

# Competent Approach For Inspecting Electricity Theft

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**Abstract:** Energy requirement is ever increasing in recent years due to the tremendous development in technology, industries and most seriously the population blast. Increasing demand and ever increasing population leads to the situation of energy shortage. Energy shortage increases the cost of consumption which is a serious concern in developing as well as developed countries. The above mentioned issues extend this problem to an illegal activity i.e. electricity theft is termed as non-technical loss. This electricity theft is estimated to cost billions of dollars per year in many countries. This paper presents an effective and most active measure to detect the energy theft and take remedial actions using Global System for Mobile Communication (GSM) to alert the vigilance team for the sake of investigate the theft.

**Key words:** GSM/GPRS, Non-Technical loss, Energy theft

## I. INTRODUCTION

Smart Grid is a fully automated power network, in which each user and node can be real-time monitored. Smart grid applies many new Technologies, such as grid control technology, information technology and management techniques, and covers power generation, transmission, substations, power distribution, electricity, scheduling and information of all aspects of power systems, thereby achieving a high degree of integration and unity of power flow, information flow and business flow. It replaces the older electrical grid which is the one way power distributors and are not concerning about the environment protection. But Smart grids are highly Green grids and are not affected by the climatic disasters like

thunder, lightning and acid rain etc., and metering the electricity consumption was necessary on a per user basis in order to allow appropriate billing according to the level of consumption of different users. In the past centuries, energy requirement was at peak level hence could not keep up with consumers demand [6] that leads to resulting in poor power quality including black outs, power cuts.

The uncertainties dragged the 21<sup>st</sup> century into the energy conservation and provides electricity on demand. Also the dominant forms of renewable energy like wind power, solar power are highly variable and so the need for more sophisticated control system that connects these sources to the highly controllable grid that should be perceived to the potential attack targets. The only way to resolve these issues is Smart grids. The extension of small distribution system is essential and regional utilities need to invest in new power plants, photo voltaic energy sources and wind turbines to integrate these into the network. Smart grid is a modernization of electricity delivery system so that it monitors, protects and automatically optimizes the operation of its interconnected elements [13]. Smart grid distributes the energy to the consumers in an on demand fashion. In this high energy requirement era, electricity usage should be thoroughly monitored in order to find the unauthorized access of the consumers. Electricity theft otherwise termed as non-technical loss has emerged as a serious problem in power Sectors especially in the developing countries. A huge amount of revenue is lost due to electricity theft. Electricity theft includes tampering meters to show a low meter reading, stealing electricity by bypassing a meter, billing irregularities and unpaid bills.

Different nontechnical and technical methods were proposed in the past to detect electricity pilfering. Nontechnical methods [7] may include inspection of the customers with suspicious load profile. Although periodic inspection can substantially reduce theft, such measure requires large manpower and huge labor. Such effort also fails in most cases due to the dishonesty of the staffs. Meter tampering is another way of stealing electricity. Impact of such illegal activities leads to energy shortage

as well as economy of the country. So many researches have done to detect the electricity theft in smart meter and it will be the easier method to monitor and detect the theft.

Electricity theft in smart meter is detectable but theft in grid line is undetectable, that is we can't locate the exact theft location when theft occur in the consumer line. Because the grid line is open to air and travel over several kilo meters. It can be easily hacked and hooked in order to bypass the electricity. This type of electricity theft is being practiced in the countries like India and East Asia which is intolerable one. It will affect the economy of the country. It also affects other consumers severely. Electricity theft detection in distribution line is the hot topic and researches are going on to detect and control such theft. Energy conservation starts from finding the electricity theft. The background motivations of this thesis are purely based on power theft detection in distribution lines and help the country's economic growth.

