Solar Powered

Telemetry, SCADA and Measurement system

For

Indira Gandhi Nahar Project with VSAT communication
1. BACKGROUND

- Indira Gandhi Nahar Project (IGNP) is a revolutionary approach to boost the agricultural productivity in Rajasthan.
- It is planned to establish monitoring and control system based on SCADA, for precision measurement, management, and monitoring of Indira Gandhi Canal Automation Project to achieve even, equal & timely distribution of the water.
- Water Resource Department Government of Rajasthan has planned “Restructuring Program” under which, proposed automation system for IGNP is taken up as a ‘turnkey’ project.
2. Scope of the proposed system

1. Measuring and Monitoring 53 open channel flows & levels at designated locations including 8 Lift Irrigation schemes.
2. Establishing 11 field stations, 3 regional stations & 2 master monitoring stations
3. Establishing automatic control system at 6 cross regulators
4. Establishing Wired / Wireless Communication network,
5. Solar power supplies with battery backup
6. SCADA software for Canal Management
7. Associated civil & mechanical works
8. Periodic canal profiling at defined measurement locations,
9. Operation & Maintenance of installed system for five years
10. Training to WRD staff & officials.
3. Challenge of the System

- It is observed that the canals are susceptible to change the profile quite frequently due to heavy siltation. Canal flow varies due to frequent change in canal profile. It was proposed to have the canal profile to be monitored periodically using electronic canal profiling equipments to cope up with the situation.
- As the locations are Remote the availability of Mains Power is remote so the total system is operated on Solar Power.
4. Installed System

- Canal flow management are carried out at 53 locations on Main canal, branch canal and Sub Branch on designated locations.
- These 53 flow measuring locations are connected using VSAT network to communicate data with 2 Master Stations, 3 Regional Stations and 11 Field Stations at different locations.
- Flow measurement system is installed at 8 lift irrigation schemes is to carry out to measurement of the flow.
- The Automation system for cross regulators at 6 locations on main canal is installed to be operated automatically.
- The installed scheme caters discharge measurement of designated 8 Lift Irrigation schemes under IGNP using Doppler flow measurement devices
- The installed system caters Automatic operation of Gates at designated 6 CR locations and measurement of flows at these locations
- Automatic Local Gate Control system is provided and control operations can be performed locally as well as from Field control room at these Location
- The equipments for flow measurement, profile monitoring, gate control, gate position indication, solar power system are designed such that it Works in very adverse condition, the flow measuring and profile monitoring equipments are Doppler / Ultrasonic type.
5. INSTALLED SYSTEM

- The solar power supply is designed to provide the power to all equipment for 3 sunless days.
- Side looking Doppler are installed at designated point, to measure velocity, and discharge accurately.
- Considering heavy siltation problem the canal profile will be monitored at regular intervals Four Doppler Canal profiler device are provided.
- At 6 CR gate locations flow measurement will also be carried out by measuring UP stream, DOWN stream level and Gate opening using SMART FLOW
- Each field station has Data acquisition, Data storage and transmission facility, the data acquisition equipments also have interfacing With VSAT communication equipments.
- The field stations data acquisition unit has remote configuration, digital display of field data facility.
- Alarms will be generated in case of any unusual conditions like overtopping, power failure, gate failure, communication failure, any equipment failure.
6. SYSTEM OVERVIEW

- The communication system for canal monitoring and voice communication for Indira Gandhi Canal Project will cater to the requirement of data transmission covering, the Indira Gandhi Main Canal 6 cross-regulators, and 47 flow measuring point along the canal at specified locations, to respective Field SCADA station.

- The telemetry communication system will be based on hybrid data communication network.

- DASTU at remote locations will acquire, store and communicate the data at measurement station to respective Field SCADA station under command. Field SCADA station will communicate the collected / calculated data to respective Regional Station and regional station to Master Monitoring station.

- Measuring station collects the data from the measuring instruments / equipment and store the data in the data acquisition and storage unit (RTU/ DASTU).

- The DATA of every 15 min. intervals will be collected and stored with date and time stamp The Data storage capacity is for 365 days on First In First Out. It will display current collected and calculated data on the 20 x 4 alphanumeric backlit LCD display.

- The data acquisition system will convert raw field data to engineering units, will perform initial alarm or limit checking, and will pre-process data into forms suitable for the data processing function and database management.
6. SYSTEM OVERVIEW

- The Field Station comprises of the Industrial Grade computers and VAST Terminal. Field Station monitors details of Measuring Points under it’s command. The Field Station also performs calculations, alarm reporting, data and report logging, trending of measurements and historical archival of data, and is responsible for all application programs used.

- The data of all other field stations is available for decision support.
Data from the measurement equipments like canal level / Flow sensor, gate position sensor, limit switches etc., are collected automatically and stored by the data acquisition, storage and transmission unit (DASTU) at pre-programmed time interval of 15 minutes. Collected data is transmitted to the Master Stations hourly using VSAT link. Each Field and Regional SCADA station receives data from Master station, through VSAT communication link.
8. SYSTEM ARCHITECTURE REGIONAL & MASTER STATION

CONTROL SYSTEM ARCHITECTURE AT MASTER SCADA STATION
CONTROL SYSTEM ARCHITECTURE AT SCADA STATION

Master Station
Bikaner/Jaipur
VSAT
Hanumangarh
Field Station
VSAT
Rawatsar
Regional Station
VSAT

RD 0 IGF
RD 496 IGF
RD 582 IGF
RD 644 IGF
RD 671 IGF

Out Stations
Rawatsar Br.
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THANK YOU !!!

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