of suppliers for similar (relatively small/low cost) projects.
2. Cross-Industry collaboration: This project has engaged a variety of industry groups (incl. ENA Open Networks, British Standards Institute, DNO reviewing partner etc.) and there is a lot of interest on this subject area (standardising interfaces and comms). This project is a piece of a much larger puzzle, therefore in future a more inclusive project which combines and/ or develops in combination several initiatives to help the industry would be advisable.

7. The outcomes of the project

When available, comprehensive details of the Project's outcomes are to be reported. Where quantitative data is available to describe these outcomes it should be included in the report. Wherever possible, the performance improvement attributable to the Project should be described. If the TRL of the Method has changed as a result of the Project this should be reported. The Network Licensee should highlight any opportunities for future Projects to develop learning further.

1. The previously mentioned investigation & specification document by Wipro produced a report outlining possible communications protocols and architectures for interfaces and end-point devices. This was reviewed and used to inform the trials that will be carried out by Smarter Grid Solutions (SGS) and the Power Networks Demonstration Centre (PNDC).

2. Trial Design and Test Schedule reports detailing the trials to be carried out at the PNDC based on the selected interfaces, Endpoints and comms architectures have been delivered.

   The tests will be split into four workstreams:
   - **WS1: Interoperability and Adoptability –**
   Tests that evaluate the current state of each of the standards and architectural options outlined in the report. APIs tests will also be considered as part of this work stream
   - **WS2: Cyber Security –**
   Tests that explore the impacts of the controls identified by SSEN's cyber assessment on the various parts of the architecture.
   - **WS3: Communications Performance and Requirements –**
   Tests that will examine communication performance and the results will set requirements to help inform a specification.
   - **WS4: Containerisation and Low-Cost End Point Devices –**
   Tests that evaluate the practicalities behind the use of current containerisation technologies and how adaptable they are to the identified low-cost end point devices

Further learning is will be shared following the trials carried out at the PNDC. These trials were delayed due to Covid-19 and working from home. They are shortly due to commence.

8. Data Access & Quality Details

A description of how any network or consumption data (anonymised where necessary) gathered in the course of the Project can be requested by interested parties. This requirement may be met by including a link to the publicly available data sharing policy.

For information on how to request data gathered as part of this project see Network Innovation Competition (NIC) and Network Innovation Allowance (NIA) Data Sharing Procedure at https://www.ssen.co.uk/InnovationLibrary/Distribution/

9. Foreground IPR

A description of any foreground IPR that have been developed by the project and how this will be owned.

N/A