Research Paper Engineering

Home Base Energy Meter Monitoring Prepaid System in GSM Technology

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ABSTRACT

This paper presents the development of a fully Automated Energy Meter which is having capabilities like remote monitoring and controlling of Energy meter. Automatic Meter Reading system continuously monitors the energy meter and sends data on request of service provider through SMS. It save huge human labor and man power. Here all the data will calculate in system. The data received from GSM device to network base system through SMS gate way for further processing by energy provider. This system provides freedom to companies for take action against lenient customers who have outstanding dues; otherwise companies can disconnect the connection companies can re connect the service after deposition off dues through SMS .GSM based automatic meter reading is more efficient to convention billing system We provide a comprehensive review of the AMR technologies proposed so far. Next, we present how future AMR will benefit from third generation (3G) communication systems, the DLMS/COSEM (Data Language Messaging Specification/Companion Specification for Energy Metering)standard and Internet Protocol-based SIP (Session Initiation Protocol) signaling at the application level. The DLMS/COSEM standard provides a framework for meters to report application data (i.e. meter readings) to a utility server in a reliable manner .The SIP protocol is envisaged to be used as the signaling protocol between application entities running on meters and servers. The DLMS/COSEM standard and the SIP protocol are expected to provide an application level communication abstraction to achieve reliability and scalability. Finally, we identify the challenges at the application level that need to be tackled. The challenges include handling failure, gathering meter data under different time constraints (ranging from real-time to delay-tolerance), disseminating (i.e., uncasing ,multicasting, broadcasting, and geo casting) control data to the meters, and achieving secure communication

Keywords : GSM sim300, ATmega 32

. AMR BENEFITS IN GSM TECHNOLOGY

Real time Pricing:
Customers are charged tariffs that vary over a short period of time, hourly for example. It helps customers control their consumption and helps utility providers to better plan for the energy market

Power quality measurement:
The electric utility engineers need more detailed readings than Kwhr so that they can efficiently plan the network expansion and deliver higher quality of supply . Power quality involves the measurement of voltage sags, swells, under and over voltages, harmonics distortion, voltage and current imbalances, and record duration of each event

Automated Billing:
Once the metering data is available at the utility company premises, billing, acknowledgement of received payments, and power consumption reports can be fully automated and made available to customers, on the web for example.

Load management:
This is another industrial area that will be feasible after having an AMR system in place. The service allows sending control signals to appliances such as air conditioners, and heaters. Importance of load management to electricity providers as well as to customers in terms of power saving.

Remote Connect/Disconnect:
The utility provider can remotely and quickly configure the meter to enable or disable energy to certain customers.

Outage notification:
This offers an effective way to improving response time. Liu et al.propose an algorithm that involves two steps: outage locating and outage confirmation through meter polling.

Bundling with water and gas:
The ultimate objective behind a fully functional AMR is to serve all kinds of meters, electricity, water and gas, under one communication technology and one protocol standard.

It discusses the Data Language Messaging Specification/ Companions Specification for Energy Metering(DLMS/ COSEM) standard and proposes using SIP as the signaling protocol. Other communication paradigms are needed to implement a full-scale AMR, not only for electricity meters but also for gas and water meters. Electricity providers seem to be at the front today, but in fact all utility providers are interested in collecting high frequency of data and ultimately in enhancing the quality of utility provision and quality of service. Soon, the AMR network will eventually have to serve all meters together. Two issues are to be taken into account. First, the proposed communication technology should be scalable in terms of the capacity as well as the area of coverage. The second issue is to comply with a standardized approach to allow diversity of meters and communication media.

AUTOMATIC METER READING TECHNOLOGY

Some manufacturers such as Cell Net Systems , Hunt Technologies and Leach Industries have already worked on digitizing and equipping the currently available meters with various communication facilities. The major part of an AMR system then is the underlying communication technology over which to deliver packets from both sides. There are four ma-

jor types of AMR communication networks. power line carrier (PLC), cellular network, telephone/Internet, and short range radio frequency. Here we discus about GSM network.

