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Protect And Techniques Power Control System

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Abstract
Acompany Wide Area Communication and Controlhas become an intelligent technology, which makes the real-time interaction between the substations and the wide area protection. and Control system possible, However, the present protection and control system to handle this real-time data has been recognized to be deficient. In this paper begins by reviewing the development history of power system protection, with special attention paid to the recent development in the field of wide-area and integrated protections, in order to Look into the future development of protection and Control systems.

New technique for power system protection and Control is proposed. Then the concept of integrated wide area protection and control is introduced, where it can be Shown that a hierarchical protection and Control system provides the protection and control for wide area or regional Power substations/plants and their associated power

The system is mainly divided into three Levels : the local, the substation/ plant, and the wide area / regional .
The integrated functions at each Level are described in details with an aim to develop an optimal Coordination mechanism between each Level. The key element in the proposed system is the wide prea area real-time protection and Control information platform, which not only enables the merger of three Lines of deface for power system protection and control, but also provides a perfect tool for the application of Cloud Computing in substations and powerk networks.

I. Introduction

It emerged at the beginning of the Last Century with the application of the first electro-mechanicalovercument relay.
the majority of the protection principles currently employed in protection relays were developed within the first three decades of the Last Century, such asovercurrent, directional,. distance and differential protection .
The development of modern science and technology, especially electronic and computer technology, promoted the development of relay technology, such as materials, Components and the manufacturing process of hardware structure of relay protection device.
At the same time, great theoretical progress had been made in the relay protection.
In the Last Century from the emergence of protection to stimulates the development in power system protection. the relay protection had gone through anamber of development stages. migrating from.

electro-mechanical to semiconductor, and subsequently to integratedCircuit and microprocessor technologies.
Today, Microprocessor -based digital andNumericnumericrelays are replacing Conventional relays in all areas of power system protection. However, many of the same relaying principles of protection are still playing a dominant role to date. in the Late 1960s, the application of a centralized substation protection system based on a Centralized Computersystem was proposed.
This Constitutes an improtant milestone in the history of power system protection.

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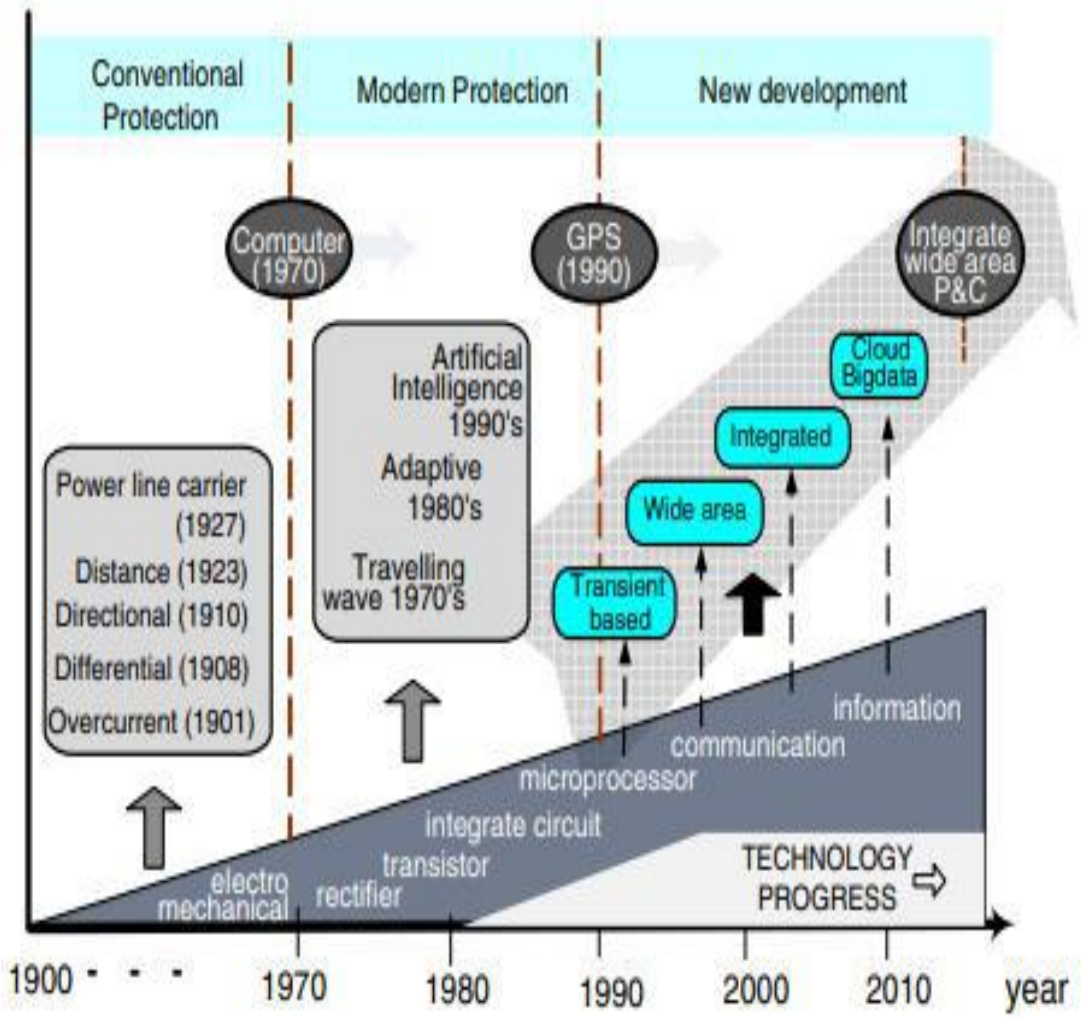

