Relay protection sampling value





Overview

Sampled Value IEC 61850 Conprove, recognized for its innovative role in developing tools for power system automation and protection, offers a complete line.

Key Takeaways

Relay protection sampling value checks ensure that digital relays correctly interpret Sampled Values (SV) from merging units, maintaining accurate protection and system reliability.

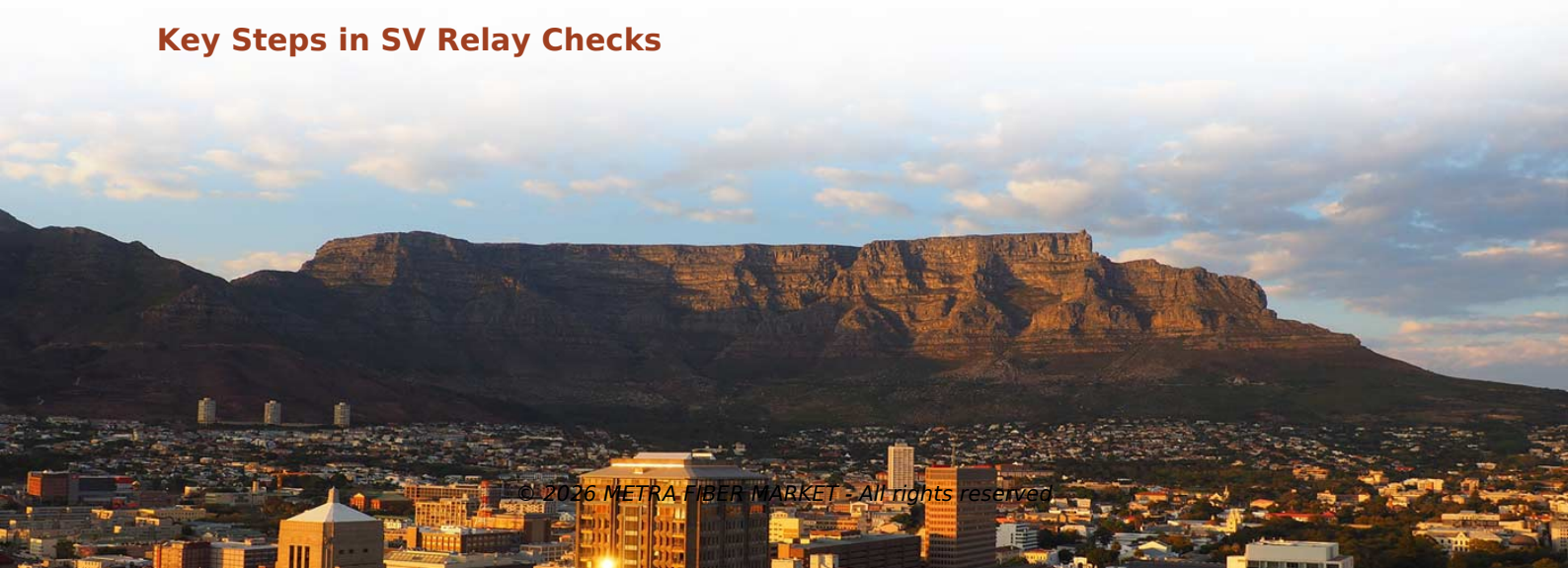
Understanding Sampled Values in Digital Substations

Sampled Values (SV) are digitized current and voltage signals transmitted over the communication network in IEC 61850 digital substations, replacing traditional copper wiring between CTs/PTs and relays.

S

V streams are generated by Merging Units (MUs) or Non-Conventional Instrument Transformers (NCITs) and are used by Intelligent Electronic Devices (IEDs) for protection, monitoring, and control. Testing these relays ensures that they respond correctly to real-time system conditions.

Key Steps in SV Relay Checks



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Simulation of SV Streams: Use test sets like CMC (OMICRON) or ASE61850 to simulate SV streams according to IEC 61850-9-2LE and IEC 61869-9 standards. These test sets can emulate primary currents and voltages, allowing relays to be tested without connecting to live equipment. Synchronization and Buffering: Subscribing relays must handle smpSynch and smpCnt values to enable or disable protection elements correctly.

Relays typically buffer a few samples to ride through transient clock synchronization events. For example, a channel delay setting of 1. 5 milliseconds may be used to account for network and MU processing delays, ensuring accurate operation.

Network Delay Consideration: Measure the maximum network delay of SV streams and configure the relay's channel delay accordingly. This ensures that relays can process incoming SV messages without false trips or missed events. Verification of Relay Response: Compare the relay's response to SV streams with expected outcomes or conventional relay measurements.

