|  |  |  |
| --- | --- | --- |
| Network Innovation Competition 2020 Supplementary Answer form | | |

|  |  |  |  |
| --- | --- | --- | --- |
| Project Name | Constellation | | |
| Question number | #4 | Pro forma section | Section 2.2.1.5 |
| Question date | 27/08/20 | Answer date | 01/09/2020 |
| Question summary | Please confirm if the reference to Figure 3 is really Figure 4.  Please explain, precisely, what is meant by “zone” and explain what “it” is that detects the instability.  Please also explain the definition of an instability and also how “it” measures it.  Is this in fact a blocking scheme that inhibits a trip at the DER?  If so, what measurement at the DER is indicating a trip condition that is blocked?  Note 10.4.2.1 doesn’t really explain this either. | | |

## 

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

We can confirm that the reference to Figure 3 in section 2.2.1.5 refers to Figure 4 and we will correct this error in the resubmission.

The term “zone” in this example refers to the feeder connecting the primary substation and the DER site. The “it” which detects the instability is the Constellation system installed at the primary and DER sites. This system will detect the instability by processing the measurements from the IEDs at both sites through the wide area protection, which will be running as a virtual (software) functionality on the Constellation hardware. This will allow the Constellation system in the primary substation to detect if a fault on another feeder or elsewhere on the network (outside the “zone” defined above) is the cause of an instability before triggering an unnecessary disconnection of the DER. It could also allow the Constellation system at the DER, on receipt of frequency data from the primary, to confirm that its local network is intact and that it should not disconnect.

We acknowledge that in the industry stability (and instability) is used in the context of frequency. As described in section 2.1.1.3, Method 2 is about addressing the issue of unnecessary disconnection of DER which in the future can lead to system instability, potentially brown outs or black outs. In the FSP we have used the term instability and transient instability interchangeably to refer to events which can cause voltage and/or frequency excursions which exceed safe operation limits and trigger generation protection unnecessarily.

ABB’s approach will rely on using existing measurements (voltage and current) as well as the status of CBs as routable GOOSE analogue signals at sites (substations and DER sites) equipped with the Constellation system. The algorithms developed for the project will make a decision whether to block or trip one or multiple DER sites using routable GOOSE messages. This will enable their algorithms to determine if an instability is directly affecting the feeder that the generator is connected to. The exact logic is to be determined within the detailed design stage of the project.

In the short term, Method 2 is blocking the G59/G99 relay for loss of mains, over/under frequency and over/under voltage. For BAU rollout once proven, Method 2 would propose an alternative protection methodology. As smart solutions, such as Active Response, are deployed across the 11kV and 33kV networks, the protection and control becomes increasingly complex with interaction and coordination required between sites. While in the FSP we have consciously separated the Methods in their description and benefits for clarity, in practice the protection and control capabilities are interlinked. This would especially be the case if learning from the Resilience as a Service project were included once completed, such as enabling opportunities to call upon inverter based DG to switch between operating in voltage control mode or power factor mode as required by the local area including any islanded operation.