

Example to Support the Order No. 754 Data Request Clarification

February 19, 2014

In this example, the Transmission Planner assesses the 345 kV buses in its area using the method described in the Request for Data or Information for Order No. 754 – Single Point of Failure on Protection Systems.

There are 28 buses operated at 345 kV in the Transmission Planner's area.

In step 1, the Transmission Planner determines that 20 of the buses meet the attributes in Table A. In step 2, the Generator Owners and Transmission Owners provide information to the Transmission Planner based on their general knowledge of their protection system attributes. Based on this information, the Transmission Planner determines that protection systems for elements at 6 of the buses meet the attributes in Table B. These 6 buses terminate a total of 19 transmission lines, 8 transmission transformers, 2 generator step-up transformers, and 1 capacitor bank. The Transmission Owners and Generator Owners did not need to perform detailed assessments of the protection systems on these elements, and the Transmission Planner should not report attributes for these protection system. At this point the Transmission Planner develops an initial "List of Buses to be Evaluated" containing the remaining 14 buses.

In step 3, the Transmission Planner simulates three-phase faults on the 14 buses based on maximum expected remote clearing times and determines that the simulations for 6 of the buses do not exhibit any of the adverse impacts identified in Table C.

In step 4, the Transmission Planner revises the List of Buses to be Evaluated to remove 6 buses based on the testing in step 3. The list now contains 8 buses.

In step 5, the Transmission Owner and Generator Owner assess the protection systems on the 8 remaining buses. Although not called for in step 5, in this particular example the Transmission Owner and Generator Owner perform a detailed assessment of the protection systems on all elements at these buses and provide the results to the Transmission Planner. At the 8 buses, the Transmission Owners and Generator Owners assess the protection systems on a total of 29 transmission lines, 12 transmission transformers, 3 generator step-up transformers, 2 capacitor banks, and 1 shunt reactor. However, the Transmission Planner should not report all of this data. The Transmission Planner will report a subset of this data based on the results in step 9.

In step 6, the Transmission Planner revises its List of Buses to be Evaluated based on the information obtained in step 5. This information is used to identify that protection systems on all elements at 2 buses meet the attributes in Table B. The Transmission Planner revises its List of Buses to be Evaluated, which now contains 6 buses.

In step 7, the Transmission Planner consults with the Transmission Owners and Generator Owners regarding expected clearing times, and in step 8, the Transmission Planner simulates three-phase faults on the remaining 6 buses based on expected clearing times. The Transmission Planner determines that the simulations for 2 of the buses do not exhibit any of the adverse impacts identified in Table C.

In step 9, the Transmission Planner revises its list to produce a final List of Buses to be Evaluated, which contains 4 buses. These 4 buses terminate a total of 13 transmission lines, 6 transmission transformers, 1 generator step-up transformer, and 1 capacitor bank.

In step 10, the Transmission Owners and Generator Owners evaluate the protection systems on the 4 buses identified in step 9 and evaluate the station dc supplies at the 20 buses identified in step 1. Since the Transmission Owners and Generator Owners already performed a detailed assessment of the protection systems in step 5, the Transmission Planner already has the necessary information on the protection systems to complete Tables 2 through 7 of the template. The Transmission Owners and Generator Owners provide information on the station dc supplies at the 20 buses identified in step 1.

In step 11, the Transmission Planner submits data. In Table 1 the Transmission Planner provides the following data:

Row 1: 28 – buses operated at 345 kV in its area

Row 2: 20 – buses operated at 345 kV meet the attributes in Table A

Row 3: 6 – buses evaluated using expected clearing times

Row 4: 4 – buses at which simulations using expected clearing times exhibited an adverse impact as described in Table C

In Tables 2 through 7, the Transmission Planner provides the protection system attributes for the 13 transmission lines, 6 transmission transformers, 1 generator step-up transformer, and 1 shunt device that terminate at the 4 buses identified in Table 1, Row 4.

Even though the Transmission Planner received detailed information on 29 transmission lines, 12 transmission transformers, 3 generator step-up transformers, and 3 shunt devices in step 5, the data request only calls for entering protection system attributes on the elements connected to the buses on the final List of Buses to be Evaluated, as identified in step 9 or an equivalent step if the Transmission Planner used an alternate method that provides consistent data (in form and substance).

Similarly, even though the Transmission Planner knows the protection system attributes for an additional 19 transmission lines, 8 transmission transformers, 2 generator step-up transformers, and shunt devices based on information provided in step 2, these attributes should not be reported.

The data request only calls for reporting protection system attributes for elements connected to the buses on the final List of Buses to be Evaluated. Transmission Planners should not report protection system attributes for elements connected to buses for which simulations do not exhibit an adverse impact. This provides for consistent reporting among all Transmission Planners. While the other information obtained at step 2 and step 5 in this example may be useful, all Transmission Planners will not have this level of detail because of the flexibility provided for entities to obtain the requested information.