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| Network Innovation Competition 2020 Supplementary Answer form | | |

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| Project Name | Constellation | | |
| Question number | #2 | Pro forma section | 10.8 |
| Question date | 20/08/2020 | Answer date | 24/08/2020 |
| Question summary | In recognition that this bid is a revision of the 2019 Constellation proposal, please explain how/what each of the 2020 Project Partners have contributed to alterations of the project methodology and/or project outputs. | | |

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

Since the 2019 submission, we have dedicated significant effort to take on and implement feedback from the Expert Panel and Ofgem. As part of all the changes, described in **Appendix 10.10**, this year we have assembled strong partners and suppliers to ensure we have the required skills and expertise in the partnership to deliver the project, as well as within suppliers. Our consortium of partners are global leaders in protection, control and telecoms and all have proven capabilities. This includes GB networks initiatives such as FITNESS, Unified Protection and the PNDC`s core research programme on digital substations. We have continued our partnership with University of Strathclyde and expanded it to include leading the academic input as well as the research and testing provided by PNDC.

To ensure a robust methodology that will deliver a number of innovative and tangible outputs from Constellation, the consortium collaborated closely. Our partners have offered invaluable technical expertise on all project elements by preparing designs and technical proposals on how different project elements can be delivered. Additionally, the partners have provided key input to the plan and give confidence that the project scope can be delivered successfully within the proposed time and budget.

**ABB**: The key strengths leveraged from ABB are in the area of centralised protection architectures and algorithms for complex wide area protection schemes:

* Method 2: Wide area protection – ABB brought their global experience as described in **Appendix 10.4.2.2** of development of algorithms used for continuous monitoring of DG to determine whether and when to activate islanding protection; and
* Virtualisation of existing protection functionality – ABB brought their virtualisation approach for deploying protection and control functionality in one single device on substation level (described in **Appendix 10.4.5**).

**GE**: The key strengths leveraged from GE are in the area of advanced distribution network control and system integration:

* Method 1: Local intelligent control / Local ANM – GE contribute to the development by collaborating closely with experts from UK Power Networks to develop the wide area synchro-phasor approach to local ANM. GE have provided a robust approach to network control when communication to ANM are lost (**Appendix 10.4.1.2**); and
* Integration with the Advanced Distribution Management System (ADMS) – GE contributed by providing valuable insights on how Methods 1 and 2 can be integrated with the central GE ADMS solution. GE also advised on the required testing and trial management for the ADMS system during the project.

**University of Strathclyde`s PNDC**: The key strengths leveraged from PNDC are in the area of de-risking and validating novel solutions:

* Trials and analysis – PNDC contributed to the development of the trial design by building a comprehensive trial design (**Appendix 10.4.10.3**) which ensures that the Constellation requirements stem from a robust evidence base. Additionally, PNDC collaborated with key experts from UK Power Networks to develop the scope of the OT integration and cybersecurity testing;
* Open Innovation Competition (OIC) – PNDC defined the OIC approach (**Appendix 10.4.8**)
* Academic insights and future governance – PNDC supported defining the scope for the research undertaken within each topic area described in **Appendix 10.4.7**.

**Siemens**: The key strengths leveraged from Siemens are in the area of digital system integration and protection coordination:

* Method 2: Adaptive protection – Siemens contributed to the development by proposing an alternative approach to dynamically validating and updating protection settings by integrating an innovative asset management and simulation engine to actively manage protection assets (described in **Appendix 10.4.2.4**); and
* Central management of Constellation – Siemens contributed by offering an innovative IT solution that enables a future-proofed system architecture, leveraging both existing critical IT and OT assets (**Appendix 10.4.3**).

**Vodafone**: The key strengths leveraged from Vodafone are in the area of communication systems:

* Secure site-to-site communication – Vodafone contributed by developing a novel site-to-site communication system leveraging the benefits of the emerging 5G technology (**Appendix 10.4.6**)

In bringing this consortium together, we genuinely believe that the outcomes of the project will demonstrate transformational approaches for the industry that can readily be rolled out by distribution network operators both in GB and globally.