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| Network Innovation Competition 2020 Supplementary Answer form | | |

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| Project Name | Constellation | | |
| Question number | #10 | Pro forma section | Section 2 |
| Question date | 03/09/2020 | Answer date | 07/09/2020 |
| Question summary | For the adaptive protection approach within Method 2, "the functionality will be carried out by the local intelligence on-site and the central management system together." What happens in the event of loss of communications with the central management system? | | |

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

Adaptive Protection is designed with the ambition to provide globally optimal settings for all protection functions to enable the flexibility and optimisation required to facilitate Net Zero at the lowest cost to our customers. As such, the solution needs to be capable of carrying out detailed protection discrimination assessments, which rely on taking data from the entire power system into account, and which are based on an up-to-date network model and detailed protection models. Within the project, Adaptive Protection aims to dynamically validate and update the load blinding settings as well as adapt the G59/G99 protection settings as required for the wide area protection element. Therefore, such protection assessments are proposed to be performed centrally rather than locally in the full submission.

In case communications between the central management system and the substations are lost at the same time that a protection setting change for load blinding or G59/G99 protection is required, it is planned that the (local) system will apply the existing static protection settings as a fall back. In general, all 33kV and 11kV protection settings are calculated to match the system requirements in a worst case scenario and therefore they will be more than adequate for normal running. The loss of communications to the central system will take away the ability to calculate optimal protection settings of the Constellation system and may need to constrain generation for the period of time communications are lost, but will not expose the network to any more risk than if the communications were healthy.

For some protection settings, it is possible to develop a separate **local adaptive protection system**, embedded locally in the substation, relying on local parameters only. This would be a different approach, not calculating protection settings based on a complete network model and detailed protection relay models, but pulling information from the local devices around the station level plant (particularly current generation and load measurements) and adapting the protection settings. This would rely on a simpler (than the central adaptive protection) automation environment, e.g. a CFC plan (i.e. rather by switching between predefined parameter groups than by recalculating individual settings). This local automation could serve as an emergency back up to loss of communication to central systems. We will understand if this option is necessary during the evaluation parts of the project when we assess the performance and reliability of the adaptive protection.

In the future, local adaptive protection could likely be gradually expanded to include more types of protection settings as our use of low latency site-to-site communication grows to allow decentralised discrimination assessments through the site-to-site communication between sites equipped with Constellation. However, for this to be reliable it requires a considerable proportion of substations to have Constellation deployed. Therefore, we have not included this within the core scope of Method 2