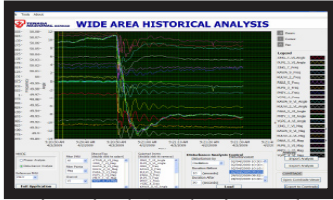


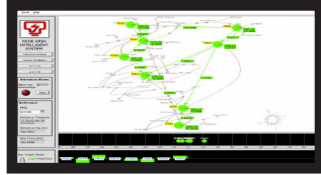


R&D Fund Project

Research and Development of Real Time Wide Area Intelligent System [Monitoring, Control & Protection] Program _ Phase I



Historical Analysis Tool



Real-Time Dynamic Visualization HMI

Project Overview

In order to cater for the increase in load demand, TNB faces many challenges with regards to power system congestion management and infrastructure expansion such as social and environmental issues. On the other hand, TNB also has to optimize its operation to deal with the continuously increasing fuel price. As a result, operating the national grid has becoming increasingly complex and it is inevitable in the near future that the grid has to be operated closer to its limits. Advance applications in wide area monitoring, control and protection offers cost effective solution under the above mentioned circumstances to improve the grid system operation. This project is the Phase 1 of a 5 year R&D program on Real Time Wide Area Intelligent System [Monitoring, Control and Protection]_WAIS which was approved by TNB Transmission on 15th January 2007. Under this project, the project team is to carry out research and development work in four different focus areas: WAMS system and power oscillation monitoring system, overload management and protection scheme, lines thermal monitoring system and generator dynamic parameters monitoring system.

Deliverables

The implementation of Wide Area Intelligent System Program Phase I was successfully completed in August 2009 with the following deliverables:

1. Completion of WAIS fundamental infrastructure: Installation of 12 phasor measurement units, Phasor Data Concentrator, Data Historian, Visualization Software and Application Engine Server.
2. Completion of WAMS Applications: Wide Area Angle, Voltage & Frequency Monitoring, Power Oscillation Monitoring (POM), Line Thermal Monitoring (LTM) for 275kV ATWR – BGJH lines, Generator Dynamic Parameter Monitoring (GDPM) for one of the generator units at Serdang (GT4), Janamanjung (U2) and Gelugor (ST) power stations and Historical Analysis Tool. Phasor and Disturbance Historical Analysis

Benefits

The implementation of Wide Area Intelligent System Program Phase I should be able to provide the following benefits:

1. Better situational awareness for control engineers to make fast and good/reliable decisions.
2. Better view of the grid stability dynamically in real-time.
3. The control engineers are able to identify the source of the grid instability.
4. Early warning to avoid power system collapse.
5. Real-time monitoring of the angular difference across a key transmission corridor enabling the operators to assess the stress on the grid.
6. Provides operators with a good estimate of the average temperature, the present line resistance and line losses (active & reactive power)
7. Able to view the sequence of events for any disturbance that occurred on the grid for post-disturbance analysis [based on phasor data: voltage magnitude, frequency and phase angle for the monitored substations].