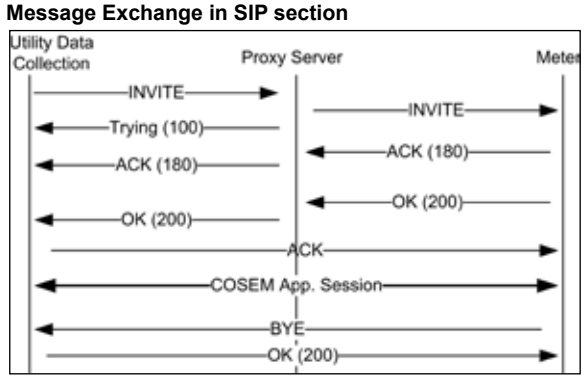
Messaging over GSM Network

Short Message Service (SMS) has become a communication protocol allowing parties to exchange delay-tolerant short text messages. It is supported by different standards, namely Global System for Mobile communications (GSM),Code-Division Multiple Access (CDMA2000) and Digital Advanced Mobile Phone Service (D-AMPS). The popularity and wide coverage of cellular networks have attracted researchers to consider the use of SMS service The system constitutes at the consumer site digital meter with RS232 interface and a GSM modem containing an SIM card dedicated for only SMS and at the energy provider site an SMS gateway to send and receive messages. Measurements are reported once a month. An SMS message contains six digit KWh with one decimal point of the energy consumption. The SIM card number acts as a unique number to identify a customer. To boost reliability, the meter stores the latest reading in an Electrically Erasable Programmable Read-Only Memory (EEPROM), and it keeps trying to send the SMS multiple times. Nevertheless, metrics are not identified for evaluating the reliability and strength of the system the use of GSM networks. Communication can be either one way or two ways. uni-direction setup, meters send readings at pre define intervals and switch off otherwise to conserve energy. bidirectional setup, the energy provider can have more control over the meter but requires the meter to be active all the time. Measurements are reported once a month as OBIS(Object Identification System) codes. However, no evaluation of the system performance or comparison with other designs is provided .Scalability and reliability of such a network however is questionable, especially under high load. SMS delivery success rate was found to be 94.9%;73.2% of the successfully delivered messages reach to the destination within 10 seconds; about 5% of them require more than an hour and a half. Using SMS for AMR service will definitely increase the flow of messages tremendously For example, on a New Year eve,the volume of SMS increases eight times. Consequently. latency grows from several minutes to an hour. Failure rate shows an increase to 20% as well. All in all, SMS should be further investigated before being used for AMR. For example, can cellular networks support messaging frequency of up to a message every 15 minutes? How reliable is the network case?

Data Collection Mechanism

All the previous work focuses on gathering power consumption information, in which AMR data is pushed from meters into the network at certain fixed times. As utility providers are interested in a large variety of data with much higher frequency, three modes of communication are required to be supported: fixed scheduling, event-driven and demand-driven. Each mode is more suitable for a certain kind of data ands such the three modes must co-exist. Each mode poses a different design challenge. Fixed Scheduling: In this mode, a meter reports data affixed intervals. This is a straight forward mechanism with the advantage of guaranteeing a certain rate for every meter under the knowledge of the available bandwidth. However, the traffic that results is significantly high. It may impact other Internet traffics at bottleneck nodes. As a result, packets will be dropped and data reports may not meet the delivery deadline Event-driven: Data are generated and transmitted as a result of events at meters. Examples of this mode include packets generated when consumption reaches a certain threshold value, power quality when it starts to degrade, and includes alarm data. This mode may cut down the amount of traffic thought it will vary from time to time; however, a tradeoff must be considered as a contention overhead and possible delay will be introduced. Demand-driven: Upon a request from the data collection center, data packets are generated and transmitted back. A utility company uses polling to identify faults, or gets a consumption report at a certain time for a subset of meters. Polling requires extra messaging for the end parties to set up other communication parameters every time. Demand-driven data typically require real-time response. Therefore, such data should be distinguished from the rest and given a higher level of priority

Message Exchange in SIP section



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