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EB MONITOR -LIFI   BASED INTEGRATION OF USER BEHAVIOUR MONITORING, PRIVACY PRESERVING

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ABSTRACT

Light Fidelity technology is a data transmission method which employs illumination for transferring light or data as a communication medium. This paper illustrates development of advanced infrastructure electric metering, user privacy and power management system is maintained. Energy saving plays a more important role in world scenario. The smart meters adoption conveys new privacy anxiety to general public. The individual factories/homes data metering is accumulate each 15 minutes. The probable to infer electricity consumption patterns of entity users. To protect user privacy completely de-centralized scenery. In this paper propose a method to monitor the user behaviour and calculate current consumption. This system tracks the user like TV Programmer through monitoring TV Remote as of remote Place. Various control modes and Device control Time are monitored. This information preserves and stored securely. The data transmits using LED variation intensity and it has faster than human eye. This is also known as visible light communication or optical wireless technology. Through LIFI technology EB meter interfaced and the data transmitted to EB server. To confirm switching state device Current Sensor connected to device. Android Application is arranged to consumer to Payment System. Dual Cost is accused in Permitted maximum Current service. By simulated data, verify proposed method feasibility and reveal performance recompense over existing methods.

Keywords: LIFI technology, EB meter, current consumption.

1. INTRODUCTION

In energy supply networks SM (smart meters) adoption and UP (utility providers) are proficient to monitor more closely grid and more accurately predict the alteration in demand [1]. This turns, permit the utility provider to enhance the reliability and efficiency of grid through dynamically regulating the energy distribution and generation, in addition to prices in that way, user demands influence. Smart meters permits the user to observe their consumption of energy profile in approximately real time in that way it benefits the users [2]. Customers can utilize the data to remove avoidable utilization or cost reduction through animatedly shifting utilization derived from prices energetically locates by Utility providers. Smart meters exploitation is dispersal simultaneously in everywhere. In Europe, Smart meters adoption has been authorized by European Parliament directive, which requires 100% in 2022 and 80% smart meters adoption in entire European households in 2020. However, the user privacy regards severe in enormous smart meters deployment at residence [3]. High resolution smart meters interpretation may permit any user to right to use the information to conclude valuable private information regarding user activities, together with electrical tools used, the usage of frequency, time and duration and even television channel is watched, while reported in. For businesses, privacy of SM information is critical like as data centres, factories etc [4], the energy expenditure activities may expose significant data regarding the business toward competitors. Consumption pattern can be detected based on monitoring granularity difference. With granularity of minutes or hours can detect user attendance, through seconds or minutes granularity able to conclude appliances behaviour like as refrigerator or television [5], with seconds granularity might identify power explode and appliances

behaviour such as toasters, coffee machines, microwaves. A number of methods projected in journalism to give privacy to users smart meters while maintaining smart meters remuneration for monitoring and controlling the grid. User anonymization is suggested by trusted third party participation. [6] Suggest sending the users group aggregated energy utilization and user keeps their privacy through addition of random noise toward smart meters readings before forwarded to utility providers. Similarly, proposes smart meters readings quantization. In above exertion, privacy is achieved by transforming / distorting smart meters readings before forwarded to utility providers. However, utility providers provided the energy to user and in principle; utility providers simply identify user energy utilization through establishing devices of smart capacity wherever client bonds to grids. [7] It look like privacy level might be accomplished powerful statement; through, consumer can obscure pattern matching for individual strategy and convention patterns through influencing energy utilization [8]. The energy utilization can achieve by filtering over time through storage appliance like electric battery or alternative energy source (AES). An alternative energy source can represent association to subsequent grid energy, like renewable energy source, micro grid, or solar panel.

2. RELATED WORK

Smart meters is one of the part of smart grids which are electrical digital meters have potential to improve energy competence in both industrial and residential sectors. Though, challenging to smart meter [9] accomplishment in residential scenery is adoption and acceptability by consumers or end users. Despite the approved challenges in adoption smart meter, small academic researches have performed on this topic. This

