

TECHNICAL AND FINANCIAL REQUIREMENTS FOR IMPLEMENTATION OF REMOTE METERING

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Department of Electrical Engineering, University of Moratuwa
in partial fulfillment of the requirements for the
Degree of Master of Science

by:

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DECLARATION

I certify that the work submitted in this dissertation is the result of my own investigation, except where otherwise stated.

It has not already been accepted for any degree, and is also not being concurrently submitted for any other degree.

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ABSTRACT

The thesis presents the findings of the study to develop a Data Acquisition System (DAS) of bulk supply consumers using a feasible remote metering (RM) option that can be used in distribution sector.

The most of the utilities in developed countries have gained the access to their meters remotely. Not only in electricity sector, but also it is used in gas and water metering as well. This has many advantages over conventional point to point meter reading. The accuracy and low cost are straight forward benefits that the utility can obtain with these systems.

Without confining merely to a remote metering (RM) system, this can be further developed to a data acquisition system, which is immensely useful not only to the utility but also to the other stake holders of the electricity industry such as to academic institutions, regulatory bodies, investors, consumers, etc. The basic requirement here is to select appropriate communication medium and to parameterize the metering and other equipment such as modems, etc accordingly to log the required system parameters.

The Colombo City distribution province of Ceylon Electricity Board was selected for this research. The data logging capability and communication facilities of different types of energy meters were studied. The potential communication options for remote metering were also studied under this research. The analysis was carried out for financial and technical feasibility of RM and DAS system. The discussion was focused on the above analysis and the benefits of the RM and DAS system.

The GSM data communication option was identified as the most suitable communication method for remote metering. From the point of view of the power utility, GSM based communication link has the simplest architecture for accessing the meter data. GSM communication in Sri Lanka is a well developed infrastructure and this can be directly utilized without any concerns of developing and maintaining by the power utility itself. The reliability of the communication

system is an established fact. The cost for the service tends to decrease due to the advancement of technology and the competitiveness among the mobile operators.

The conventional electronic energy meter acts as a transducer for data acquisition system. Apart from monthly energy consumption and maximum demand for billing, it is possible to obtain load patterns, demand variations (Active, Reactive and Apparent), voltage variations (drops and rises), power outages, power factor details, frequency and harmonic levels, various event details, etc of bulk supply consumers.

Minimizing the engineer's time for meter reading and billing is the straight forward benefit for the utility. The actual and timely parameters of the distribution system can be effectively used as inputs for system planning activities and hence to develop more accurate proposals to mitigate system imperfections. The event list available with the meter provides the facility to resolve consumer issues since the list contain the history events for about five years time. Further by using tamper event list the loss reduction and anti-tampering activities also can be effectively implemented as any malpractice can be identified at its origin itself.

More accurate information on different kinds of bulk supply consumers can be collected by using this particular system. It is beneficial to the other stake holders such as to people of academia, policy makers, investors, etc of the electricity sector for their academic and decision making purposes. Further the consumers can be empowered to view their load profiles, billing data, etc via the internet, so that to encourage energy saving and self generation activities.

Therefore the outcome of this research is remarkably important not only to the distribution utilities, but also to the other stake holders of the electricity sector. Since this is the first time that this particular comprehensive study on RM and DAS system for bulk consumers is carried out, we expect to share the experiences and the outcomes with all interesting parties of the sector to extend the benefits not only to the utilities but also to the consumers by means of quality, reliable and low cost power supply.

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