This includes checking trip signals, blocking, and restraining functions during simulated faults. Use of Test Software: Tools like Conprove CTC or Megger SVA provide visualization, control, and analysis of multiple SV streams, allowing engineers to perform compliance testing, event playback, and troubleshooting.

Best Practices

Reuse existing test plans from conventional relays by replacing hard-wired inputs with SV configurations. Ensure all relays are configured with correct SCL files for accurate mapping of SV streams. Record and playback SV traffic to analyze relay performance under different fault scenarios.

Include GOOSE and S

V pins in your relay test package to fully validate protection functions.

Conclusion

Performing a relay protection sampling value check involves simulating SV streams, configuring relay buffering and synchronization, accounting for network delays, and verifying relay responses against expected behavior.

Using IE

C 61850-compliant test sets and software ensures accurate, repeatable, and safe testing of digital protection relays in modern substations.

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Article Content

Sampled Value IEC 61850

Conprove, recognized for its innovative role in developing tools for power system automation and protection, offers a complete line of universal testers compatible with the IEC 61850

Protection Testing with Sampled Values

It sends Sampled Values representing primary currents and voltages from the electrical power system to test the proper operation of protection relays. The test set generates up to three Sampled Value

Performance of IEC 61850 Sampled Values Relays for a Real-World

This section of the line uses an IEC 61850-compliant Sampled Values (SV) bus differential relay (87B23-79DTL) that receives digitized current and voltage values from two merging units (MUs).

Protection and Testing Considerations for IEC 61850 Sampled Values ...

We propose a closed-loop test model to perform benchmark line distance protection tests by comparing the protection performance of relays that receive analog signals via traditional copper wiring with

On the Assessment of Sampling Rate Impacts on Responses of Digital ...

This article assesses the performance of time-based, frequency-based, and time-frequency-based digital protective relays, when operated at different sampling rates. Tested

How to calculate relay settings for IEC 61850-9-2 Sampled Values ...

A simple Ethernet-based remote data acquisition system using IEC 61850 Sampled Values (SV) technologies is shown in the figure below.

Advanced Testing with Sampled Values

Function-specific test modules graphically display relay characteristics, and thus allow to easily check settings as well as mode of operation. The software offers fully automated protection

Using sampled values in line differential protection

Results show that the proposal is feasible and enhances the line differential protection scheme. Line differential protection features great selectivity to isolate equipment under fault conditions.

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Performance of IEC 61850 Sampled Values Relays for a

The protection algorithm in commercial P&C IEDs normally operate with sample rate of 8 to 12 times a cycle . In RTDS, the protection algorithms in relays are modeled to operate with

Testing IEC-61850 Sampled Values-Based Transformer Differential ...

This paper assesses the performance of time-based, frequency-based, and time-frequency-based digital protective relays, when operated at different sampling rates.

SEL-751 Feeder Protection Relay | Schweitzer Engineering Laboratories

The SEL-751 Feeder Protection Relay is ideal for directional overcurrent, fault location, arc-flash detection, and high-impedance fault detection applications.

Protection and Testing Considerations for IEC 61850 Sampled Values ...

Protection and Testing Considerations for IEC 61850 Sampled Values-Based Distance and Line Current Differential Schemes Steven Chase, Erin Jessup, Mauricio Silveira, Jiawei Dong, and Qiaoyin Yang

Performance of IEC 61850 Sampled Values Relays for a Real-World

Performance of IEC 61850 Sampled Values Relays for a Real-World Fault John Bettler, Commonwealth Edison Ryan McDaniel and David Bowen, Schweitzer Engineering Laboratories, Inc.

Using a Real-Time Digital Simulator to Compare Performance of ...

Abstract—This paper compares the performance of two protection systems by measuring the same analog quantities. One system takes measurements through direct wiring, and the other

Protection relay selection table

Protection relay selection table Please note before using selection table! number = Number of stages, shots, X = Function supported inputs or outputs O = Function available as option

Performance Analysis of Sampled Values-Based Protection in IEC

One specific area of interest is the performance of protection systems that utilize voltage and current samples digitized directly at their source. This research presents a complete test bench for

Sampled Value IEC 61850

Sampled Value IEC 61850 High-Speed Digital Measurement for Smart Substations With the advancement of digitalization in the power sector, the IEC 61850

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Microprocessor relays offer a range of recording lengths, from 9 to 72 cycles for first generation relays, and from 8 to 630 cycles for newer relays. The sampling rates of these fault records range from four

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