especially the Adaptive and the Artificial intelligence (AI)-based protection techniques proposed in the 1980s and 1990s.

The adaptive protection started with the application of invers definite Minimum Time overcurrent (IDMT) protection in the early time of protection history. The Concept played an important role in the 1980s with the progress of Computing technology.

and associated Control theory It can be defined as a new type of relay protection which can' change the Performance, characteristics or set Value according to the operation mode and fault Condition of the power system.

The basic ided of adaptive relay protection is to protect the power system as much as possible to improve the performance of the protection.

The idea fits well with the Concept of an overall integrated protection where the protection Package would not only oversee individual units of a plant but also a section of the network.

However, the idea has not been widely applied unit recently, Since there were No availablecomputezhardwane/ soft Ware or Communication technologies to support such an idea. Since then, Relay technology has enjoyed successful successfull developments based on theapplication of digital techniques.

The introduction of microprocessors into protection in the 1980s, generally followed the Conventional approach with the implementation of distributed processing Platforms that concentrated on protecting individual units of the system.

Limited integrated protection was provided in the form of back-up protection and thus remained a secondary function.

Developments in the 1980s and 1990s provided new means to advance power! system protection,

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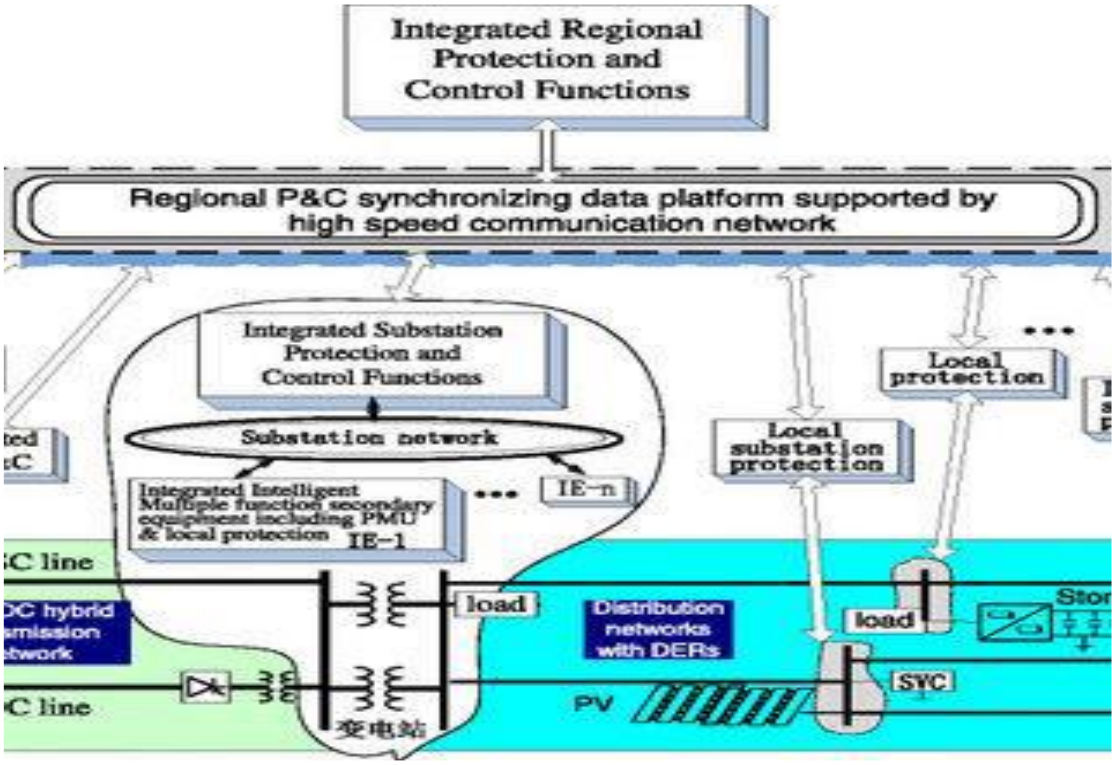

