

Updated Transmission Line Protection Communications

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Abstract

The telecommunications revolution has increased the options and capabilities available for communication assisted tripping of transmission lines. To improve tripping speeds on long and short lines, protection engineers can select from a host of media, protocols, and logic schemes. The question that needs to be addressed is what communication scheme is best for which circumstances.

This paper begins by establishing performance baselines of double-ended scheme operating times measured in event reports of a variety of in-service lines. It includes various successful systems and takes into account all the elements that must be addressed when commissioning a protection scheme, such as relay pickup time, communication interface and latency, coordinating time delays, and sequential tripping times.

These in-service schemes are then compared with laboratory tests of new systems using radio and fiber communications with serial and Ethernet protocols. Methods of optimizing different systems are tested and evaluated with final results tabulated and compared.

No single scheme is best for all circumstances. With comparison data, the protection engineer can select the best options to improve overall power system performance. Recognizing the strengths and weaknesses of different schemes assists the engineer in addressing new situations. Comparing laboratory tests and in-service performance provides a tool for evaluating a transition to new technologies.

Discussion Points

4. The paper is useful to new and experienced engineers by including established and new communication systems.
5. Using in-service examples ensures that factors that could unfairly help or hurt particular schemes are eliminated.
6. A simple, but proven, comparison chart makes communication choices easier when considering new technologies.