learning endeavours to contribute towards developing SMT adoption model and testing it via German consumer survey. Consequences highlight the significant role played through factors like as external and internal locus control on customer intention to accept SMT. [10] whether using wireless internet in coffee shop or at conference, challenging for bandwidth probably gotten aggravated at slow speeds. Many people with their many strategy access wireless internets, blocked airwaves are obtaining to build it. The Herald Haas germen physicist approach with explanation "data through illumination" - captivates the fibber beyond fibber optic through sending data by LED bulb that differ in intensity quicker than human eye be able to follow. Haas suggests his invention DLIGHT produces data rates quicker than 10 MB per second, which is faster than average broadband connection. Haas envision prospect where data for tablets, smart phones and laptops is broadcasted through light in room. If light and data can't able to see or access then security could be break [11] We suggest new procedure, which permits individual meter to description correct power utilization interpretation with prearranged prospect. LSE (Load serving entities) able to modernize entire power utilization district or state through algorithm of inference, but discovering each user the energy utilization patterns ability is extensively reduced. [12] The LIFI attracts great attention because it might offer efficient and real radio-based wireless. While increasing number of people and devices access the wireless internet, air waves becoming progressively crammed, making it additional difficulties to obtain reliable, high speed signal. So LiFi [13] has dazzling future. Even if wonderful technology used practically, afterward every bulb can used like Wi-Fi hotspot for brighter future [14]. Smart meters privacy is

deliberated by considering an EHD (energy harvesting device) owing to covering user's contribution consignment. Consumer satisfies element or power requirements from EHD. Therefore, few data may reveal to utility providers using Smart meters. The EHD is normally prepared with rechargeable power storage device [15], example battery, and instant power substance restrictions user's capacity in wrap their power utilization. Privacy is deliberate by information leaked regarding user's real energy utilization when utility providers monitor energy demanded from grid, which smart meters reports and reads to utility providers. The smallest amount of data reveal rate is differentiating like calculable data theoretic particular-letter phrase when energy harvesting device battery capability is moreover zero or infinite. Statistical outcomes are obtained for distinct binary contribution consignment to demonstrate impending privacy expands from storage subsistence appliance. [16]

3. PROPOSED WORK

This paper gives wireless sensor network overview using LIFI tools through equal power distribution and also it evade power theft issue. LIFI power meter sends the consumer energy handling reading to energy provider sector. In consumer side the energy unit will display in LCD. When the power distribution range is low the energy provider control change device priority. By giving energy devices like computer, TV, bridge etc power can able to control through this energy distribution method. EB monitoring has electric equipment power reader it contain electric power details. LIFI transmit the power details to user through server. Then also this paper proposes online EB bill payment.
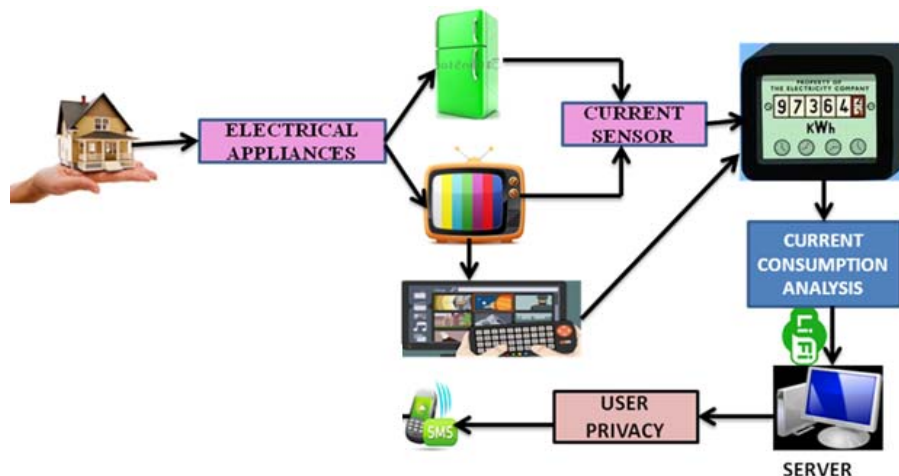

Figure-1. EB Monitor.

A. Electrical appliance and EB monitoring

The wireless sensor network manages the devices in network. The electric appliance consumes power in the network and avoids the power theft issues then it also intimates the power consumption by node to energy provider and consumer side. This paper propose a

technique wireless sensor network to sense the electric current reading of a particular appliance like TV, refrigerator, laptop etc that reading detail will store in EB monitoring. The proposed method performance is established in two divisions corresponding to data usability preservation analysis and Privacy protection

analysis. Both Analyses estimate the two indices performance, privacy protection capability and estimate aggregated smart meter accuracy reading using few statistical tests correspondingly.