## II.LITERATURE REVIEW

The prolonged discussion clearly defines the architecture of e metering system. The architecture proposed in this study is a multifunctional approach to read the energy meters located at the consumer sites. This report states that out of total energy generated only 55% is billed and only 41% is realized [1]. Each customer equipment provides the energy consumption to the MCIC that keeps the details of individual users. The meter tampering is easily detected by this approach. But the implementation cost is high. This paper discusses simulations and models based on data from pre-paid meters in order to determine the feasibility and method of Operation for remote check meter. The resolution of illegal consumers detected depends on the deviation of the losses and the connected time of the check meter [2], this report gives only the simulation result. It would be the better method for minimum amount of users. The further improvements to detect the electricity theft lead to grouping of customers by means of Support Vector Machine (SVM) [3]. This methodology insists data processing and data mining methods to detect the customers with abnormal consumption of electricity. It involves many complicated mathematical calculations that may provide erroneous results and can detect only 60% fraudulent customers. The previous methodologies are apt for the traditional power systems. Aryadevi Remanidevi Devidas [4] proposed a wireless sensor network for remote monitoring and optimizing electric transmission in India. This will reduce the energy wastage and save lot of energy for future use. Even this is an advanced technology it cannot cover the remote area. In order to check out the wide area real time investigation is needed [5].

This paper defines the spot monitoring of the energy meters to verify whether the electricity theft has happened or not. It continuously compares the determined meter reading with the traditional meter reading to avoid relaying of the values. The above mentioned methodology doesn't give the exact theft detection criteria. Better analysis of about technical and non-technical losses will provide the electricity theft measures [6]. This paper implements black tracking algorithm to determine the power deviation between the meter data and delivered

power data. In this idea, the malfunctioned consumer's power supply will be turned off. The detection of exact theft location is somewhat harder when we talk about the previous methods, to overcome the drawbacks Vineetha Paruchuri proposed GSM based diagnostic technique which uses BOUNCE algorithm [7] and uses IEEE p1675 protocol to detect the exact theft location. This method is valid for the highly equipped distribution line and is not applicable for the rural areas. To expand the coverage area GPRS based electricity stealing prevention method [8] is proposed by Litao to monitor wide range of electricity users that uses GPRS communication software will reduce the electricity losses. The above mentioned procedures only dealt with the meter readings of individual customer don't care about the neighborhood readings.

Zhifeng Xiao and Yang Xiao implements non repudiation in neighborhood area networks [9] that is to discover problematic meters that report inaccurate reading values. This method may not be efficient because it considers the nearby meter reading. Unauthorized tapping of distribution line is detected by the methodology proposed by Sagar Patil [10] that repeatedly comparing the transmitter and receiver meter readings. This concept may detect the electricity theft but not the exact location. In the previous proceedings, the power thefts in various ways are detected but no more provision to investigate the illegal activity. The smart prepaid energy metering system [11], consumers can recharge their energy meter according to their requirements. It reduces the illegal electricity consumption but it's a cost effective method. Zigbee based wireless electricity theft detection system [12] is mainly used for detecting the unpaid customers who perform the illegal meter tampering and bypassing the meter. But this method is used for short range of communication and requires high end devices to communicate with the central control unit.

## III.EXISTING SYSTEM

Detecting non-technical loss is an open research problem still so many researches is being processed to find the solution. In the existing system the electricity theft is detected only for separate house and are never be practiced in real time. One researcher implemented an algorithm to detect the energy theft but it cannot be included in the real time work. Another process is implemented with fixing energy meter in the house and the electrical pole but it alone cannot be useful for finding the energy theft. Some implemented.

## IV.WORKING PRINCIPLE OF CURRENT SYSTEM

In the previous work some disadvantages can be found in order to detect the energy theft. To overcome such issues this proposed system reuse the already practiced work with some added features. In order to detect the electricity theft, first of all feeder are spitted up by means of circuit breakers then under a specified feeder, collective consumers are picked up. The feeder input energy is monitored and are stored in a data base besides

consumer consumption detail is also keep up in a data base. The system architecture is shown in the fig 1.

