Loss of Mains Protection Issues

Unintentional islanding is not allowed in distribution networks due to a number of reasons:

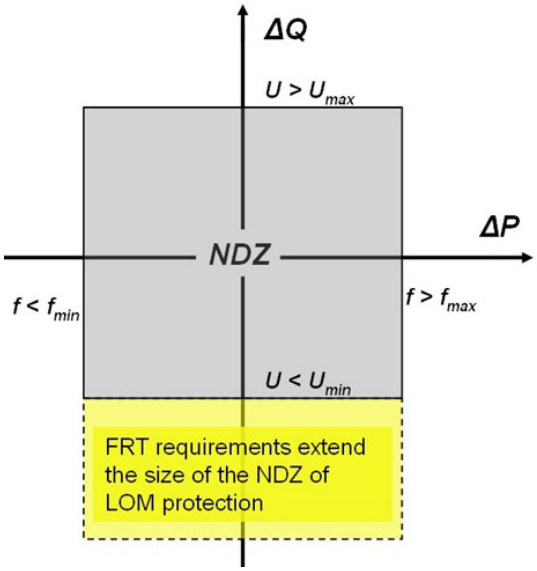
- Safety hazards for repair crews
- Potential risks of components being damaged
- Unintentional islanding can cause autoreclosing failures

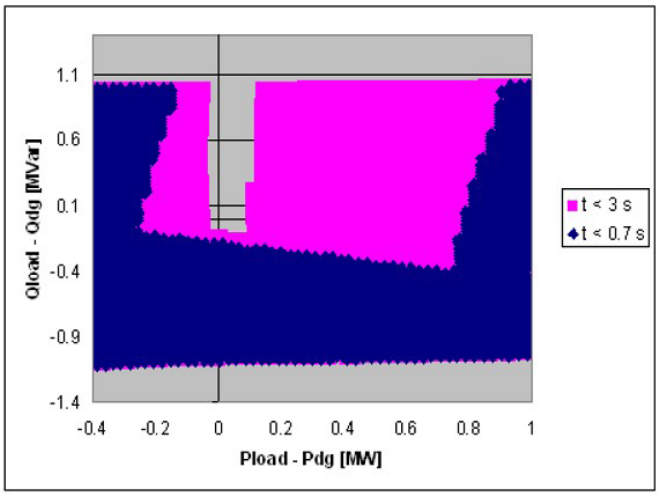
Because of these reasons, it is obligatory that all DG units are equipped with a LOM relay which ensures that unintentional islanding does not occur.

The most utilized LOM detection methods fail to detect islanding when the production matches closely with the consumption in the islanded zone. This blind area is called the non detection zone (NDZ). The size of the NDZ can be reduced by tightening the LOM relay settings but it may cause unwanted tripping. Stricter settings are also problematic in the sense that DG should support the power system during voltage dips (Fault ride through (FRT) requirements).

Many protection studies including real protection relays have been carried out with the help of a real time digital simulator (RTDS) in the ADINE project:

- The functioning of autoreclosing in a network including DG
- The contradiction between FRT and LOM protection
- The determination of the NDZs of various LOM protection functions
- Testing of a specific communication based LOM protection method by ABB





The left figure illustrates how fulfilling the FRT requirements extends the size of the NDZ due to the necessity of loosening undervoltage protection setting of the LOM relay. The right figure, which shows the form of the NDZ of a real LOM protection relay, was determined based on a myriad number of simulations which were carried out with the help of a real time digital simulator (RTDS).

ADINE is a project co-funded by the European Commission

ENHANCED LOM PROTECTION WITH FAST COMMUNICATION

The Adine project has demonstrated substantial benefits in generator protection using fast communication between IEDs. The communication uses both standard IEC 61850 GOOSE messages and user definable signals using Binary Signal Transfer (BST) that RED 615 IED offers.

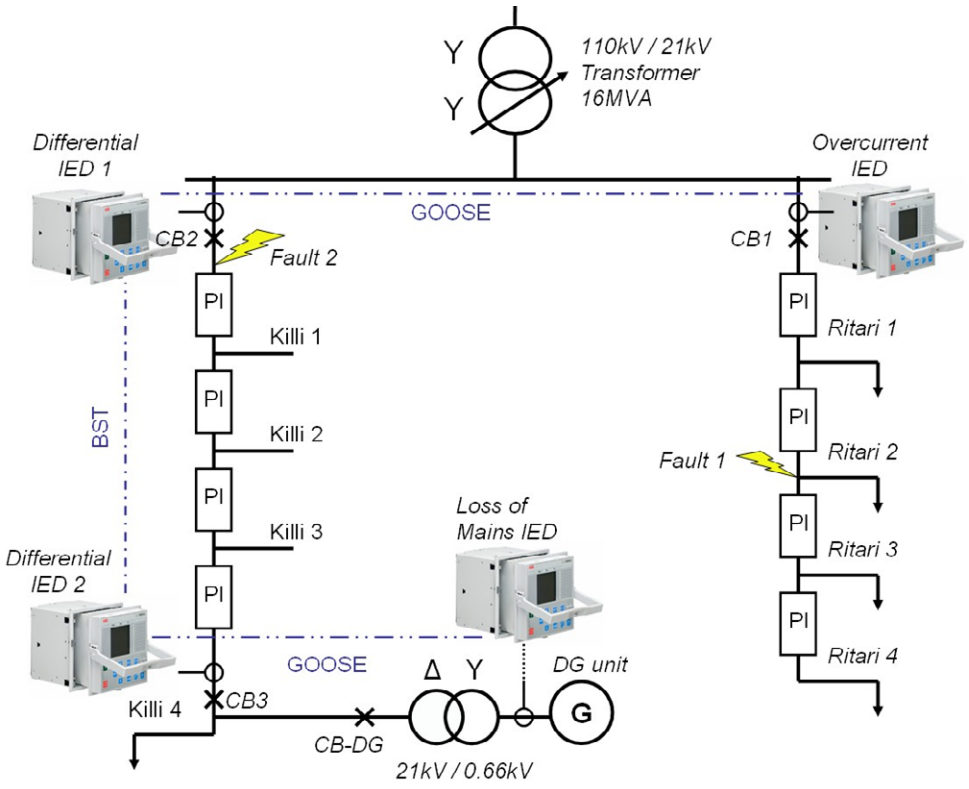
RESULTS

- Fast tripping of generator when the fault is in the generator feeder or on the substation
- Securing FRT when the fault is on the other feeders

DEMONSTRATED CASES

Fault in location Fault 1 causes a voltage dip. IED of CB1 trips and sends block as a goose message to IED of CB2. IED of CB2 sends the message via BST to IED of CB3. IED of CB3 sends the block message to LOM IED as a goose message.
-> DG unit was not disconnected

In case of Fault 2 overcurrent protection in IED of CB2 trips and sends a command using BST to IED of CB3. This IED sends trip message to LOM IED.
-> DG unit was disconnected without unnecessary delays.



The demonstration network model having two feeders and 4 IEDs utilizing GOOSE and BST messages.

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OSKE

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