B. LIFI with current analysis process

All the information on internet will flow to lamp driver when LED is turn on microchip transfer digital information in light form. The photo detector sensitive device receives signal and transfer back to original data. The light rapid pulses broadcast the information in wireless it's technically known as Visible Light Communication. The elevated brightness of white LED acts like transmission source then receive the element silicon photodiode along with good response. The individual appliance EB reading is stored in server.
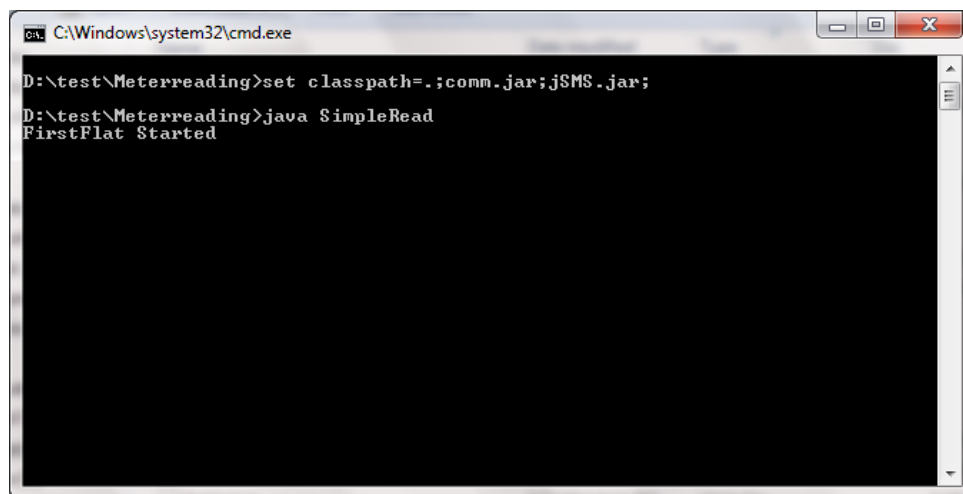
C. Payment process and user privacy

The electric reading transmits from consumer to energy provider Station by forming the path in network.

LIFI technology assist many applications, like as Home Automation and Commercial Building. We suggest a novel approach to protect customer privacy through SM while promising the load server capacity entities to calculate consumption of current electricity. EB server sends the request to monitor result using LIFI technology. To sustain secure transaction we make e-billing system.

4. RESULT AND DISCUSSIONS

In this paper, the wireless sensor network sense the reading of electrical appliance will send to server. The server calculates the reading and sends bill details to particular user through mobile. Our proposed Approach is experimented in this paper by configuring the following requirements like windows 7 or XP Operating System with i3 processor and also it's require 2GB RAM and 500GB hard disk drive to implement this paper in Java. The proposed EB monitoring system is implemented in Java.

Figure-2. Server process

In Figure-2 shows server process. To start server have to set the class path after that server will be start.
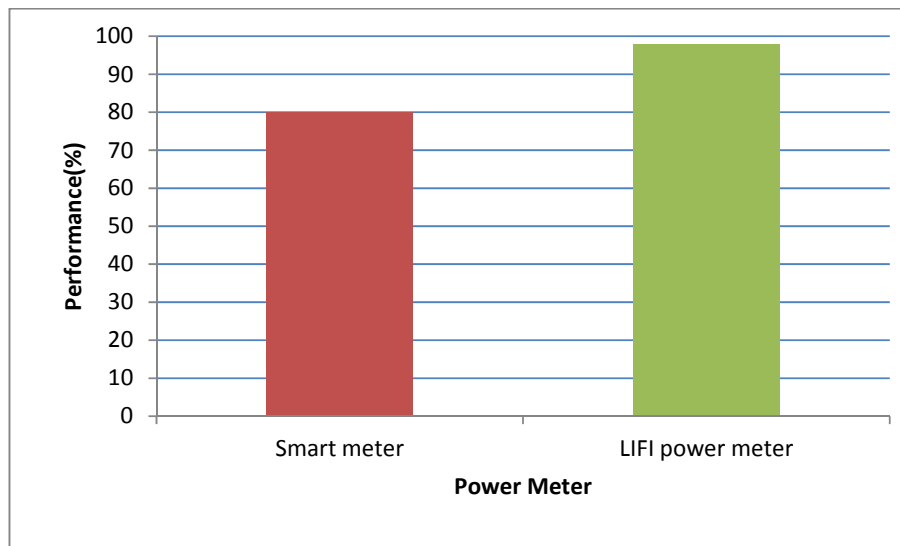
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Figure-3. Power meter.

The Figure-3 shows power meter. The LIFI power meter has better performance when compare to existing smart meter.

5. CONCLUSION

We have presented privacy power utility explicit characterization for exponential and binary input load allocations. We shown optimal energy allocation presented by the alternative energy source in exponentially disseminated scenario load input can be derivative using algorithm of reverse water filling, which resemble rate-distortion utility for several Gaussian sources. The suggested data theoretic framework to privacy in smart meters systems gives valuable devices to discover fundamental disputes and restrictions for this serious problem, whose significance will enhance as adoption smart meters becomes more extensively spread. More interesting research issues implore further revise; as well as time associated loads contribution, method with several EMUs, including pricing and cost issues taking into consideration dynamic charging eventually.

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