INTEGRATED POWER DATA MANAGEMENT SYSTEM
Robust, Hybrid & Headend System

IPDMS - is a next-generation Meter Data Acquisition Channel. Fully Automated with Customer Interaction System - the Platform that the world hasn’t seen before IPDMS.

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Integrated Power Data Management System

SECTION I – Meter Data Acquisition & Management

**ABSTRACT** — Meter data acquisition is critical to determining consumption and baseline data. However, as the meters can be geographically dispersed over a large area, meter communication infrastructure is a core part of this total system. IPDMS provides MDAS with a comprehensive communication infrastructure for data acquisition from various meters. The options for the communication infrastructure are GPRS, CDMA. IPDMS provides the entire suite of products (modems, gateways, data concentrators, front-end processors, etc) for acquiring the data from various meters. MDAS is to acquire meter data from meters within the distribution system and consumer meters fo System performance monitoring and decision support. Monitoring and collecting data on consumer energy usage, billing, CIS, tamper, outage detection, and notification. Monitoring energy flows in the energy supply chain to provide information for energy auditing. Reeling under an average AT & C losses of around 33%, it is quite impossible for power distribution sector to keep up the desired economic pace without major reforms in the Power sector, especially in Distribution. System Integrator has been working closely in the Power distribution sector to address AT & C loss reduction, bring transparency, improve customer satisfaction and increase employee productivity through right convergence of IT & Automation. Technology innovation can only benefit the sector and system integration has a major role to play in empowering the power distribution utilities. There is a huge need for specialized, customized and upgraded system solution for the power sector and System Integration Power solutions can help utilities to make a significant leap in Field Automation and reducing their Aggregate Technical and Commercial losses. The objective of Meter Data Acquisition Solution Provider is to collect meter data of DT and Consumer Meters at desired frequencies remotely and make available for DISCOM operations.

With these objectives in mind, IPDMS brings a single platform for all digital needs of Power Utility Sector; such as:

1. Meter Data Acquisition System,
2. Workforce Management System,
3. Supply Chain Management System,
4. Enforcement Management System,
5. GIS-Based Asset Survey System,
6. Customer Interaction System,
7. Billing Engine,
8. GIS-based consumer indexing and asset mapping,
9. SCADA in big towns and cities,
10. Energy accounting and auditing,
11. Establishment of baseline data,
12. IT applications to run business processes that address consumer grievances and integrate meter reading, billing, and collection.
INTRODUCTION

Meter data acquisition is critical to determine consumption and baseline data. However, the meters are geographically dispersed and meter communication infrastructure is the core. Inesh provides MDAS with a comprehensive communication infrastructure for data acquisition from various brands of Single Phase and Three Phase Meters. Meter data acquisition system, supply necessary hardware, software, and communication equipment in the Substations, DTs and select consumers in the towns for the purpose of centralized meter data logging. The substation Data logger PC will acquire data from Feeder Meters and will transmit the same to Subdivision office server through a GSM/CDMA Modem, whereas the Subdivision office Data Acquisition server will acquire data directly from all Distribution Transformers. This entire exercise is aimed at establishing baseline data and a data collection system for the distribution utilities to capture aggregated technical and commercial losses (AT&C) in a precise manner without manual intervention and also to plan and implement corrective measures. The IPDMS scheme covers the strengthening, improvement, and augmentation of the distribution system. This involves:

1. Identification of high loss areas,
2. Preparation of investment plans for the areas identified above,
3. Implementation of the plan,

Further, distribution utilities have to work with their respective regulatory commissions to ensure that a part of the financial benefits arising from AT&C loss reduction is passed on to the consumers within the project area.

FEATURES OF IPDMS

- AMR data collection from system meters (distribution transformer, HVDS, feeder, etc.)
- AMR data collection from HV and selective LV consumers’ meters
- Polling of data to the CDC
- Generation of alarms and notifications based on system conditions and validation logic
- Reading of energy usage parameters including instantaneous load, load survey, event logging, etc.
- Use of user-defined dashboards
- Reports based on the above-mentioned parameters for feeder/distribution transformer MIS.

BENEFITS

- Smart automated processes instead of manual work.
- Accurate information from the network load to optimize maintenance and investments.
- Customized rates and billing dates.
- Streamlined high bill investigations.
- Detection of tampering of Meters.
- Accurate measurement of transmission losses.
- Better network performance and cost efficiency.
- Demand and distribution management.
• More intelligence to business planning.
• Better company credibility.

LITERATURE SURVEY

Meter Data Acquisition System in Power Utilities:

The project envisages implementing Automatic meter-reading of various makes of energy meters installed in the 33/11 KV Sub-stations using the Data Concentrator Unit (DCU). The meter data from these Substation feeder meters shall be transferred to the Centralized Database server. This Module collects data from a network of metering device installed at incoming & outgoing feeders within the substation. The IPDMS is a reliable & consistency solution for processing data from the metering device using Internet communication protocols. It can handle different interfaces developed on a single platform which allows data processing in real time.