result of these developments, the performance. of the protection relays has been improved.

However, these developments have Concentratedon the improvement of Conventional relaying techniques, and no significant new relayingprinciples have been derived from the"application of the Adaptive and AI techniques,At the same time in the 1990s, with the Continuous expansion of the power network, the demand for fast fault clearance to improve system Stability encouraged research into non the power Network, the demand for fast fault clearance to improve system stability encouraged research into non power System frequency fault detection techniques to increase the speed of the relay response.

This Led to the development of the so-called "transient based protection" relays based on travelling Wave and superimposed Components which utilizer the fault generated transmission system protection.

Studies have found that the fault generatad high frequency transients can be detected and quantified, creatingthe possibility for or developing new protection principles and techniques.

Considerable effort has now been devoted to research on high frequency transient detection.

Another important milestone is the application of novel Communication. technique, the

Adaptive relay protection has the advantage of improving the response of the system, economic the reliability and improving the, enhancing benefits. It has a wide application prospect in the field distance protection, transformer protection, generator protection and so on.

Research has discovered that, to achieve the protection of the system adaptive to the operation mode and fault status, more detailed system operation and fault, informationare required Communication network. The 1990s witnessed the rapid development of electronic and Computer technology, the artificial intelligence technology such as articial neural networks, genetic aLgorithms, evolutionary algorithm, fuzzylogicand other research applications, which have been applied to the relay protection.

For example, artificial neural network (ANN) isused to achieve fault type identification, fault distance measurement, direction protection and etc.

Artificial neural network has the characteristics of distributed storage, parallel processing, self-organization and self-Learning.

The application artificial intelligence will improve the speed and accuracy of fault detection and analysis, which represents the future development of an intelligent diagnosis system. As a

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obtained from multiple power plants, and Components, which could have significant advantages over the existing protection techniques, based on the individual plant or Component, unlike Centralized protection (or substation area protection), the integrated protection does not simply Centralize the relay hardware/software, but Contrates on the developments of newConcepts and algorithms based on multiple points of measurements via this means is hoped that the concepts and algorithms on multiple points of measurements, via this means it is hoped that the performance of protectioncan be improvedSignibrantly. There was also research in the Field of integrated wide area protection.

IV. New technique and development

A new Concept of the integrated wide area protection and Control has been proposed recently.

The main focus of the Concept is the integrationbetween the protection and control, particularly at the wide-area orregional Level.

aimed to provide a number of benefits to e.g. the future potential and control system .

e.g. of defence system and on-Line Self-healing decision making in order to prevent Cascading tripping of Large area power network. The Concept wide area protection and Control is introduced, in which a three-Level hierarchically coordinated system, supported by the specially designed realtimesynchronised wide-area Communication network provides the protection and Control for wide-area or regional power substations/plants.

utilization of globalpositioning system (Gps) in power system protection. In this respect, anumber of new techniques has been proposed. In particular, the new proposed protection relay principle is able to provide protection for wide area power network. following the development, the concept of wide area protection focusing on Control aspect, has been presented.

II. Recent development in power system protection and control.

New technique progress in high-speed Communication network and information technology, there were Significant developments in power system protection, power system Control and wide area Control in recent years, particularly in the wide-area and integrated protection.

