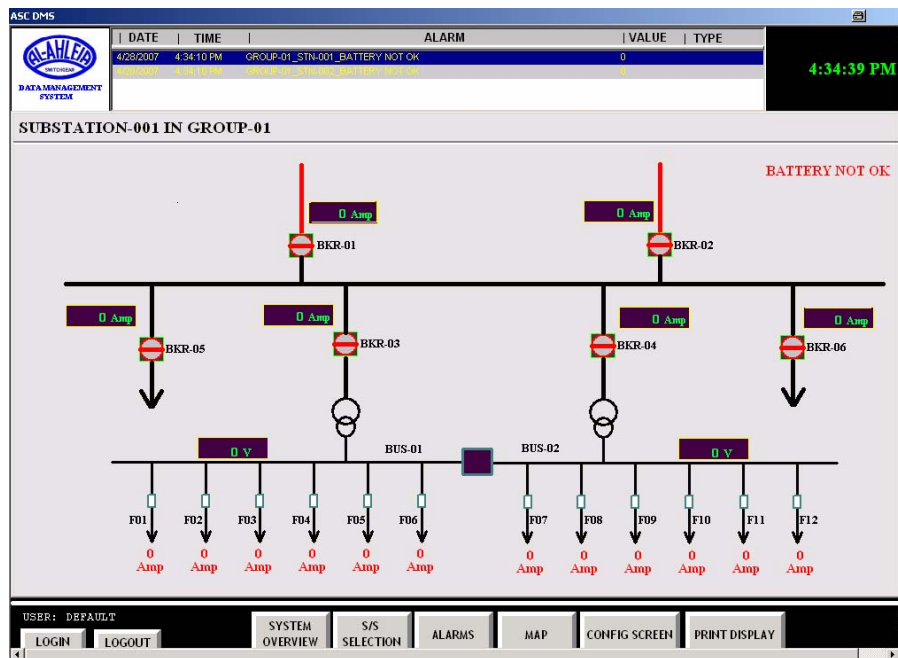


DATA MANAGEMENT SYSTEM FOR 12KV DISTRIBUTION SYSTEM



INTRODUCTION

Objective:

1. Acquisition of various data at central location from 11kV/0.433kV ring main distribution substations located at different areas. Data at each substation will be periodically updated every two hours. Any fault at any substation will over ride this two hour period and will get displayed immediately
2. Display of acquired data in such a way that location wise ring main substations can be monitored and supervised easily.
3. Easy expansion of the system.

Limitations:

1. 12kV ring main units are distributed all over the country in large numbers.
2. Additional cabling for data acquisition from various locations will be very costly and impractical. So without laying any additional cable, information should be acquired at a central location from various substations.

DATA TO BE MONITORED FROM EACH SUBSTATION

Data required to be monitored from 11KV/0.433KV ring main units.

1. High voltage system monitoring

- 12kV switchgear status (breaker ON/OFF indication)
- 12kV switchgear current in feeder and transformer panels in Y phase.
- 12kV switchgear fault status for feeder and transformer Circuit breakers.

2. Low voltage system monitoring

- Current on each outgoing feeder in Y phase.
- Voltage on each bus.

3. Battery Charger monitoring

- Alarm for Battery voltage not available.

4. Transformer monitoring (optional)

- Transformer Protection Device operated
- Transformer Alarm operated

METHODOLOGY

- Monitoring above data from each substation will be done by using PLC at each substation. For this, one DMS Panel will be supplied for each Substation.
- PLCs in a group of substations will communicate with one data concentrator PLC at Control centre at central location using GSM/GPRS communication.
- No of data concentrators will depend on total no of substations.
- Each data concentrator PLC will communicate with SCADA system at Control Centre using Ethernet communication. One SCADA Panel will be supplied for the Control Centre.

HARDWARE AND SOFTWARE

A. At each Substation

1. Cabinet with the following items mounted.

- PLC with input/output cards for acquiring digital and analog data from various devices.
- GSM/GPRS modem for communication.
- SIM card to activate the modem.
- 5 Amp, 24V DC power supply.
- Transducers for measuring voltages on LV switchgear panel.
- Transducers for measuring currents of LV outgoing feeders.
- Transducers for measuring 12KV feeder currents.
- MCBs
- Terminal blocks for control wiring.

2. New current transformers for LV outgoing feeders current.

3. Modification required

- C.B on/off status, Fault status and Y phase current to current transducers from 12KV switchgear.
- C.T fixing for LV board feeders.
- C.T. circuit in LV board to take Y phase current to current transducers
- Voltage circuit in LV board to take voltage from each bus to voltage transducers
- Modification of transformer panels to allow circuit breaker to trip on transformer faults(optional)
- Cabling between 12KV switchgear, LV board, transformers and PLC cabinet.

4. Modification in Transformer (optional)

Addition of transformer protection device.