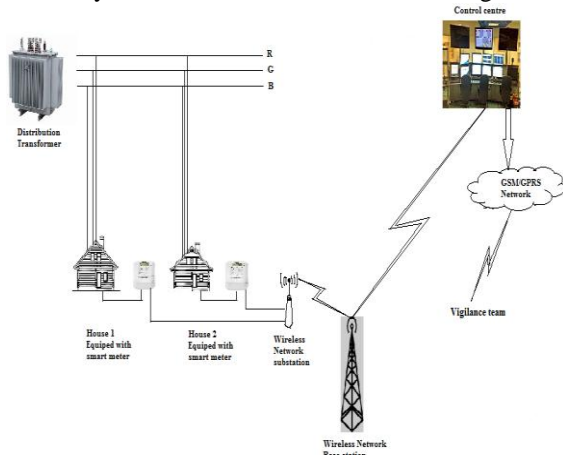


Fig 1. System Architecture

The data base keeps the feeder details includes the number of grid, number of sub stations, and number of feeders of a whole city. So that the staff personals can anytime check out the consumption level. This collective information is very much useful for the future inspection also useful for detecting the consistent usage of the consumer. The other added feature is fixing a wireless data communicator Instead of normal energy meter preferably Wi-Fi shield is attached with the usual energy meter. A separate Wi-Fi shield is fixed with individual meter and it collects the consumption level of individual consumer then stores it into the data base. After getting the information from the Wi-Fi shield, the consumption detail is compared with the feeder input level. Both collective consumption and individual consumption is also compared against the feeder details. Suppose the control unit detects the abnormalities in the consumption then the unit alerts the staff personal by means of message. The officials immediately rush to the spot and investigate the energy theft. Using this method, only a small region of electricity theft can be detected not the exact theft place.

#### A.CONTROL CENTRE

Control Centre plays vital role in monitoring the consumers i.e., energy consumption of individual consumer. This maintenance center keep track of the consumption details in a separate database also keeps the substation and feeder details. A separate control Centre also equipped with GSM/GRPS shield in order to send message to the staff personals to investigate the energy theft. Traditional electricity board does not featured with such wireless devices like Wi-Fi shield and GSM/GPRS modem. In this system, the electricity line is thoroughly monitored by the central control unit hence energy theft can be detected efficiently so that electricity will be conserved and illegal consumption will be eradicated.

#### B.GSM/GPRS

GSM/GPRS is most suitable two way communication system that is equipped with SIM card that send and receive information i.e. message between the users just like a mobile phone. Here GSM/GPRS modem is fixed in control Centre in order to alert the staff personals to investigate the energy theft. This modem will automatically send the information to the officials without any human intervention. This device is more cost

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effective and handy one that can transfer information's to the required persons.

## V.CONCLUSION

In this prolonged discussion it clearly explains the impact of electricity theft in day to day life also how this illegal activity affect the country's economic growth. Overall scenario provides the working nature of the existing system and also the proposed idea. In the traditional electrical system, countries like India, no more monitoring system for supervise the distribution line and individual consumer. The proposed architecture describes the smart system that automatically update the usage level and also figure out the hot need of the energy conservation in the high demand time. Population burst and severe economic degrade leads to the illegal activity like electricity theft. This updated phenomenon gives the solution to the energy theft. Every year due to electricity theft hundreds of crore of money have lost in India. To avoid such inconvenient and unwanted situation so many operations have been done in the past era. This proposed idea has somewhat polished and advanced technique compare to the previous techniques. SMS alert is one of the latest trends that it reduce the processing time and very much useful to save the energy for the future need.

## VI. FUTURE WORK

In order to improve the efficiency of the current system first Smart meter if fixed in a consumer location and then calibrate the electricity consumption and feeder input. Secondly, vigilance alert must be improved. Future work adds GPS device to track the vigilance team and the control Centre thoroughly monitors the energy consumption level and also alert the staff personal immediately. Vigilance vehicle is equipped with GPS tracker so that their location will be continuously monitored. Control Centre can also calculate the distance of the vigilance vehicle hence the nearby vehicle i.e. the vehicle near the theft location will be alerted.

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