

Grounded Wye Delta Transformer Power System Distribution Modeling with ETAP

BACKGROUND: Power systems are easily modeled with ETAP power system modeling software. A grounded Wye Primary and Delta secondary transformer can cause significant coordination problems during a Wye side ground fault. Nuisance tripping on un-involved radial feeders occur. Voltage imbalances in the grounded Wye side during the ground fault cause zero sequence currents to flow in the transformer Delta side. This in turn induces zero sequence current back feeding into the Wye side contributing to the ground fault currents.

SOLUTION: System parameters are gathered and the one line diagram is modeled in ETAP software. Ground faults are then simulated to verify the magnitude of the problem. Over-current devices are then coordinated. The typical solution is to un-ground the Wye side transformer preventing zero sequence current from flowing. An alternate solution is to implement directional 21 element over current protection.

SYSTEM: Options were evaluated using ETAP software. A direction 21 element relay was implemented to prove the application. Ultimately, the transformer Wye neutral was un-grounded preventing zero sequence current from flowing. This system was chosen for simplicity.

RESULT: Several ground faults have occurred since the transformer Wye neutral un-grounding. No nuisance tripping has occurred. ETAP software accurately simulated the power system ground faults.

