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SIPS for enhanced Transfer capacity

System Integrity Protection Schemes (SIPS) are designed to add an additional layer of defence against large disturbances. The increased security provided may e.g., enable operation outside the generally accepted security criteria, increase the secure level of power transfer capacity over critical corridors, and decrease the sensitivity to severe and/or multiple contingencies.

A number of SIPS solutions are in operation in various grids, typically designed as event-based protection systems with actions including: load shedding, generation tripping, controlled network split or fast HVDC ramping. Development of response-based SIPS will provide additional value for a broader set of operational conditions and unforeseen contingencies.

Response to special report question C2 PS1/Q1.7

The security of supply is a critical requirement for system operation and the implementation of algorithms that attempt to prevent critical network conditions is usually implemented. Given that most of these systems compute worst case conditions, how can we guarantee that the energy market is not being hindered due to the priority given on security of supply?

Answer:

SIPS solutions are economically efficient as well as sustainable means to increase the transfer capacity of the power system.

SIPS solutions are however both technically complex and involves additional risks. Therefore, development and implementation of SIPS solutions requires significant engineering as well as sufficient levels of redundancy to prove a secure and functional solution.

Developing solutions to mitigate n->1 events is extra challenging due to the nature of such events, having a very low probability to occur. Coping with this kind of event is a calculated risk in any power system. However, with SIPS solutions reaching increased maturity and becoming integrated into other operational software solutions, they will be able to become an integrated part in increasing resilience toward high-impact low-probability events.

One way which SIPS may reach increased maturity/acceptance is through the development and use of SIPS solutions to increase transfer capacities (increased trading) and provide additional security for parts in the grid which are not N-1 secure. In this manner the system operator will become accustomed to the type of system and the SIPS also become increased integrated in the “normal” operation.