AUTOMATIC METER READING SYSTEM

BY

B.V.PAVAN SRIKANTH

B.TECH (ECE)
Issues with Stand-alone meter reading

- Highly Person dependant.
- Human errors cannot be avoided.
- Accessibility of meters in rural/ Agricultural zones is difficult.
- Energy Audits performed based on bill collection which is highly inaccurate.
- Billing done mainly on estimated/ monthly average basis
- Inability to monitor and control discrete loads
- Billing cycle requires excessive time.
Smart Metering and IT: An opportunity to Leapfrog

**PAST**

- **ELECTRO-MECHANICAL**
  - Low Accuracy
  - Control – NIL
  - Communications - Expensive
  - Theft Detection – Poor

**CURRENT**

- **DIGITAL SOLID STATE**
  - High Accuracy
  - Control – LIMITED
  - Communications – External through Retrofit
  - Theft Detection – Node only

**LEAPFROG**

- **NEXT GEN SMART METER & IT SYSTEM**
  - Very High Accuracy
  - Control – FULL
  - Communications – Built in (on chip / PCB)
  - Theft Detection – High (Network level)
Critical Benefits from AMRS

- Ability to detect tamper events and outage occurrences.
- Remotely Connect/ Dis-connect power supply through meter.
- Calculate transformer loading and sizing from interval data.
- 15 minute interval data gives accurate load information for supply scheduling, switching operations, planning etc.
- Monitor voltage at each premise to know conditions when to operate capacitor switches or regulators.
- Consistent and granular data for improved accuracy.
Connectivity in AMR Architecture

1. GSM Based Communication
   Single stage communication between Meter and central station through GSM Modem

2. Hybrid Communication
   Two stages of communication in AMR System

3. PLLC Communication
AMR USING GSM NETWORK
GSM Based Communication
• The complete system is made up of multiple GSM power meters installed in the city, SMS gateway, Application Terminal, Database Server, Email Server, Printer and Web server.

• A SIM card with a unique special service number is require for the GSM power meter to receive and to reply its meter reading to the energy provider using SMS.

• The SIM card service number is also use to identify and retrieve the owner or customer details from the database server for billing purposes.

• On the ICT side the eBIS application software was installed in the application terminal where the energy provider operator uses to perform meter reading routine in the monthly interval through the GSM network.
Meter reading by the consumer using mobile phone SMS
- Power to Communication Interface Board (P2C)
- Distribution Control Board
- GSM modem
- Antenna
The digital power meter is used to measure the power consumption drawn from the energy provider sub station to the consumer in kWh unit. A Single Phase digital Watt Hour Meter ATec12 from ATec was chosen for GSM Power Meter.

The Power to Communication (P2C) interface board is used to interface the impulse store the meter interval. at every single impulse count reading into its internal non-volatile EEPROM memory

GSM modem SIM-T03 from SIMCOM was chosen to use in the prototype implementation. The GSM modem used a RS232 serial communication protocol
Once a request SMS is receive from the GSM modem, the P2C interface board retrieve the last meter reading from the EEPROM memory.

The distribution control board is use to cut off or to restore the supply to the consumer. The distribution control board is control by the P2C interface board.

Once the GSM modem receives or sends power cut and reconnect SMS then P2C interface board can also send a signal to distribution control board to cut or restore the power.
eBilling Information System (eBIS)

- The eBIS was entirely developed in a computer system. The eBIS application software was developed and implement by using Microsoft Visual Basic 6.0

- The database was developed by using SQL. The Web Portal was developed by Microsoft FrontPage
The eBIS application software GUI that displayed the customer information and total bill after requesting, retrieving and calculating the meter reading into the system.
➢ All the notifications are generated by the eBIS system and customer information is retrieve from the database.

➢ The billing notification to customer send by SMS, Email and hardcopy printing for postal.
Once the customer received the billing notification then they can check and made payment online through the web portal.

the customer detail and billing information after login into the web portal. The customer can click on the pay online button to pay the bill using the credit card
Once clicked on the pay online button, the pay online page is display which allows the customer to key in the credit card details for banking transaction.
Power Cut-Off and Power Restore Notifications

➢ In the event if the consumer fail to make payment after the payment date, the eBIS allow the operator to send a power cut off SMS to the particular GSM power meter to cut off the power supply and at the same time notify the consumer through SMS that their power supply has been cut off due to no payment.
Once payment has been made, power restoration is done by the same procedure through the eBIS application software user interface by sending power restore SMS.
Advantages

ELECTRIC COMPANY BENEFITS

- Smart automated processes instead of manual work
- Accurate information from the network load to optimise 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.
CUSTOMER BENEFITS

- Precise consumption information
- Clear and accurate billing
- Automatic outage information and faster recovery
- Better and faster customer service
- Flag potential high consumption before customer gets a high bill.
CONCLUSION

The design and development of GSM Power Meter to demonstrate the concept of wireless power metering, eBilling and distribution control using ICT and GSM network technology has been proven viable. With the development and implementation of eBIS and GSM power meter together with the utilization of available ICT and GSM network infrastructure in the country it provide efficient wireless automatic meter reading, distribution control and making fast billing system, accurate, effective and reduction of labor cost of operation.
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Thank you