Intelligent Prepaid Metering System (IPMS)

Infusing pre-payment functionality in to smart meters using Meter Data Management Systems.

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Meter Data Management System (MDMS) is the crucial component of a smart grid deployment as it acquires and analyzes huge amounts of data from various smart meters. It validates, cleanses, processes and analyzes meter data to support the Customer Information System (CIS), Outage Management System (OMS) and Customer Relationship Management system (CRM). Though the smart meters are making rapid strides and replacing the conventional meters in the recent past, pre-paid meters continue to exist due to absence of adequate mechanism that integrates head-end systems of the meters with a tightly integrated common MDMS for timely disconnection and re-connection management for revenue protection. The mPower™ MDMS of Phoenix is aimed at fulfilling these objectives and utilize any smart meter as a pre-paid meter using the configuration capabilities and system integration potential.

Revenue collection against the power, water or gas supplied to the consumers is of utmost importance for the health and sustenance of the utilities at large and there has been greater focus on pre-payment systems from revenue protection angle, more so in the electricity sector.

Smart Grid is an interactive grid system intelligently built through the concerted combination of core electrics, operational and green energy technologies with communication, control and information systems.

It is expected that a proper combination of these technologies makes the Grid system both energy efficient and customer friendly. The key drivers for the smart grid for a utility may be based on the financial capabilities, regulations, priorities and the field conditions where it needs to be implemented either on a small or big scale. In the context of India and several other developing countries, reduction of aggregate technical and commercial loss reduction (AT&C) continues to be the key driver and it dominates all other factors in the smart grid sphere.

Phoenix IT Solutions, an ISO9001-2008 Company with more than a decade of experience in delivering CIS and CRM solutions to power utilities, is well known for solution centric approach for utility empowerment and transformation. The company offers a wide range of integrated smart utility solutions with the right mix of products and services from its mPower™ suite broadly consisting of the following components.
Smart meters are the basic building blocks of the Smart Grid which offer the following key benefits:

**Utilities**: Utilities can enforce disconnection on defaulters based on thresholds like scheduled pay date, violation of pre-set thresholds such as contracted load, demand, consumption, power factor, etc. and reconnect after clearing the dues besides insights on Time of Usage (TOU) and dynamic pricing. They also get feedback on power quality for better outage detection and management besides network surveillance aspects.

**Customers**: Customers can get advance alerts to avoid disconnection on threshold violations, get dynamic pricing and benefits from such engagement in energy management helping in reduction of energy usage and peak load shifting and the opportunity to lower bills or mitigate cost increases etc.

**Social Benefits**: These are the benefits accrued from energy use reduction through demand response and load control which ultimately help in load flattening, reduction of power purchase cost, avoiding additional T&D capacity, promotion of renewable energy integration and lowering of carbon emissions.
Why prepaid metering?

Power distribution utilities worldwide quiet often find it difficult to collect revenue dues from certain consumer categories such as local bodies, temporary services and hard to crack consumers like some politicians etc. This most important function does not match with the same billing cycle, leading to huge accumulation of dues that impairs utility financial status. It is here that prepaid metering comes as a boon for the utilities. Prepaid meters are essentially meant to collect electricity charges from the consumers in advance for units they are likely to consume during the month. However, the conventional pre-paid meters which are prevalent in the era of the Smart meter proliferation, primarily suffer from the following shortcomings.

- Require a smart card/ token / key pad punching to recoup or recharge the units once the equivalent advance money is exhausted.
- Utility is required to place vending infrastructure for programming / recoup the units into the smart card, dedicated server and printers etc.
- Separate cash collection and accounting mechanism is required at vending stations which involves engaging additional resources etc.
- Consumers require a separate in house display unit for getting the alerts on the daily consumption units and load etc on reaching the pre-set threshold etc.
- Consumers need to visit vending machine counters for recouping.
- Fixed firmware in the pre-paid meters restricts introducing any additional consumer friendly / utility required features.
- Does not support for introducing any value added features in the existing pre-paid meters.
How is IPMS the best alternative?

Phoenix IT solutions thought over the above setbacks with the conventional prepaid meters and came up with an Intelligent concept of modeling and configuring the Smart meter for prepaid functionalities using its two-way communication capabilities, exchange of web services and the core potential of mPower™ MDMS (meter data management system), while preserving all the features and advantages of the smart meters intact. The system is meter independent.

How does an IPMS work?

Meter data from the Head End System (HES) of a smart meter is ported online to our Meter Data Management System, with the help of a dynamic data exchange process using the pre-defined rules and web services and extended the functionality to various other makes of meters and achieved the interoperability.

![Data exchange process of mPower™ IPMS](image)

The key functionalities incorporated are as follows

- MDMS gets the payment status from the integrated Customer Information System (mPower™ CIS).

- The MDMS has an option to set threshold settings for the units consumed or the equivalent money value derived through the existing tariff structure incorporated in the application.

- SMS based advanced alerts are also programmed to facilitate the consumers to regulate their consumption for the leftover money and avoid disconnection.
The IPMS system is also being integrated to the customer self service (CSS) portal as a part of providing historical consumption trends and comparative information etc to the consumers as a part of Phoenix demand response functionality.

The gated communities/ consumers can also give feedback to the utilities on the power quality issues and get quick redressal of the issues, which will in turn help in maintaining better health of their appliances/gadgets, etc.

Conclusion:

With the Intelligent pre-paid metering system (IPMS), power distribution utilities no longer require prepaid meters to serve the prepaid customers. Simple IPMS based smart meter with advanced metering infrastructure comprising remote disconnect and reconnect can perform the function of pre-paid meter. With online powerful interval data available at utility's disposal, our IPMS application will indicate the credit left on prepayment account and can initiate necessary actions like generating alerts on exceptional such as consumption exceeding the preset threshold, etc and perform remote disconnect/reconnect etc.

From a revenue standpoint, as per the pike research, the total prepaid meter device market was expected to reach USD 1200 million and that projected at a CAGR of 9% is expected to reach USD 1846 million by 2017. mPower™ IPMS™ gave us visibility and access to progressive utilities already working on smart grid projects globally to consider our proposition and this has accelerated our efforts in partnering with smart meter vendors who were too willing to work with us to take this innovative solution to the global markets.

It is worth mentioning that, with the introduction of mPower™ IPMS™, utilities can now realize their payments in advance effortlessly thus helping in realizing their goal of improved revenues and reduction of AT&C loss.

References:

http://www.edisonfoundation.net/iee/Documents/IEE_BenefitsofSmartMeters_Final.pdf

For more Information please visit: www.phoenix.in

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