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Research Paper

A HYBRID AC/DC MICRO GRID CONVERTER CONTROL

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Micro grid acts as a solution of to integrate the large amount of micro generations without the disrupting them operation of utility grid. Power generation from their renewable energy sources like winds, solar, fuel cells, micro turbines, etc., will give us significant momentum in order near futures. Thus hybrid AC-DC micro grid will be best solution of to reduce the multiple reverse conversions (dc-ac-dc or ac-dc-ac) in a individual ac or dc grid. The proposed method of hybrid grid consists of both AC and DC networks connected to distribution generations through the multi bidirectional converters. The AC source a load is connected to the AC networks whereas DC sources and loads are tied to the DC networks. When energy storage system can been connected to DC or AC links. This micro grid can be operates in a grid tied isolated mode. The coordination of control schemes are proposed for smooth power transfers between AC and DC links during various supply and demand conditions. This paper presents at simulation of small hybrid micro grid and its modelling in the MATLAB/SIMULINK environment.

Keywords: Micro grid, Converter, Storage system

INTRODUCTION

The increasing high energy demand along with low cost and higher reliability requirements, are driving the modern power systems towards clean and renewable power. Micro grid technologies are going to be a huge supports for small Distributed Generation (DG) units on power system. Distributed Generation (DG) units in micro grid dispatch clean and renewable power compared to this conventional centralized power generations. A micro grid system which operates with different types of load and micro sources. Due to their high penetrations of Distributed Generation (DG) unit with different types of load can cause power quality and power control issues. The total load demand sharing by distributed generation's unit should sharing equal load to maintain the power control stability.

The proposed hybrid grid can operates in a grid tie or autonomous modes. The coordination control algorithm is proposed for smooth power transfers between ac and dc links and for stable

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systems operation under various generation and load condition (Dugan *et al.*, 2003).

The performance of SM control is compared with that of conventional linear control in terms of transient characteristics. It has been shown that the use of SM control can lead to an improved robustness in providing consistent transient responses over a wide range of operating conditions (Rosenberger *et al.*, 2008).

Harmonic distortion in a distribution system is a growing with concerned and has adverse effect on power quality and reliability. Understanding load characteristics during peak demand on a system provides an opportunity for appropriate conservations voltage reductions, providing saving to both the utility and the customer. Gathering demand and energy metering method data is also needed for a system planning to optimize load capacity and assists in planning for future development.

POWER QUALITY MEASUREMENTS

Traditional reliability measurement include customers per outage, outage duration, and outage frequency. Reliability indices most commonly used by electric utilities include the System Average Interruption Duration Index (SAIDI), System Average Interruption Frequency Index (SAIFI), and Customer Average Interruption Duration Index (CAIDI).

Figure 1: Hybrid Ac/Dc Micro Grid System

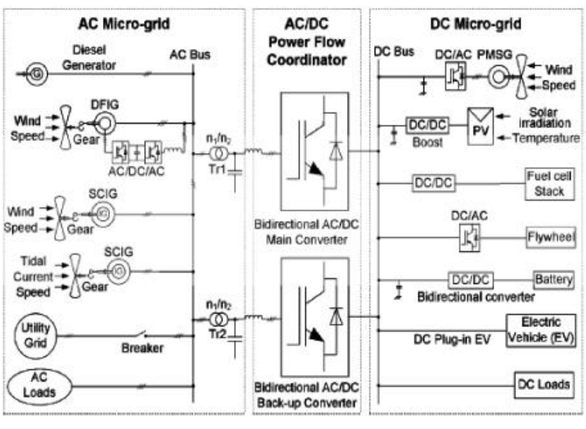
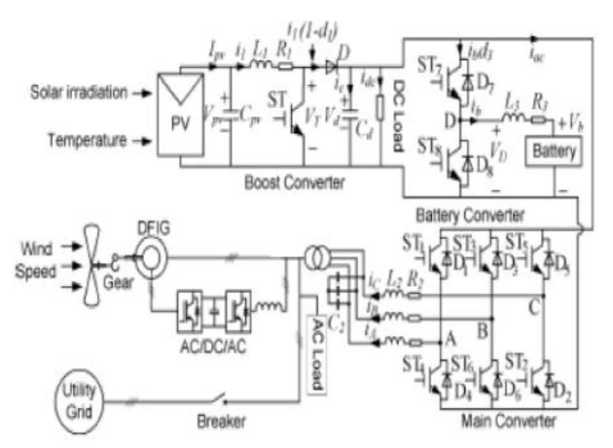


Figure 2: Circuit Diagram



Power Quality Solutions

Reducing the time to locate and clear faults has the greatest positive impact on reliability indices. Effectively locating faults is very difficult on a distribution system. Relying either on customers to call and report an outage or on crews to patrol the line to locate faults is inefficient and time-consuming but is the common approach today. Although many IEDs provide a calculated distance to a fault, most IEDs use impedance based calculation methods that are commonly used for transmission fault location but are inaccurate on distribution systems because of their complex feeder configurations.

