The power grid has experienced significant change over the last decade. Distributed Energy Resources (DER) penetrating the grid increases the complexity of the traditional distribution network. The high penetration of decentralization generation creates challenges to the interconnected utility. Managing the evolving network requires greater flexibility while improving safety and grid resiliency. One of the challenges is the grid compliance requirements to prevent unwanted islanding of the interconnection.

Anti-Islanding protection and challenges
Islanding is when a Distributed Generation (DG) resource or a set of generators continues to power a portion of the grid when the connection from the main utility electrical power grid is no longer present. It is important to avoid unwanted islanding not only because it may lead to safety hazards for utility field personnel but also because DG units and network components may be damaged, unregulated voltage and frequency can arise. Beside the above mentioned challenges, existing communication between the utility and the interconnected DG can also be problematic. As the evolution of IP-based networks increase, telephone companies providing existing communication services are phasing out leased communication lines.

ABB solution
Transfer-trip method
Equipping the utility substation and DG interconnection with automation and external communication systems ensures a reliable, safe and a cost effective solution. The utility can be assured that they will always have a method for disconnecting interconnected generation (transfer-trip) in the event of a fault or other conditions where the utility source is lost. ABB’s anti-islanding protection solution utilizes state-of-the-art control technology based on IEC 61850 communications. It enables and addresses the automation connection with either wireless or direct fibre communication systems, as a long-term solution for phasing out leased communication lines.

Features
- Scalable automation able to handle a single interconnection or two line interconnection with easy and flexible controls e.g. de-coupling order for unwanted islanding, active and reactive power control modes.
- Remote monitoring of the DG generator at the utility SCADA/Distribution Management System center
- Connection with protection relays, power plant controller of the DG units and the Automatic Transfer Switch (ATS)
- Communication architecture deployment utilizing direct fiber or wireless provide an economical alternative to traditional leased lines

Benefits
Personnel Safety
The anti-islanding protection functionality allows for fast and reliable transfer trip. The utility field operations team can safely work on the grid knowing the local generation will not back feed into their network.

Scalable and flexible solution
The ABB solution is scalable and highly flexible. Thanks to its modular approach and proven 61850 capabilities, the control system can be designed for multiple interconnected substations which makes the solution cost-effective and future-proof.

Meeting the governmental regulations
IEEE 1547 requires any distributed generation to de-energize the island within 2 sec of the loss of utility main source. The ABB anti-islanding protection solution allows utility to meet the regulations and adhere grid compliance.
Application example

Solution description

Control

The compact remote terminal unit, RTU540, with its proven gateway functionality allows the remote monitoring and control of the utility substation via wireless or wired communication. At the independent power producer interconnection, in addition to the control functionality, the automatic transfer switch control function can ensure the reliable power supply to the grid. Supervision from the control center to the utility substation, as well the independent power producer interconnection, is enabled thanks to the MicroSCADA Pro Distribution Management System allowing the remote control of the DG interconnect.

Transfer Trip

The RTU540 is a dedicated control interface managing information exchange, via 61850 GOOSE messages, between the utilities and independent power producer sites in order to ensure the interconnection isolation to promptly avoid the dangerous islanding.

Enabling products

- Remote Terminal Unit - RTU540
- Wired communication - FOX605
- Wireless communication - TropOS 6420
- Distribution Management System – MicroSCADA Pro DMS600

Points to consider

- Do you have distributed energy in your system or planned in future?
- How do you prevent distributed energy resources from energizing lines that should be de-energized?
- How do you ensure the grid regulations are satisfied according to IEEE 1547?
- How safe is your field personnel while working on the substation or lines near a DG interconnection?