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Transformer Fleet Monitoring

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Abstract

Transformer monitoring systems are increasing in number and having a clear overview of the whole fleet of monitored transformers is becoming crucial in an effort to provide the end user with an easy way to monitor its transformer assets and react accordingly to the monitored situations. This paper will introduce a Fleet monitoring solution that provides the architecture and tools to accomplish the set tasks of connecting and accessing information of all the monitoring systems from their dedicated locations.

Standard transformer monitoring system configuration is made of a local unit on the transformer for collecting and processing raw data from the sensors and transferring the data to another unit, usually a server located in the substation which stores it in the database. The server unit is also responsible for the presentation of data to the end user and communication with supervisory control systems. This configuration is well capable of achieving its purpose of monitoring the transformer state and operation. The challenge is in accessing the monitored data.

Traditional approach for accessing the data was to access the servers locally in the substations. Responding to the monitored conditions was done by connecting critical alarm signals from the monitoring system to the substation control system and in case of an alarm indication the operator from the substation was required to access the monitoring system for further details and inform personnel responsible for the maintenance of transformer units. The transformer maintenance personnel were then required to check the monitored data either by connecting remotely to the monitoring system, which in most cases is not possible due to security and technical restrictions, or to travel to the remote location to investigate the issue. This approach was both very time consuming and costly. There is also a consideration that the modern substations are becoming unmanned or have just a basic crew which may consist of personnel not qualified or trained for the required tasks.

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The challenge was to enable a centralized access to the distributed monitoring systems across multiple substations. An architecture, both hardware and software, was developed, that accomplishes this task. The architecture is highly modular so that the components of the system can be distributed and integrated into an overall system which is fully customizable to the end user requirements. During development one of the main considerations was to make the integration of already existing systems as seamless as possible. The result is a Fleet monitoring solution that centralizes access to the information from all connected monitoring systems while at the same time does not interfere with the work of dedicated monitoring systems at remote locations. This way the data can be presented directly to the right personnel. This paper will also discuss further goals and directions of development for transformer fleet monitoring.

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Keywords: transformer monitoring; fleet monitoring; asset management

1. Introduction

Transformer monitoring systems have seen an increase in number and in system complexity over the past 10 years. Monitoring systems are generating more information that must be presented to the user in a clear and organized way [1,2]. As the monitoring systems grow in numbers they are becoming an independent subsystem in the substation that has a different purpose that the traditional control system in the substation. The main purpose of the monitoring system is object oriented monitoring and asset management [1].

The paper will present Končar TMS Fleet monitoring, a system that rises to the challenge in accomplishing the task of networking transformer monitoring systems and giving the end user the best possible insight into their equipment.

Nomenclature

TMS	Transformer Monitoring System
DGA	Dissolved Gasses Analysis
LCP	Local Control Panel
NI	National Instruments

1.1. Traditional approach

Standard transformer monitoring system configuration is made of a local unit on the transformer for collecting and processing raw data from the sensors and transferring the data to another unit, usually a server located in the substation which stores it in the database [4]. The server unit is also responsible for the presentation of data to the end user and communication with supervisory control systems. This configuration is well capable of achieving its purpose of monitoring the transformer state and operation. The challenge is in accessing the monitored data.