IMPLEMENTATION

An MDAS implementation commences with the installation and connection of modems to various makes of Energy meters in the field across an entire state. The modem has to be configured with the appropriate parameters (baud rate, make of meter, network service provider (NSP) access point name (APN), etc.). It must be installed with the right communication cables for the different makes of meters. Meter data should be successfully polled to a back-end compatible application at the central data center (CDC) over a GPRS network. That data should be sent at regular intervals, i.e. hourly or daily, based on requirements.

Meter data acquisition is critical to determining consumption and baseline data. However, as the meters can be geographically dispersed over a large area, meter communication infrastructure is a core part of this total system. CMS provides MDAS with a comprehensive communication infrastructure for data acquisition from various meters. The Scope of Meter Data Acquisition Solution Provider is to collect meter data of DT and consumer meters at desired frequencies remotely and make available for DISCOM operations. This Scope is achieved by supply, installation, and commissioning of Common Automatic Meter Reading (CAMR) units with GSM/GPRS modems at remote meter terminals of identified HT/LT consumer locations and the Distribution Transformer locations. These units will collect the data from the meter units and send to the central data center in the predefined format at regular intervals. Meter data received will be processed for

• Billing data extraction,
• Analysis of metering healthiness,
• Analysis of system conditions such as

The Intervals for meter data acquisition is programmable for each block of data. The default times are as below:

• Instantaneous - 15 Minutes
• Historical - Once in 10 days
• Tamper - On Occurrence
• Load Survey - Daily
The collected power consumption reading is sent to the central billing server where it is stored. Many commercial servers, as well as management software, are available in the market. However, the cost of such a server and software management system is very expensive. To decrease the cost of the proposed AMR system, in-house software is developed using JAVA Servers and is used to control the central server. The implemented meter data management system will have the following functions:

- Remote metering: The meter reading is sent automatically to the server and customers can remotely get their consumption at any time.
- Bill issuing: The billing system shall provide a monthly bill for the customer who does not remotely access the server.
- Customer tracking: The billing should include better customer tracking, bill forwarding, identification of customer financial accounts information, and use of monetary deposits for account closing requirements.
- Apply different tariff for different customers: Houses, schools, factories are treated differently and the bill should be calculated according to the corresponding tariff assigned by electricity authority.

DISCUSSION AND RESULT

Initially, the focus was on bringing about structural changes like unbundling of the state electricity boards and the creation of independent generation, transmission and distribution companies. Subsequently, power generation became the focus. However, in the recent past, it has been felt that power distribution is the weakest link in the entire value chain and that sustainable development and economic viability of the power sector is not possible unless electricity distribution issues are resolved. With these objectives in mind, India’s national Ministry of Power launched the Restructured Accelerated Power Development and Reform. The Thesis essentially covers the application of information technology in distribution utilities across the country. The scheme involves the implementation of:

- GIS-based consumer indexing and asset mapping
- Meter data acquisition system (MDAS) for distribution transformers and feeders
- Establishment of baseline data
- IT applications to run business processes that address consumer and integrate meter reading, billing, and collection.

This entire exercise is aimed at establishing baseline data and a data collection system for the distribution utilities to capture aggregated technical and commercial losses (AT&C) in a precise manner without manual intervention and also to plan and implement corrective measures.

Further, distribution utilities have to work with their respective regulatory commissions to ensure that a part of the financial benefits arising from AT&C loss reduction is passed on to the consumers within the area. The main focus:

- Adopting a systematic approach for information management
• Reducing AT&C loss to 15% Decreasing power outages and interruption in supply Improving quality and reliability of power availability improving consumer satisfaction.

It comprises automatic meter reading of distribution transformers, feeders at substations and consumers in order to provide meter data for further accounting of AT&C losses in the areas. For solving the interoperability issue of a different model of Meters installed presently in different utilities, Utility is responsible for providing meter protocol and memory map of the meters installed in their area. The proposed Data Logging system is expected to provide continuous online monitoring and logging There are the following parameters in respect of all incoming and outgoing feeders, Distribution Transformers and consumers on a real-time basis:

• Voltage, Phase to Phase and Phase to Neutral
• Current (Line / Active) on each phase
• Power factor
• Frequency
• Power – Active / reactive / Apparent
• Energy – Active, Reactive and Apparent

The proposed system is expected to provide continuous online monitoring and logging of above-mentioned parameters and capability to generate Spread Sheets and MIS report as below:

• Nameplate Data
• Instantaneous Data
• Billing Data
• TOD Data
• Load Profile
• Load Survey
• Tampers
• Power On/Off and Events
• Specific Parameters Data

CONCLUSION

Meter Data Acquisition System envisages implementing Automatic meter-reading of various makes of energy meters installed in Substations using the Data Concentrator Unit (DCU). The meter data from these Substation feeder meters shall be transferred to a Centralized Database server. This Module collects data from the network of metering device installed at incoming & outgoing feeders within the substation.

The IPDMS is a reliable & consistency solution for processing data from the metering device using TCP/IP communication protocols. It can handle different interfaces developed JAVA which allows data processing in real time & lightning fast.