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Scada Configuration on 20kv Distribution Network Using Ropo, Idas, and Survalent

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ABSTRACT: Electric Power Distribution System in Central Java and D.I. Yogyakarta uses the SCADA system in its operation or also known as DMS (Distribution Management System), where the entire process of electricity distribution is monitored and controlled through a centralized SCADA system. However, this has not been implemented in Central Java & DIY, the existing SCADA system is still separate in each scattered area. To concentrate it is not as easy as imagined, it takes a strategy and steps that are quite significant. Therefore a unit of PT. PLN (Persero) Central Java & DIY Distribution Regulatory Area to be in charge as well as the operation of the distribution of the electric power system from transmission to network.To optimize all three and improve the reliability of electricity distribution PT. PLN (Persero) APD Central Java&DIY changed the current SCADA configuration (which is still separate in each region) into a centralized and well-organized future configuration. The stages of realizing the plan include: setting up the SCADA master configuration, namely ROPO, IDAS, and Survalent; Build a backup server (Quad Reduntdant Server); and embody the concept of 3 DCC.

Keywords: Configuration, SCADA, Distribution

I. INTRODUCTION

PT. PLN (Persero) Central Java and DIY Regional Distribution Control Areas were chosen as the Field Work Practices because this company is a company that regulates / controls the distribution of 20 KV voltage for Central Java and DIY areas, where Semarang PPE has controls such as SCADA, ROPO, IDAS, Survalent for distribution control. So it is a suitable place to explore the knowledge of electric power distribution control systems.

It is hoped that this paper can provide an understanding of the electric power distribution system, especially the use of SCADA at PT. PLN (Persero) Distribution Control Area of Central Java and Yogyakarta Special Region and introduce the world of work in PT. PLN (Persero).

The purposes of this writing include:

1. Knowing the electricity system in Indonesia, especially the Electric Power Distribution System applied in Central Java and the Special Region of Yogyakarta
2. Understand the Supervisory Control And Data Acquisition system applied to the electric power distribution system in Central Java & DIY

II. DISCUSSION

A. SCADA system

SCADA stands for Supervisory Control and Data Acquisition

What is meant by SCADA is a system of monitoring, controlling and processing data in real time. .SCADA components include Master Station, telecommunication media and Remote Station / Remote Terminal Unit.

SCADA System Configuration Picture

B. SCADA Equipment

a. Master Station

Master Station is a collection of hardware and software that is in the control center of the SCADA system. The data obtained from the substation is sent to the master station while the orders from the operator at the Control Center are sent from the master station to the substation (RTU).

b. Remote Terminal Unit

Remote Terminal Unitis one component of an electric power control system which is an electronic device that can be classified as a smart device. Usually placed in substations, connecting substations, distribution substations, and generating centers as a device needed by the control center to acquire process chain data for remote control, teleindication and telemetering.

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c. Functions of Tele Control Control, Tele Signal, Tele Metering

1. Telecontrolling

Telecontrolling, namely the operation or control of switching equipment at the Substation or Generating Center that is far from the control center.

2. Telesignaling

Telesignaling or teleindication, which collects information about system conditions and operating indications, then displays them on the control center

Indications that can be monitored from the control center are:

- PMT/PMS status.
- Alarms such as protection and other equipment.
- Remote control position.
- Transformer tap change position.

3. Telemetering

Telemetering, which is carrying out measurements of the electric power system quantities in all parts of the system, then displaying them on the Control Center.

The quantities that can be measured are as follows:

- Bus bar voltage and current.
- Active and reactive power generating units.
- Active and reactive power IBT transformer 500/150 or transformer 150/20KV
- The active and reactive power of the conductor/feeder.
- System Frequency

- **Existing Condition of SCADA Central Java&DIY**

Currently, all GIs in the Central Java & DIY APD areas have been installed with SCADA facilities. PLN APD Central Java & DIY has 3 Master SCADA systems namely Survalent, ROPO and IDAS.

