Case Study

Automatic Fault Isolation

Challenge

As part of an extensive effort to reduce system outages and increase service reliability, a government agency is in the process of converting all overhead distribution lines to underground. At the same time, the agency wanted to reduce any outage restoration time by adding automatic fault isolation capabilities for critical load areas. To be considered, any new equipment needed to accommodate their present radial system configuration and be adaptable to a future loop scheme which would be capable of automatic feeder reconfiguration without the need to send out an operations crew.

Six way padmount switch with motor actuators on source ways 1 and 2.

Solution

After considerable investigation of possible switchgear providers, the agency liked the flexibility of the G&W Electric Automated 15kV, SF6 insulated, padmount vacuum interrupters (TNI style) with SEL 451relays and SEL 2100 logic processor solution. For their immediate Stage 1 requirements for a critical load area, three G&W Electric padmount fault interrupting switches were installed on their radial system for fault isolation. The switches were configured with two source ways and four tap circuits. The four tap circuits utilized vacuum interrupters for fault protection and were electronically controlled using G&W Electric Type 3 controls. The tap circuits presently require manual reset if tripped by a fault but can easily be automated at a later date by adding a motor actuator.

The SEL 451 relay is housed in a separate enclosure on the side of the switch.

The two source ways of each switch also utilized vacuum interrupters for fault protection. To accommodate the automatic system restoration requirement however, motor actuators were mounted to each source way, controlled by the Schweitzer SEL 451 relay mounted on the side of each switch. The 451 relay permits the reading of overcurrent values and can communicate this data to other 451 relays along the radial system. Each 451 relay can be programmed with user preferred time delays which provides the capability of isolating only the faulted circuit to minimize service outage and duration. All communications to and from the relays were accomplished using fiber optic cable and transmitted to an SEL 2100 logic processor rack mounted in a nearby equipment room. The SEL 2100 was added to accommodate the future requirements of reconfiguring to a dual feeder loop system. Stage 1 was designed for the initial radial system configuration of one source and potentially all switches closed. For the future loop feed design, Stage 2 was configured for two sources and one normally open switch for fault isolation and system restoration in a two source loop configuration.

The SEL 2100 processor is rack mounted in a nearby equipment room.

Conclusion

The customer can now isolate all faults from the substation to the end of the feed on their radial system. Future modifications to accommodate a new loop configuration have been incorporated which will greatly simplify any further system enhancements.

G&W Electric
Engineered to order. Built to last.

GWCS14-2019 09/19