|  | |  | |  | |
| --- | --- | --- | --- | --- | --- |
| Network Innovation Competition 2020 Supplementary Answer form | | | | | |
| Project Name | Constellation | | | | |
| Question number | #21 | | Pro forma section | | Section 10 |
| Question date | 29/09/20 | | Answer date | | 01/10/20 |
| Question summary | In the bilateral discussion the concept of a central protection platform was discussed. The Constellation submission does not make direct reference to such a platform, although with the benefit of the discussion it can be partially inferred from Appendix 10. We believe that you drew our attention to the UKPN NIA project “Unified Protection”. Please confirm that this NIA project is the intended reference, and please correct us if not. Assuming it is the right project, this project appears to solve hardware challenges of incorporating increasing complexity in substation IEDs. We recognize that Constellation can help in this area, but we are also interested in the ability of Constellation to help implement completely new protection philosophies that the changing network might benefit from, rather than extending protection practices that are decades old and evolved for much different conditions. Please explain what protection philosophy work you are engaged with and with which partners or collaborators, and what opportunities Constellation might offer here | | | | |

## Please note: we have reduced the question font size to allow it to fit in the form.

## Answer (please retain document formatting and do not exceed 2 pages unless otherwise agreed with Ofgem)

We can confirm that the NIA project we referred to during our second bilateral meeting was Unified Protection. This project aims to centralise (within the substation) all legacy protection and control functionality in our substations. We have successfully incorporated standard protection functions and deployed them on vendor specific devices (i.e. protection functions from ABB have been deployed in a Centralised Protection and Control (CPC) unit by ABB).

Constellation will build on the success of Unified Protection (as well as other projects, like FITNESS and SIARA) which will enable new opportunities:

* New protection and control architectures: Working with all partners and subcontractors Constellation will provide an open platform for deployment of standard operating systems within containers on a common IEC61850 platform. This will provide an interoperable and secure environment for third parties to develop solutions, including protection and control functionality, which can operate on a common platform. This will provide a solution that removes the requirement for each vendor or application to have its own dedicated hardware platform. There are significant implications to this and through academic work package 4 (10.4.7.4) we will identify the necessary regulatory and legal changes required to govern this and manage the associated risks;
* New control philosophies: Method 1 is the first live demonstration of a new kind of local active network management improving the resilience against communication failures to central systems. Working with GE the Local ANM Method uses centralised high performance computing for building machine learning models and deploys the models in substation devices. Thus, the learning has access to many diverse data sources and draws on advanced tools applied in other sectors, while deploying models to the local substation for use within the local limitations. This is a significant departure from traditional control approaches that are deterministic and dependent on directly measured data;
* New protection philosophies: Method 2 with ABB is the first demonstration of wide area-based protection applied in a distribution network setting using RGOOSE analogues (IEC61850). This will change the principle behind how network protection operates and shift our protection philosophy from one that trips the generator off when may be necessary, to one that keeps generation on if at all possible. Our wide area protection approach will also enable us to call upon capable DERs to switch between operating in voltage control mode or power factor mode to provide additional smart services and support the system. We expect to bring additional novelty with the market suppliers for the second iterations of Methods 1 and 2 after the detailed design stage;
* Research theme 3 “Adaptive and LoM Protection”: working with Strathclyde University from the start of the project we have a dedicated research stream focusing on this topic described in FSP section 10.4.7.3; and
* New testing and commissioning philosophies: Our legacy protection only requires local (on-site) testing and commissioning. Constellation will unlock opportunities for automated and remote testing which can alleviate some of the existing (well-managed and reasonably practicable) safety risks and reduce time / cost to commission plant. We will work on this approach with all partners and suppliers during the project.

For simplicity, the points above detail the new changes and opportunities enabled by the various Constellation items in isolation. In practice, the points above are interlinked and together the platform could support and enable many future opportunities such as:

* Distributed system operation;
* Secure and stable network islands and Black Start from DNO networks;
* Virtual private wire schemes;
* System time synchronisation;
* Area-targeted fast frequency services; and
* Network constraint relief.

These opportunities can be exploited through the Open Innovation Competition as part of the project (and within the allocated funding), as future innovation projects or as business as usual after successful completion of Constellation.

The changes above pose a fundamental change in our existing network philosophies. We intend to leverage our multi-disciplinary and cross-industry consortium and the academic research aspects of the project to identify other opportunities to evolve our business to be ready for the changes required to achieve Net Zero sustainably and cost efficiently.