SCADA/DA Systems for TNB's Metro Region Putrajaya, Selangor and Wilayah Persekutuan

Tenaga Nasional Berhad (TNB) – the National Utility of Malaysia. It's core activities are in the generation, transmission, and distribution of electricity with installed capacity of 17,000 MW. The transmission grid of TNB operates at voltage levels of 500, 275, 132 & 66 kV, and the distribution network operates at 33, 22 & 11 kV.

In early 2002, **inCONTROL Tech Sdn. Bhd.** (formerly known as VA TECH SAT Sdn. Bhd.), with its partner **PSI CNI** from Germany, received the order from TNB Distribution for the design, supply, deliver, install, test and commission of TNB's SCADA/DA systems for the Metro Region. The order consists of one (1) Master System as SCADA and Distribution Automation facility for the entire distribution network in Klang Valley and 110 Primary RTUs to be installed around Klang Valley.

Overview

The Master System, **PSIControl-*EE*** consists of basic SCADA functionalities such as data acquisition from the RTUs, processing of acquired data, supervisory control, user interface functionality (HMI), historical data processing, trending, communication with the communication gateway, etc...

Additionally, two (2) enhanced Distribution Management Systems (DMS) are also implemented into the Master Systems. These are the Work and Network Management Functions.

1) The first DMS function covers activities and tasks such as Distribution Operation Analysis, Safety Documents, Operational Document Management and Operational Planning.
2) The second DMS function is the Forced Outage Management Functions, which include Fault Location, Isolation, and Service Restoration function, estimation of customer interruption, and Network Normalization Management.

The telecontrol protocols currently implemented are:

- IEC 60870-5-101
- Extended WISP+
- Harris H6000

The Extended WISP+ and Harris H6000 is required for replacement of TNB's existing Master System in Bangsar (BRCC) and Klang (KRCC), to support all existing RTUs. Whereas the IEC 60870-5-101 protocol is mainly used to communicate with the new RTUs to be installed in TNB's network, including the 110 primary RTUs awarded to iTEC under the same Contract.

The TASE-2 protocol is also implemented as control center to control center communication protocol.

The VA TECH SAT RTU is the first RTU type tested in Malaysia to comply with rigorous IEC standards with specifications as high as Class IV (or Level IV). The RTUs were tested for a period extending well over 3 months to more than 15 IEC/CISPR/EN standards each having various test cases. Researches were done in-house in iTEC's Sungai Buloh engineering facilities, to meet the requirements of the high level specifications. For e.g. no testing laboratories in Malaysia were conducting the 50Hz interference tests as per IEC 61000-4-16 standards. iTEC were the first and the only one till date to completely built the circuitry for testing and also successfully tested and complied to it.

Figure-1: AK 1703

Today all the 110 RTUs have been delivered and commissioned to fullest satisfaction of TNB.

Key milestones of the Project:

In the midst of project execution, TNB requested iTEC to speed up the implementation process for the SCADA portion of the Master System before contractual completion dates, to facility advanced telecontrol and monitoring of the distribution network in Klang Valley.

TNB awarded this Fast Track implementation order to iTEC in April 2004, whereby the project was divided into 2 phases, with Phase-1 for the SCADA functionalities, and Phase-2 for enhanced DMS functionalities. Subsequently, the Phase-1 factory acceptance test was successful completed in June 2004, and the system was successfully commissioned in August 2004.

The Phase-2 system factory acceptance test was successfully completed in October 2005, and the entire Master System was commissioned in March 2006.

Figure-2: Soft Launch of Metro RCC on 4th May 2006

Conclusion

The execution of the project by iTEC went very well and in a very friendly atmosphere with the owner TNB. The capability of splitting the Master System into 2 phases, and performed the FAT within 2 months from the Order is the evidence of excellent leadership and change management. It was the first time in Malaysia that such large SCADA system implementation was completed and ready for operation on time.