Master Survalent was built in 2004 (in the Semarang Area) has 1 master 1 redundant located in the Central Java & DIY APD Office with a coverage area of Semarang Area (13 Substations), Pekalongan Area (2 Substations), Yogyakarta Area, APJ Surakarta and APJ Klaten (33 Substations), as well as several GIs in the Kudus, Salatiga, Magelang, Purwokerto, Cilacap and Tegal areas which are implemented with a dual master system, namely Survalent and ROPO.

Master Ropo was built in 2005 (in 3 areas Salatiga, Pekalongan and Cilacap) totaling 7 units located in each area according to the coverage area, namely the Kudus Area, Salatiga, Magelang, Pekalongan, Tegal, Purwokerto and Cilacap (34 substations). The background of the development is the handover of the 20 KV feeder cubicle assets from P3B to the Distribution Office but with the human resources.

Master IDAS began to be built in 2007 (in the Semarang Area, only for keypoints in the distribution network (Recloser and LBS) with the name DAS) has 1 master 1 redundant located at the Central Java & DIY APD Office with a partial coverage area of the Semarang Area (5 substations and network). The background of the development is the grant assistance (grant) from the South Korean government through KEPCO.

- **SCADA ROPO**

Remote Monitor and Control System for Outgoing Feeder Operator 20KV is a system that functions to carry out the process of monitoring and controlling equipment at the Substation (Substation) of a Master Station as a control center.

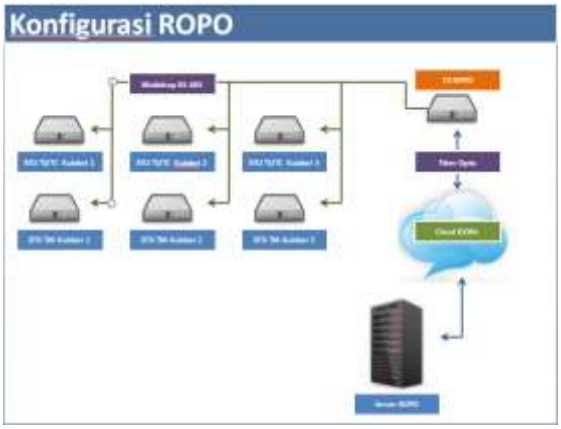

Figure 1: Feeder Out Remote Operator Configuration

- **IDAS SCADA**

Intelligent Distribution Automation System(IDAS) is one of the Supervisory Control and Data Acquistion (SCADA) applications produced by Korea and has just been implemented in Indonesia, especially at PT PLN (Persero) APD Semarang and was inaugurated on September 16, 2010. IDAS is a software that can monitor and control Load Break Switch (LBS) and recloser on distribution network remotely, as well as Supervisory Control and Data Acquistion

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(SCADA) SURVALENT and Remote Operator Outgoing Feeder (ROPO).

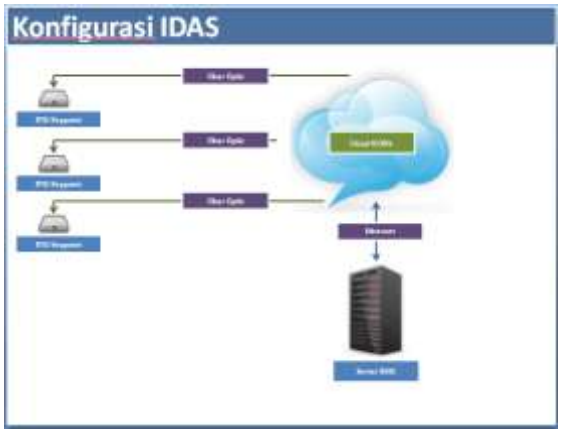

Figure 2 :Intelligent Distribution Automation System Configuration Picture

- **SCADA Survalent**

Survalent is a SCADA technology originating from Canada which has several parts in its operation in Central Java & DIY PPE. OnSurvalentScada Software, a program provided for MMI (Man Machine Interface) is Worldview.

