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Fault detection and autoline distribution system with Gsm module

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Abstract - *Transmission lines is the important factor of the power system. Transmission and distribution lines has good contribution in the generating unit and consumers to obtain the continuity of electric supply. To economically transfer high power between systems and from control generating field, High voltage (HV) and Extra high voltage (EHV) overhead transmission systems are being used. Transmission lines also perform interconnection in operation for bi-directional flow of power. Transmission lines run over hundreds of kilometers to supply electrical power to the consumers. It is a required for industries to detect and locate the faults in the power system as early as possible. "Fault Detection and Auto Line Distribution System With GSM Module" is a automation technique used for fault detection in transmission line and auto sharing of power. The significance undetectable faults is that they represent a serious public safety hazard as well as a risk of arcing ignition of fires. A high impedance fault which is not detected by conventional over current protection, such as fuses and over current relays. It is very useful in technology to provide many application like home, industry at large levels of application. Now a days, The electric power system and advance devices has become a very complicated system because of re-structuring and the penetration of distributed generation and storage. In this system the automation link is made possible between the detection and the solution of problem in minimum amount of time.*

Keywords: Fault Detection and types, Auto line distribution, GSM Module, Relay Switching.

1 INTRODUCTION

This paper represents the Line Protection on the applications of fault detection technology. This addresses the detection of those abnormal conditions where a conductor breaks and does not contact either another conductor or a grounded element. Detection of fault on

line is done by automation. Automation of system has become the demand of the day. In fact most of the system are impossible to be controlled by human being.

As fault analysis became important requirements of the electric power system to became more accurate. The need of automatic fault clearance became a necessity.

There are combinations of a circuit breaker and a relay protection system in a typical fault cleaning system. The main parts in protection system are wiring, transducers, auxiliary power supply, switches, circuit breakers, relays and the operating coil of the circuit breaker. Earlier fault is automatically cleared by electro magnetic relays. The electrical quantity, which is voltage or a current, was transformed to a mechanical force which operated the relay when a preset threshold was exceeded. But now a days the solid state relays are developed so that the operation can be performed easily and accurately.

Power devices act as imperfect loads, generate a distorted waveform which contains harmonics and interference component of waveform. These harmonics can results problems ranging from telephone transmission interference to degradation of conductors and insulating material in devices and transformers. Therefore it is important to investigation of the total effect of these harmonics impact. The addition of all harmonics component in a devices is known as total harmonic distortion (THD).

Electrical fault is the deviation of voltages and currents from normal values or states of input signal. In normal operating conditions, power system equipment or lines carry nominal voltages and currents which results in a accurate and good operation of the system.

There Fault are mainly two types of faults:

1. Symmetrical faults
2. Unsymmetrical faults

1. Symmetric fault

A symmetric or balanced fault as name indicate affects each of the three phases equally. Transmission line faults normally, 5% are symmetric.

There are of two types namely

- line to line to line to ground (L-L-L-G)
- line to line to line (L-L-L).

2. Asymmetric fault

An asymmetric or unbalanced fault which does not affect each of the three phases. Common types of asymmetric faults, and their cause

There are mainly three types namely

- Line to ground (L-G)
- Line to line (L-L) and
- Double line to ground (LL-G) faults

TYPES OF FAULT DETECTION

The fault occurring in the power lines and cable can be classified into four main categories : short circuit in the cable or transmission line, short circuit to earth, high resistance to earth and open circuit.

Four method that are mostly used in detecting fault location are described as follow

1. A frame
2. Thumper
3. Time domain reflectometer (TDR)
4. Bridge method

This survey includes the relevant fault models, failure effects or manifestations, fault injection techniques used in developing and validating the safety system, requirements for failure diagnosis, and finally the actual failure diagnosis methods themselves. The development of the algorithm for detecting the faults on the transmission lines has been progressed, especially in recent years. These several decision algorithms have different solutions and techniques. Transmission and distribution lines are vital links between generating units and consumers. They are exposed to atmosphere, hence chances of occurrence of fault in transmission line is very high, which has to be immediately taken care of in order to minimize damage caused by it. In this paper discrete wavelet transform of voltage signals at the two ends of the transmission lines have been analyzed. Transient energies of detail information for two consecutive data windows at fault are used for analysis. Four layer feed forward back propagation neural networks are designed to classify and locate the fault at different single line to ground fault conditions. It is done by automation. Automation of system has become the demand of the day. In fact most of the system are impossible to be controlled by human being. The main objective of the project is to design and fabricate an automated control system for automatic power grid control. Detection of fault done through micro controller and with the help of LED we can analyze the fault. The whole process is centralized around micro controller and relays. Here GSM module is used for information. Advances in digital technology have enabled practical solutions for the detection of a high percentage of these previously undetectable faults.

