# IOT BASED PREPAID ENERGY METER MONITORING WITH LOAD CONTROL SYSTEM

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## ABSTRACT:

Internet of Things (IOT) aims at interfacing different gadgets to the internet web – encouraging human-machine and machine-machine connections offering superior security, console and effectiveness. The concept of IOT is utilized in this model, remote monitoring of energy meter which is intended to overcome the issues in existing Automatic Meter Reading (AMR) system. It spares tremendous human work. A controller integrated with electronic energy meter assist in distant correspondence from the developed android application. This application enables monitoring of bill generation at consumer premises without human intervention and also in visualizing live data consumption and sight energy expended points of interest on daily/monthly basis. In addition, it gives authority to power organizations to seize lenient customers who have extraordinary dues for remote disconnection of the power supply. So IOT based remote AMR framework is more viable methodology than tradition of billing framework.

**1. INTRODUCTION** Conventional meter reading for any energy utilization by the consumer and billing is done by meter pursuers from place to place. This requires multiple labors and long working hours to accomplish complete region information perusing and billing [1]. Meter pursuers billing are inclined to perusing error, wrong entry of data perused. There exist accessibility bottleneck to isolated places. Likewise the consumer has no clue of energy consumed each day / week. Progresses in this path include AMR [2]. It is the technology of remotely gathering of energy devoured and utilizing this data in central office for invoice generation. This technology saves power suppliers the cost of intermittent outings to each physical area to peruse a meter. This convenient data combined with analysis helped both power suppliers and consumer's better control the utilization and generation of electrical energy. Recent advancements in IC, microchip technology [2] as empowered to create cost-effective items/products which avail economic advantages that justify AMR systems.

There are diverse technologies being utilized for information exchange remotely, yet the precision, speed, productivity, reliability and cost viability are the standard advantages legitimately accomplished in this framework with an extra android application to see the points of interest of energy devoured by the customer over a period of time.

Electro-mechanical meters with motorized nature of the segments utilized in many regions ruin due to long usage [1]. These meters were later substituted by digital energy meters having high precision and accuracy with LCD display [1]. Evolution in this pathway includes AMR using digital energy meters [2] [3]. There are diverse technologies being utilized for AMR using Bluetooth [11], GSM [4] [7], GPRS [5], ZigBee [6] [8], PLC [10], RFID [9] and so on. Design of such meters based on BT, GPRS may direct to network uncertainty [5] [11]; with GSM, instantaneous invoice might lead to loss of message, which humiliates performance and accuracy [4]. PLC system makes use of existing power lines to convey info from energy meter to server. The solidity and consistency are the main issues in this method as the carrier wave is readily troubled by noise [8]; also as these systems are wired AMR systems transmission distance, transmission cost, maintenance

and security are critical setback in this technique.

**2. SYSTEM METHODOLOGY** The proposed system is a remotely monitored energy meter with help of WiFi, IOT MQTT protocol, server and android app. Fig.1 visualizes overview of the proposed system. It enables distant monitoring of bill generation, relay connection and disconnection without human intervention and also to perform load analysis. This system makes use of an ARM Cortex M4 microcontroller which is connected to standard calibrated digital energy meter, wireless module, relay and a printer. Energy meter makes use of voltage and current sensors using CT which provide the measured value as a serial output via serial port. This info is hoarded on daily basis in the controller memory, which is utilized for visualizing day-wise energy usage statistics. An intelligent, easy to use application is created utilizing android. Upon receiving generate bill command from the app a descriptive bill is generated at the target end printer as well as a notification is sent along with cost of bill. Furthermore, in the app the energy expended points can be sighted on daily basis and outlook live data of energy devoured. The relay which is also connected to ARM Cortex M4 microcontroller can also be remotely

operated with help of app to disconnect/connect the supply. Server link facilitate android app to gain remote admittance to energy meter and it as well ropes the updates to the microcontroller which is integrated to energy meter.

## BLOCK DIAGARM:
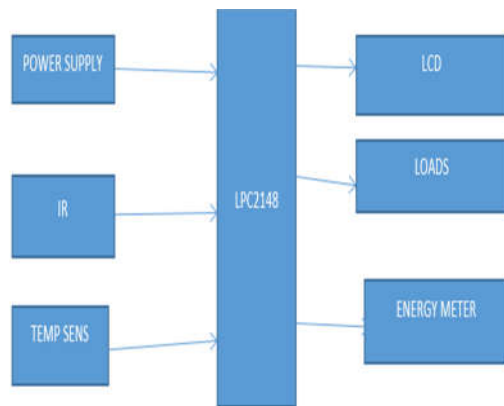


## 3.LITERATURE SURVEY

Lots of survey papers had been published whose critical content fabric are targeted at the SG communique node necessities, efficient infrastructure in network domain which incorporates low scale communication for HAN, NAN and WAN for SG excellent node types. In the literatures, there's the lack of a entire communique network version wherein one-of-a-kind RATs communication trends desirability price being described for particular SG node kinds unique verbal exchange necessities. There are nonetheless some of studies annoying conditions earlier collectively with a whole network planning and optimization,

assessment of capability of the heterogeneous community as a characteristic of node numbers, RATs traits and SG node kinds communications necessities. Besides, a manner to select and assign the SG node types users the diverse top notch RATs which could fulfill the SG communique requirements continues to be an open hassle. Moreover, Eb/N0 as a very critical parameter has now not taken into consideration as an input in combination with special verbal exchange traits to tough an green community version for assisting SG node communique necessities [162]. Finally, elaborating load balancing method in an utility of M2M primarily based gadget such as SG by thinking about all communique parameters isn't well studied.

