Complying with FERC Order No. 754

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The Federal Energy Regulatory Commission (FERC) recently issued Order No. 754, which directs the North American Electric Reliability Corporation (NERC) to issue a data information request to registered transmission planners regarding the study of a single point of failure on protection systems.

The purpose of NERC’s survey/request is to solicit data and information from each transmission planner in the United States, in coordination with generator owners, transmission owners and distribution providers in its transmission planning area, to identify specific information regarding potential single points of failure on their protection systems to determine whether there is a risk to the reliability of the bulk power system. In particular, the survey seeks to identify Elements [1] within each transmission planning area on which a three-phase fault accompanied by a protection system failure could result in a potential reliability risk. The following items will be reported in accordance with the data reporting template:

- Statistics concerning the buses evaluated
- Statistics concerning the attributes of the protection system(s) associated with each identified element
- Statistics concerning the attributes of the station DC supply at selected buses in each transmission planning area

Responding to this data request is mandatory for registered entities in the United States. It is not mandatory for registered entities in Canada to respond, but Canadian entities are strongly encouraged to submit data so that decisions regarding the concern stated in Order No. 754 can be based on complete data across North America.

In order to respond to this survey/request, the entity must perform certain power flow and dynamic stability studies, but the conventional methodology can be complex, time consuming and data intensive. Utilizing this traditional methodology, NERC has provided the suggested guidelines for gathering the requested statistics and data. This method uses an iterative approach between the transmission planner and the asset owners to narrow the list of buses to be evaluated by initially screening the buses based on stability simulations using conservative assumptions and knowledge of protection system design. Subsequent steps involve detailed analysis based on expected fault clearing times and review of protection system documentation. This method will identify the buses at which a protection system single point of failure could result in an adverse impact to reliability of the bulk power system. After the transmission planner has identified these buses, the generator owner, transmission owner, and distribution provider will perform a review of protection system documentation to identify whether single points of failure exist [2].

For illustration purposes, FERC prepared estimations of the time required to prepare the requested data for a transmission system and estimated over 1,000 man-hours for a transmission planner. It requires collection of detailed protection and control settings at many substation locations to verify if a single point of failure exists. This level of effort can be extra taxing on key utility resources, as they are faced with imminent deadlines for reporting.

However, Siemens PTI power system consultants have automated several tasks through PSS®E planning software and other programs, thereby significantly reducing the total amount of time for completion. These computer-simulated programs include several modules/automation scripts, for example written in Python™ programming language, which will perform individual tasks such as performing transient stability simulations, analyzing the results, sorting the information in desired formats required by NERC, etc.
For a utility with at least 50 buses above 300 kV, this can equate to as many as 1,000 man-hours if handled in-house by the utility. Siemens PTI’s power system consultants can typically perform the required analysis in less than half the man hours due to the experience and customized modeling and automated approach that we’ve specifically put in place for FERC Order No. 754 compliance.

Given the significant reduction in man-hours, this automation technique not only reduces the burden on key internal staff when working to meet NERC’s strict reporting deadlines, but it also allows for the request to be addressed in a cost-effective manner. With the first reporting phase completed, compliance with FERC Order 754 will only become more complex, data intensive and time consuming on the remaining lower voltage levels. Transmission planners reported data for buses operated at 300 kV or higher to NERC in October. The next data request for buses operated at 200 kV or higher and below 300 kV must be reported by March 2014 and below 200 kV by September 2014. Regardless of your current progress in the FERC Order No. 754 compliance process, Siemens PTI can proactively support your organization in meeting your remaining reporting deadlines.

References:
[1] Any electrical device with terminals that may be connected to other electrical devices such as a generator, transformer, circuit breaker, bus section, or transmission line. An element may be comprised of one or more components.