2 LITERATURE SURVEY

Below are the literature review on fault detection in transmission line using different technique by some authors and their main observations:

High Impedance Fault Detection of Distribution Network by Phasor Measurement Units:
Author estimated the High-impedance faults on distribution feeders are abnormal electrical conditions that cannot be detected by conventional protection schemes because of the low fault current due to the high impedance fault at fault point. These faults often occur when an overhead conductor breaks or touches a high impedance surface such as asphalt road, sand, cement or tree and pose a threat on human lives when neighboring objects become in contact with the line's bare and energized conductors So far, many models have been proposed to show high impedance faults features such as nonlinearity, asymmetry and the low frequency of HIF current. By Mohsen Ghalei ,Monfared Zanjani, Hossein Kazemi Karegar

Multi-Agents for Fault Detection and Reconfiguration of Power Distribution Systems: Author introduced system model for fault detection and reconfiguration based on graph theory and mathematical programming. The multi-agent models are simulated in Java Agent Development Framework and Matlab and are applied to a power system model designed in the commercial software, the Distributed Engineering Workstation.By K. Nareshkumar.

Earth Fault Detection in Noneffectively Grounded Distribution Systems: Author introduced novel approach for fault detection and direction determination for these transient/intermittent faults. The basic idea is to extract the fault direction using the instantaneous power's direction. The instantaneous power is obtained by using Hilbert transform. By Tao Cui, Xinzhou Dong.

Optimal Coordination of Automatic Line Switches for Distribution Systems : Author
focuses on distribution feeder automation system; protection coordination; underground 4-way automatic line switch This study investigates the coordination time intervals (CTIs) among the protection devices of the duty point of high voltage customers, automatic line switches lateral protection relays, feeder overcurrent protection relays, bus-interconnection overcurrent protection relays, and distribution transformer overcurrent protection relays, so that the entire protection scheme of the distribution systems can be formulated, particularly for the two-level protection scheme below the feeder circuit breaker (FCB). By Ming-Ta Yang and Jyh-Cherng Gu Hilbert-Transform-Based Transient/Intermittent.

Fault Detection Techniques For Power Transformers: Author investigated An artificial neural network is used to detect off-line faults and whereas wavelet transforms are being used for on-line fault detection. The Dissolved Gas Analysis to detect incipient faults has been improved using artificial neural networks and is compared with Rogers ratio method with available samples of field information. By N.Yadaiah and Nagireddy Ravi.

Transmission Line Faults Detection, Classification, and Location Using Discrete Wavelet Transform: The Author proposed system uses Discrete Wavelet Transform (DWT) which is widely used in recent times for power

system protection. DWT is used here to extract the hidden factors from the fault signals by performing decomposition at different levels. Daubechies wavelet "dB6" is used with single level decomposition and adaptive threshold is calculated to discriminate and detect the faulty phase. By K.Saravanababu.

Multiple-Output Propagation Transition Fault Test: Author discussed The test results of eight "challenge" Murphy chips that escaped either at least one of the loo%** single stuck-at fault test sets or the 100% transition fault test set were analyzed. The results show that: (1) An input pattern sequence is needed to detect the defects in the eight chips; (2) The detection of a transition fault depends on the outputs at which it is observed; (3) A transition fault test set is more effective if each transition fault is detected more than once. A transition fault test set, TARO, in which each Transition fault is propagated to All the Reachable Outputs, is created and the experimental results are presented. By Chao-Wen Tseng and Edward **J.** McCluskey.

3 CONCLUSIONS

The electric energy produced at generating stations is transported over high voltage transmission lines to utilization points. In the early days , electric systems were operated as isolated systems with only point-to-point transmission at voltages that are considered low by today's standards. Transmission lines should transmit power over the required distance economically and satisfy the electrical and mechanical requirements prescribed in particular cases. It would be necessary to transmit a certain amount of power, as a given power factor, over a given distance and be within the limit of given the regulation, efficiency and losses. The lines should stand the weather conditions of the locality in which they are laid. The choice of a device for fault consideration, best suited to particular field conditions, is not only a technical issue but also an economical one. Unfortunately, most publications on various devices for harmonic suppression are confined to design or to properties of particular devices or methods. Comparative studies on them are generally not available.

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