Smart Grid Communication Infrastructure for Different Node Types

Plenty of studies and papers had been done regarding to introduce the particular node forms of the SG conversation requirement and the proper RATs to fulfill those requirements. The summary of some of them are given on this element.

There is a whole observe by means of B. Karimi et al. On AMI infrastructure investigating how to speak and manage consumer information accrued with the useful resource of utilities and handling

inadequate communication network resources Based on the those works, many statistics relay elements, collector or aggregators are required to gather facts generated by using using SMs to send them through a conversation backhaul network to the CS. SMs message concatenation hassle is studied in this art work and a manner to concatenate multiple small smart metering records arriving at information aggregators devices with a view to reduce protocol overhead. Consequently, network utilization in case of decreasing overhead (goodput growing) results is studied. To be delivered constraint appreciate to beginning message from its supply that has its very personal stated reduce-off date, it's been taken under consideration on the equal time as the concatenation manner is achieved. This paper emphasizes on message concatenation algorithms that can be an crucial a part of statistics concentrators deployed in SG to remedy the mission of transferring huge amount of information through final mile limited backhaul networks. In this paintings by way of proposing an set of guidelines to obtain to effective message concatenation, is validated that this technique is succesful to reduce normal statistics extent thru 10-25% for every aggregator.

Then, primarily based mostly on functionality boundaries, a theoretical evaluation had been finished to decide the facts capacity of the use of linear chain RATs due to the fact the conversation backhaul. Finally, a case check to test the capabilities of any boundaries imposed via the proposed communique architecture is investigated thru using AMI necessities as the defined situation. Despite of introducing several RATs that have been counseled to fulfill conversation necessities at the distribution degree, nonetheless the shortage of a technique to assign SMs among RATs ought to be studied properly. The method to show the desirability of a RAT evaluating with the opportunity RATs may be useful to assign the customers to one of a kind RATs based totally mostly on their mutual fitness values. Thus [43] mentions that ―Though one particular communique structure for the distribution degree of the strength grid became advocated on this paper, an most suitable shape can also range broadly‖. Therefore, regardless of of the proposed technique in this art work and its contributions on imparting a suitable communication community topologies and making an assessment of their technical feasibility, nonetheless a way for choosing the amazing preference the various wi-fi RATs is left behind and a specific look at have to be done. P. Rengaraju et al. Have

worked on the communique requirements an d evaluation of distribution networks by means of the usage of WiMAX RAT as SG verbal exchange network

There are the opposite preferred surveys at the verbal exchange structure in SG. One of them has been finished through W. Wang et al. [45]. Briefly, on this paper the network implementation concerns and demanding situations within the strength machine settings had been deeply studied in which the research outcomes are tremendous. Another survey on the communication shape in SG changed into studied on Communication network requirements for the principle SG packages in HAN, NAN and WAN via the usage of M. Kuzlu et al. [46]. Based on a variety of smart grid use cases and determined on requirements, this paper gathers information about considered one of a kind communication community requirements for extraordinary SG programs, at the three special domains, Home Area Network (HAN), Neighborhood Area Network (NAN) and Wide-Area Network (WAN). An method to resource implementation of selected SG projects is noted. Although this paper has gathered the database of RAT tendencies for designing a SG community however, although the specific sort of the SG nodes have now not been added. Department of

Energy Communication Requirements of SG technology in USA has mentioned the main troubles in SG by way of introducing the principle purpose of SG and introducing the user kinds in SG in general

M. Souryal et al. Studied on a way to evaluate wireless technology for SG [51]. It certainly presents a method for assessing the suitability of numerous wireless technology for nice the communique necessities of SG node kinds regardless of defining the amount for it and considering all RATs traits and SG node kind requirements. It describes an technique for rendering application requirements to link traffic characteristics, figuring out the transmission variety or coverage place of a wireless technology, and modeling the link layer to acquire normal overall performance measures along with message reliability, eliminate, and throughput, mainly the KPIs. But, the overall performance of three representative software use instances had been analyzed just over an IEEE 802.Eleven link now not the one-of-a-type RATs. This work is very worth for giving a complete belief due to the fact it is an method to modeling wi-fi communications on the link layer that, first, detects the diverse programs using a specific link. Then, it explains the necessities of these applications to link traffic characteristics within the form of a

link layer arrival rate and common message size. Also, it uses a insurance evaluation to determine the most style of the era under the outage constraint for a given channel propagation parameters. Lastly, the use of the hyperlink visitors characteristics and coverage vicinity decided above employs a bodily version guiding precept to degree hyperlink performance in phrases of reliability, delay, and throughput as the main communication KPIs of the SG purpose.

## CONCLUSION & FUTURE ENHANCEMENT

In the era of smart city advancement, this project is concentrated on the connectivity & networking factor of the IoT .In this project, an energy consumption calculation based on the counting of calibration pulses is designed and implemented using MCU in embedded system domain. In the proposed work, IoT and PLC based meter reading system is designed to continuously monitor the meter reading and service provider can disconnect the power source whenever the customer does not pay the monthly bill and also it eliminates the human involvement, delivers effective meter reading, prevent the billing mistake. The Project has achieved following objectives:- • Ease of accessing information for consumer from energy meter through IoT. • Theft detection at

consumer end in real time. • LCD displays energy consumption units and temperature. • Disconnection of service from remote server. Future enhancement In the present system, IoT energy meter consumption is accessed using Wi-Fi and it will help consumers to avoid unwanted use of electricity. The performance of the system can be enhanced by connecting all household electrical appliances to IoT. So, in future following objectives can be achieved to save power and avoid thefts:- • We can make an IoT system where a user can monitor energy consumption and pay the bill Online. • We can make a system where a user can receive SMS, when he/she crosses threshold of electricity usage slab. • We can make a system which can send SMS to the concerned meter reading man of that area when theft detected at consumer end.

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