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IEC 61850 GOOSE Based Arc Flash Protection Scheme

Authors

1. *Hayden Nikolajenko, BE (Hons)*
Mitton ElectroNet Ltd, Christchurch, New Zealand
Hayden.nikolanjenko@mittonelectronet.com
2. *Aman Bajracharya, BE, MScEng*
Entura, Hydro Tasmania, Melbourne, Australia
Aman.bajracharya@entura.com.au

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Abstract

Arc flash protection schemes have been implemented by several utilities across New Zealand, as a form of high speed bus protection on various indoor switchboards. Arc flash protection schemes commonly apply overcurrent supervision, use relay output contacts which are hard wired directly to the circuit breakers for a bus trip and may require a separate panel. These approaches may increase cost and complexity.

This paper presents the development of a decentralised, stand-alone, modular arc flash protection scheme, using Schweitzer Engineering Laboratories (SEL) SEL-751 relays [1] and IEC 61850 GOOSE. Minimal copper wiring is used and bus tripping signals are sent via IEC 61850 GOOSE to other relays in the scheme. Overcurrent supervision is not configured; however, the scheme has been designed to prevent mal-operation when sensors are exposed to ambient light.

A single settings file has been developed, to suit all bay types (feeder, incomer, bus riser and bus coupler) and three different switchgear types. The scheme can be specified as part of a new switchboard, or retro-fitted to an existing switchboard.

Comprehensive laboratory testing of this IEC 61850 GOOSE based arc flash scheme achieved an operating time of no longer than 7 milliseconds (ms). This measured operation time is comparable to a typical hard wired scheme. This IEC 61850 GOOSE based arc flash scheme significantly reduces complexity and has the potential to reduce design costs.

1 Bibliography

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