B. At Control Centre

1. SCADA system

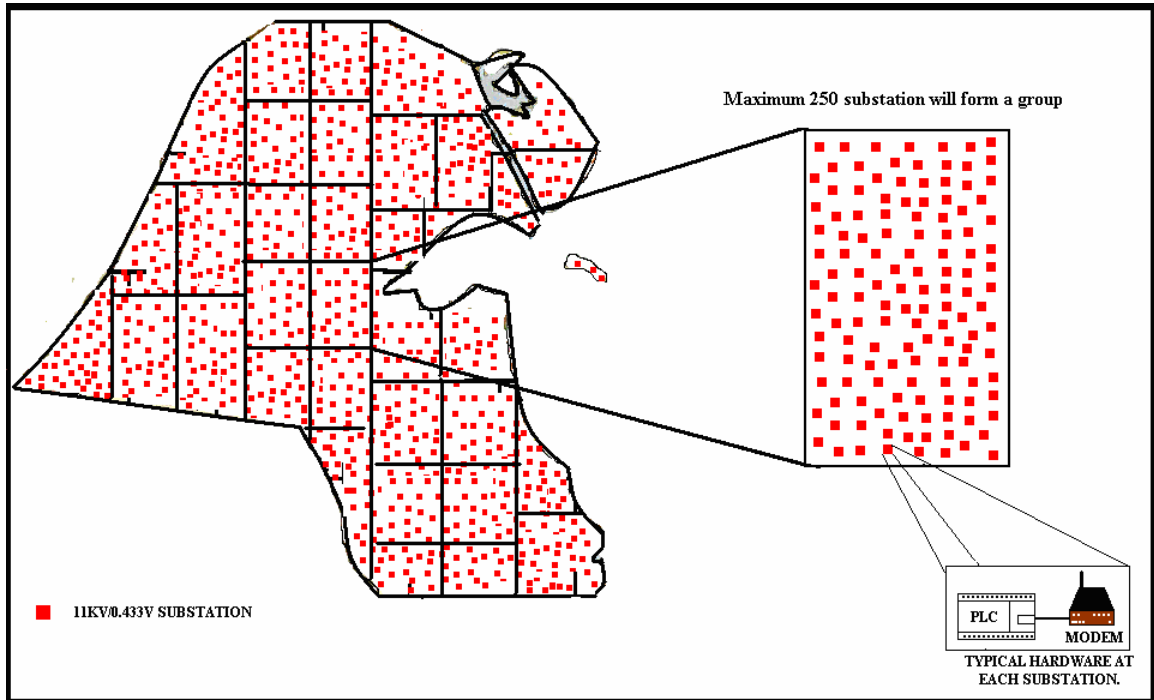
- Industrial computer for monitoring and storage of data.
- SCADA and communication software for visualization.
- PLC programming software.
- AC UPS.

2. Cabinet with following items mounted.

- Required nos. of PLCs with higher memory capacity as data concentrators.
- GSM/GPRS modem with each PLC.
- SIM cards to activate the modems.
- Required nos. of Ethernet switches.
- MCBs for PLC.
- Terminal blocks for control wiring.

Quantity of above items depends on the no. of substations to be connected to the DMS.

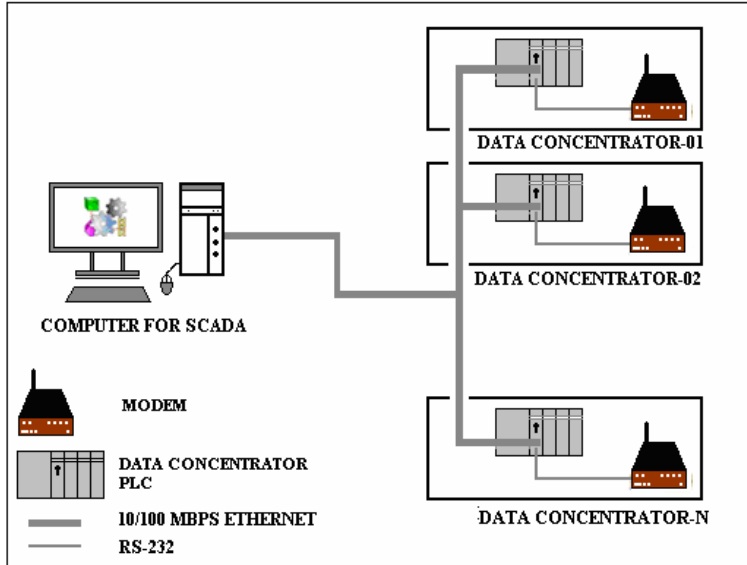
Following figure describe typical system for data management system.



As shown in figure “squares” shows the location of 11 KV/0.433 V substations. Locations of substations are mapped approximately only for reference. Hardware used at substation is shown in zoom view.

Maximum 250 substations will form a group and it will communicate with the data concentrator units located at central location. Group is indicated as rectangles with black line in the figure. Data concentrator is also a PLC unit with higher memory capacity which will use GSM modem for communication with remotely located PLCs. Multiple group will be formed to cover all substations required to be monitored.

System configuration at Central location.



As shown in figure each data concentrator contains PLC with higher memory and one GSM/GPRS modem. Each Data concentrator will communicate with various PLCs located at substations in a group to acquire required data. All unmanned data concentrators will communicate with SCADA computer using 10/100 MBPS Ethernet connection. Quantity of Data concentrator will depend on total number of substations.

SCADA system will poll real time data from all data concentrator at regular interval and display on the SCADA PC. Data concentrator will poll real time data from each substation connected with it at regular interval.



ADVANTAGES OF ASC-DMS

PLC hardware

- PLCs are having all open protocols like device net, control net, Ethernet etc. connectivity options, which can be easily integrated with multiple vendors' hardware or software.
- PLC Input/output expansion can be done very easily because of its modularity. If system needs to expand, just add expansion card with the basic PLC.

Communication

- GPRS/GSM technology is used for communication. Most of the PLC vendors are providing facility in PLCs to communicate with GPRS/GSM modems.

Software

- SCADA software used in system can accept any hardware of reputed vendors of PLCs like Siemens, Mitsubishi, GE etc.