Recent development wide Area protection in recent years, the fast development in Communication technologies makes the wide-area information exchange poussible. In this respect, the emergence of the wide area measurement system provides a new idea for the design of power system protection systems. The first Wide-area protection principle is derived from the transient based protection in 1996, in which Gps time synchronization played major role in the design.

This Was immediately followed by a summary paper in 1997, which systematically outlines the Concept of the so-called " Wide area protection", focusing principally on the Control aspect of the area.

The Wide area algorithms based on novel algorithms and a clearance fault clearance, analyse the effects on the system stability based on the fault system analysis and take necessary Control measures to perform the functions of relay protection, Security, and stability Control in order to prevent voltage Collapse.

Wide Area relay protection has quickly become a hot research topic with many research published particularly in recent years.

III. Integrated protection

With the development of digital technology, more and protection functions for any given apparatus (Line, transformer, generator, etc.) have been implemented within one protective device to achieve Certain degree of integration For Example, anameric Line protection relay may have distanceor Current differential Function as the backup protection. The recent development in microprocessor and Communication techniques provided new means to derive new protection principles and Schemes based on the information

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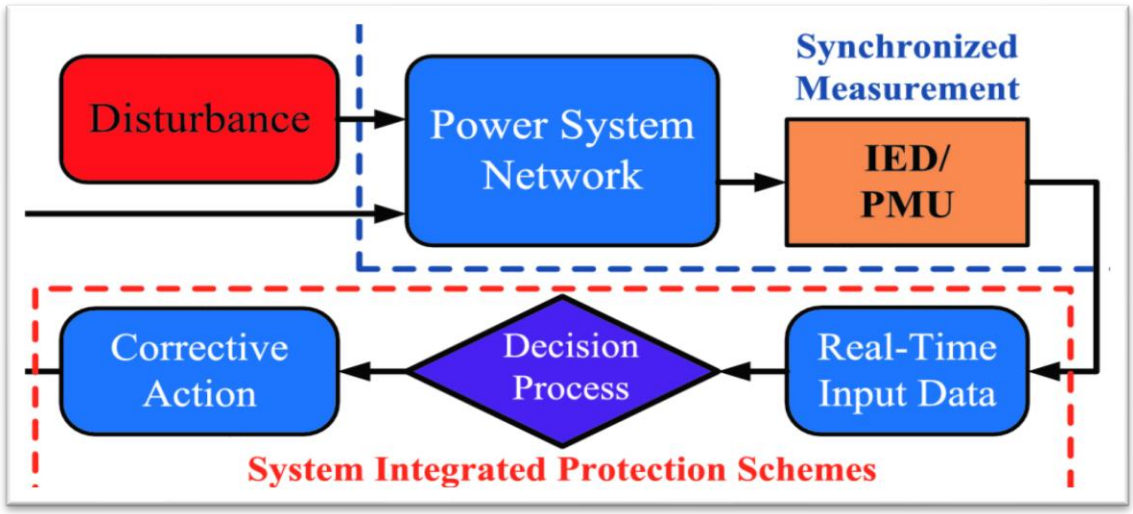

V. Integrated wide area/regional protection and control

It offers a potential for the merger ofthree Lines of defence into a unified system to ensure more the reliable and safe operation of power grid.
Advanced applications for the integrated Wide area protectionand Control.
With the Continuous advances in application, the system to become useful in power system application.

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The IWAPC specially designed for the protection and control of power network is able to offer fast protection.
In addition, they both integrate functions of automatic UFLS and UVLS, voltage and frequency Control, Oscillation detection and out-of-step separation in order to achieve significant improvements in the protection and Control of Power systems. Synchronized information platform Substation is installed with a wide range of electrical equipment.

The real-time synchronized information accurately Collects wide area information and Conducts data mining to investigate the Logic relation between real-time information to increase the Sensitivity, reliability and fault tolerance Capability.

VI. Conclusions

This technique presents an integrated wide area protection and Control system based on a hierarchical structure, which integrates protection and Control at Local, substation and regional Levels.
Covering both transmission and distribution networks, the system is supported by proposed high-speed Synchronised Communication network and the real-time protection and Control information platform.
The system, which integrates the advanced protection techniques and the developments in Control system, offers not only fast protection, but also Complete Control of the entir power network.