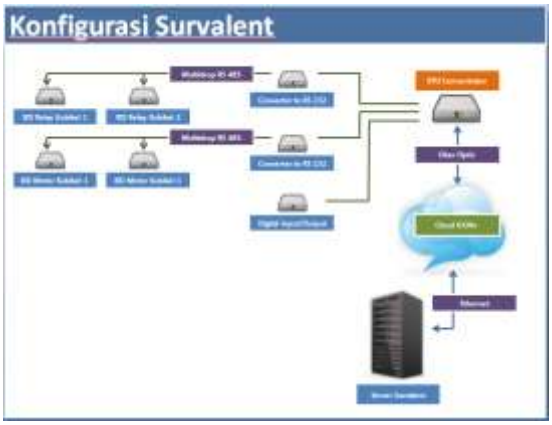

Figure 3: Survalent configuration

C. SCADA System Development

A reliable system can be improved in terms of data accuracy and settings that are always updated and follow real conditions that also continue to change with the times. Therefore, a mature development plan is needed to improve system performance.

i. Quad Redundant Server Plan

To support the reliability of the system, of course, it is necessary to have a backup system or backup system that supports and covers the continuity of the distribution of electricity. As previously explained, currently in Central Java and the Special Region of Yogyakarta, there is only one Distribution Management Area unit, namely in Semarang. However, it is possible that the Central Java & DIY PPE, which is the control center for the electricity system in the Central Java & DIY region, will experience non-technical problems and cause disruption to the distribution system. This can be due to external factors such as environmental factors, natural disasters for example. The following is the current condition of the distribution system controlled by Central Java & DIY APD.

The Quad Redundant Server plan is a plan to build a backup Distribution Regulatory Area that can take over control of the electricity distribution system in the event of a disturbance that does not allow Semarang PPE to operate. The first step is to build a server in Yogyakarta then leased line and integrate it so thatit can be automated. This is so that when an interruption occurs, the Yogyakarta Server can directly take over control so that there is no system blank out.

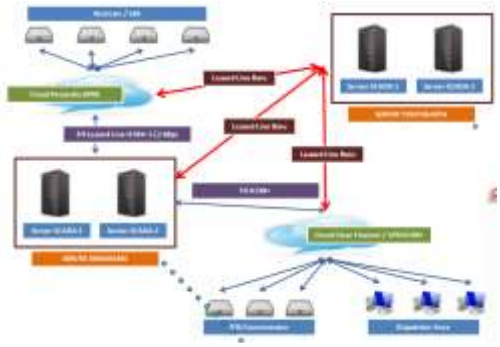

Figure 4 Quad Reduntdant Server Plan

ii. Distribution Control Center System

Masters that cannot meet future development plans will not be developed and their control load will be gradually reduced without disrupting network operations. It is planned that the network equipment to be controlled will always increase both in terms of volume and type, including data points that are processed, so to maintain the reliability and performance of the scada system, it is necessary to build a new master server, the number of which adjusts to the development of equipment on the network. The concept applied is DCC and sub DCC.

III. CONCLUSION

The Central Java&DIY Distribution SCADA System development plan includes three main stages: changing the master configuration,

building a ready-to-operate backup server, and realizing 3DCC. The plan for the Quad Reduntdant server is to build a backup server in Yogyakarta which is exactly the same as the server in APD Semarang complete with an operational system to back up data and control the SCADA Distribution System in the event of a disturbance that is severe enough to cause the Semarang APD server to not operate.The 3 DCC concept is to build three Distribution Arrangement Areas in three different places, namely Yogyakarta, Purwakarta, and Semarang. With three servers complete with their operating systems, the control and monitoring are divided according to their respective DCC areas to improve the operational performance of faster and more accurate distribution of electricity.

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