Statistical analysis has been used for determining locations based on fault current levels. Many utilities are starting to use system models and software packages for location estimations. Using faulted circuit indicators greatly improves these methods, but without an automated solution, statistical analysis and system models are only as fast as the data collection methods supporting them.

Additional protection devices on a single feeder allows for an smaller portion of the feeder to be isolates for down line faults, but simple time coordinated protection required progressively longer time delay for uplink protections. A fault close to the substation may see a relatively long trip delay to allow for coordination's, leading to increased equipment wear. Figure 4 shows the addition of high speed peer-to-peer communications between intelligent reclose controls on the feeder. High speed communications eliminate the need for conventional time coordination between protection devices, other than downstream fuses.

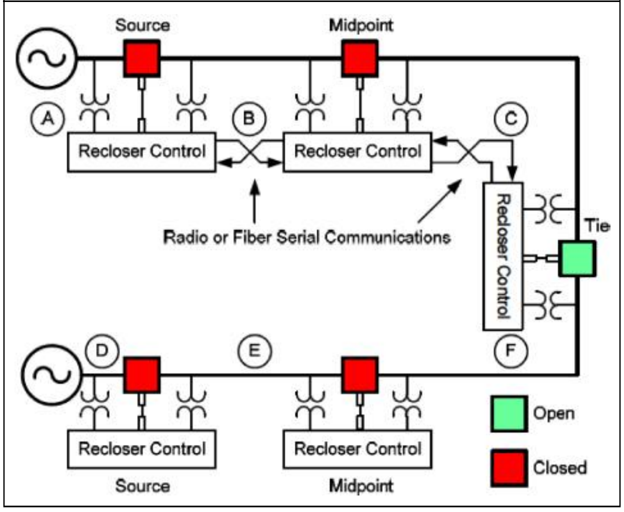
DISTRIBUTED NETWORK AUTOMATION

Communication with IEDs was originally necessary only for setting and configuring protection devices. Now, utilities collect data from IEDs for advanced automation applications. IEDs measure system quantities, such as voltages, currents, and breaker status, and make decisions based on these measurements according to protection or control settings and configurations. IEDs also record useful information for fault location and event analysis during system disturbances.

Collecting this information, along with additional monitoring reports, such as load profile reports, voltage sag, swell, and interruption recordings, and breaker wear reports.

A centralized approach to distribution automation provides benefits in many areas of reliability and power quality. A centralized control automatically coordinates point application devices from a central location, such as a substation or control center.

Figure 3: Distributed Flow Control



FLOW CHART

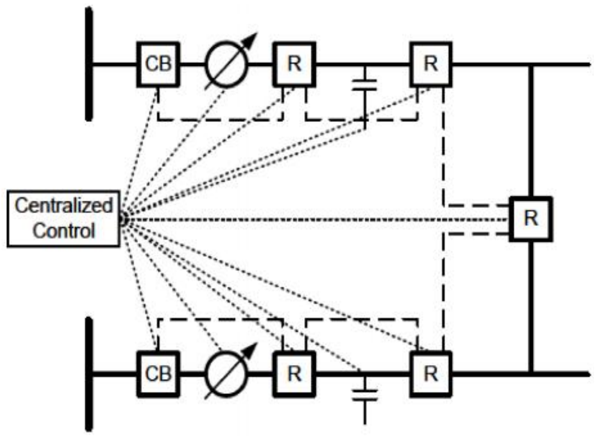
Distributed Control

The coordination of modern protective relays and controls increases the reliability of a system. One example of effective coordination is Automatic Network Reconfiguration (ANR), or FLISR, which includes sectionalizing permanently faulted segments and restoring power to nonfaulted segments so an outage impacts the fewest number of customers. Distributed control techniques for ANR may be accomplished with or without communications. Without communications, ANR schemes operate by monitoring voltage at each switch and depend on time-coordinated switch operations to reconfigure. These schemes can operate in less than a minute to isolate the faulted section of the line and restore load, a significant improvement compared to the time required to manually restore the load.

SIMULATION RESULT

A centralized control for feeder automation is

Figure 4: Simulation Result



useful when coordinating a large or very diverse distribution system. Peerto-peer systems become more complex as more interconnections or multiple sources are added to the system. Figure shows a centralized control system used for automation. Protection functions should still be addressed locally in each device or using high-speed peer-to-peer communications.

CONCLUSION

Using a system-wide approach and combining local- and wide-area communications provide the highest level of distribution automation. IED capabilities are underutilized in many systems. The use of advanced automation and communications features provides dramatic improvements to distribution system reliability and power quality. Using a system-wide approach to protection, automation, and communications helps maximize the potential of IEDs in service and creates additional opportunities for improvements in reliability and power quality. Any utility will see improvements in reliability and power quality by taking advantage of the automation, control, and communications features built into modern IEDs.

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