Power Grid Corp. of India Ltd.
Power Transmission
Monitoring & Control

SIRIUS *success story...*

The **Rihand-Dadri HVDC Transmission Line,** owned by **Power Grid Corporation of India Limited (PGCIL)** was the first HVDC line in Asia, designed to transport 1500 MW of power from Rihand in Eastern U.P to Dadri near Delhi. Two HVDC bi-pole terminals, one at Rihand and the other at Delhi are connected through approx. 820 km long, 500 KV DC transmission line.

Synergy Systems & Solutions was awarded the task of upgrading the existing SCADA System. The project posed a unique challenge of deciphering and developing the protocols to interface with the existing ABB hardware. Synergy Systems & Solutions deciphered all the five different protocols and implemented its SIRIUS SCADA system with better functionality.

Each site consists of 25 devices communicating over 4 different communication lines. Approximate I/O count at each terminal is 4000.

HVDC system consists of seven sections:
- AC Yards: Rihand and Dadri
- DC Yards: Rihand and Dadri
- Filter Bank: Rihand and Dadri
- Reactive Power Control: Rihand and Dadri
- Pole 1 control
- Pole 2 control
- Bi-pole control

Status data of above sections is acquired over 4800 baud RS232 link from an intelligent device called **ACCB** and presented in the form of Single Line Diagrams (SLD). Alarm data is acquired from 22 nos. of devices called LAS (Local Alarm System) over **RS422** link at **153 kbps**.

The system has been designed in such a way that status data and alarms of Rihand are acquired and shown at Dadri, and vice versa. Similarly both the stations can control the other station.

Dual redundant SCADA servers are connected to dual redundant communication servers over a dual redundant fault tolerant LAN. A separate Engineering cum Operator station is provided for maintenance purposes. The SCADA servers also serves as Operator Station.

'...SoE, Automatic Reports, Online Events Transfer, Time Sync with GPS, Energy Calculation, 1 sec Trends...'

Alarms and SoE: The system interrogates LAS to acquire around 2500 numbers of alarms. Alarms/Events are time-stamped with **1 msec** resolution to present the correct chronology of their occurrence. Alarms/events are printed on-line on dual redundant event-printers.
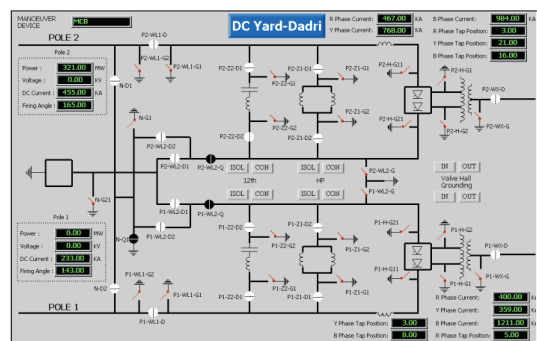
Reports: Varied variety of reports have been provided like Shift Handover report, Shift wise hourly reading of AC & DC Yard, Monthly Energy Counter report, Monthly report on Ground Ampere Hours accumulated by SCADA, Daily Statistics and Historical Events.

Time Sync. with GPS: SIRIUS SCADA system takes input from the GPS system for time synchronization. A pulse from the GPS system is fed into the SCADA Servers and communication servers. SCADA machines use this pulse to synchronize their clocks with **1ms resolution.** SCADA system further generates pulses to time-synchronize PGCIL's Transient Fault Recorder and three numbers of wall-clocks.

Repeater Station Monitoring: There are two remote repeater stations along the Rihand-Dadri line, one monitored from Dadri and the other from Rihand over 100 baud PLCC link.

Energy Counter Data: MWH and MVARH import/export is measured by accumulating the energy pulses in a PLC. The daily readings are automatically calculated by the system and printed daily.

The project scope included design, engineering and supply of redundant SIRIUS SCADA Software licenses, SCADA Servers and custom hardware to interface with existing RTUs.

The project was successfully commissioned in July 2004.