



Exploiting Time-Evolving Meeting Probability Data Transmission Zigbee in Reducing Wifi Power Consumption for Mobile Devices

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Abstract—Transmission of efficient data in wireless sensor networks WiFi interfaces applications is one of the major important key challenges with ensuring the law of human activities. A probable way to increase the efficient data transmission with high packet message delivery ration is by proposing message delivery scheme and that decrease the overhead of data transmission and efficient data transmission in WiFi interfaces. To manage the above mentioned challenge in WiFi interfaces in this work proposed a novel time evolving probability based data transmission methods that decrease the overhead problem in WiFi interfaces and simultaneously solves data transmission problem in WiFi interfaces such as Zigbee protocol. The proposed method the copy management method is introduced to reduces the overhead problem during message transmission. Based on this scheme additionally three protocols have been introduced in Zigbee protocol to save energy in the interfaces such as scanning, standby and wakeup correspondingly. Simulation results are analyzed that the proposed data transmission schema with ZigBee protocol have produces high message delivery ratio , higher throughput and lesser packet drop ratio with sustainable accuracy of energy consumed during data transmission process respectively.

Keywords—Energy savings, ZigBee, 802.15.4, mobile devices, data transmission solution .

I. INTRODUCTION

Saving of energy in handheld devices have been received a more attention in recent years [1-4] to save energy consumption and reduces the cost of the communication interfaces. Among them several numbers of communication radio WiFi radio become one of the mostly used communication interfaces in mobile devices, so saving the energy straightforwardly affects the performance of the user knowledge. In earlier three numbers of scenarios have been proposed to energy saving in WiFi radio without consideration of some real communications. Initial, WiFi radios have to continue dynamic to examine in favor of networks in the scanning situation. The power consumption used for network scanning is significantly significant on behalf of lack of WiFi exposure in a lot of places. Second, all the way through PSM (Power Save Mode) supply, a WiFi radio wants to continuously change to dynamic to obtain wireless access point (AP) beacons, and make sure condition the AP has defense its packets.

The complete scheme for power consumption correspondingly and earlier works [5-6] showed with the purpose of the awaken conflict might cause up to four period further power utilization. To decrease WiFi power utilization in these methods, propose to develop a novel WiFi interface schema to reduce the utilization of power known as ZigBee radio. Since the Wi-Fi radio will be switched off if there is no number of packets will be transmitted from source to destination and the ZigBee radio is dependable on behalf of determining the existence of WiFi designed for device communication .By doing this process the power utilization of WiFi radio reasonably reduces for ZigBee radio.

In beacon-enabled networks, is one of the specialized forms of networks which consist of nodes in the ZigBee called as Routers in order to transmission of interrupted beacons to validate their existence to further network nodes. Nodes might be asleep among beacons, thus subordinate their **duty cycle** and enlarging their battery lifetime. Beacon intervals are major depends on the data rate which is sent by user, in generally there are starts from 15.36 milliseconds(ms) to 251.65824 seconds next to 250 kbit/s, from 24 ms to 393.216 s next to 40 kbit/s. Though, small duty series procedure through extended beacon time needs accurate point in time, which cans variance through the necessitate intended for low down invention cost. In all-purpose, the ZigBee protocols decrease the point in time the radio is going on, as a result as to decrease power utilize. In beaconing networks, nodes just necessitate on the way to exist dynamic at the same time as a beacon is individual broadcasting. In non-beacon-enabled networks, power utilization is particularly irregular: a number of procedures are always dynamic, at the same time as others expend the majority of their moment in time inactive.

ZigBee radios by way of smart phones designed for smart home purpose [7] and power savings [8-9]. ZigBee radio can be straightforwardly associated in the direction of a mobile device by means of USB interface. Today's mobile phones are prepared through an extensive variety of intelligence, computational, storage space and message assets with

the intention of mobile applications in location-aware based social networks. However, individual's applications be capable of potentially decrease the battery lifetime of movable handsets. Unhappily, battery equipment has not knowledgeable the identical development as the rest of hardware system in transportable handsets. To extend the battery life of the handheld devices especially for mobiles, developing a additional energy efficient scheme plays a major important role in the WiFi interfaces.

In this paper proposes a novel WiFi-ZigBee message deliverance system, with additionally three stages such as scanning, standby and wakeup correspondingly. A capable technique on the way to enlarge the effectiveness of message delivery scheme and to decrease packet overhead is to make use of smaller amount of packets to predetermine commonly and more packets to predetermine those infrequently second-hand messages. Data transmission solution schema additionally introduced in this work to solve these above mentioned problems and simultaneously copy management approach is specified to decrease the message delivery overhead.

II. BACKGROUND STUDY

Previous effort [10] has considered the collision of diverse energy saving method in 3G networks via investigative representation. These works investigate the collision of the immobility timer through representation the interruption and power consumption intended for dissimilar standards intended for the immobility regulator. Their objective is to decide the most favorable assessment of the immobility timer on or after the network operator's viewpoint.

Yeh et al. [11] systematically evaluate the impact of the immobility control in together 3GPP and 3GPP2 networks. In contrast, our knowledge pleasures the immobility device assessment as a known and expands algorithms intended for energy-efficient schema for real application traces. Energy-efficient movable system activity: a number of preceding studies [11] have examined in mobile phones sustaining numerous wireless technologies.

Rahmati et al. [12] demonstrate with the intention of intelligently switching among Wi-Fi and GSM decrease power utilization considerably in Wi-Fi radio during the communication process. On the other hand, in order to keep away from the cost of avoidable examine in the appearance of underprivileged Wi-Fi accessibility, in this work design an efficient method with the purpose to determine Wi-Fi accessibility, and the device scans on behalf of Wi-Fi AP's in Wi-Fi radios through high likelihood.

Cell2Notify [13] make use of cellular direct to awaken WiFi radios designed for VOIP calls. The additional method move toward to accumulate WiFi stand-in power is recommended through E-MiLi [14]. Because these approach objective dissimilar section of WiFi standby, they are accompaniment every one added in energy saving for Wifi radio. This method initially ascertains a low-power channel among Access points and ZigBee radios selectively. While Wake-on-wireless [15] requirements innovative plans at together sender and receiver part permit handset to notice the subsistence of the low-power channels.

Zhao et al. [27] considered the multiplication series of web browsing, collective information communication mutually and exchange to FACH following the communication is finished. To decrease the instance time used up in FACH condition, they proposition a prediction algorithm based on Gradient Boosted Regression Tree (GBRT). The proposed method forecast the user's examination moment in time following downloading the web pages. Balasubramanian et al. [28] decrease the moment in time exhausted in FACH through scheduling together delay-tolerant and perfecting-benefit appliance correspondingly. The successive communication is combined in the direction of decrease the moment in time used up in FACH. It is frequent second-hand applications in smart phones.

III. PROPOSED METHODOLOGY

In our present intend each and every one WiFi-ZigBee messages contain the equivalent length. A capable method to enlarge the effectiveness system by proposing message delivery scheme thus decreases packets overheads problems by frequently using same packets again and again. Based on this scheme additionally three protocols have been introduced in Zigbee protocol to save energy in the interfaces such as scanning, standby and wakeup correspondingly. Additionally introduce copy management, based transmission methods for data communication by calculation of highest probability value for each one of data. The proposed message forwarding method is categorized into three ways, discover the intermittent neighbor of the destination node, discover the suitable moment in time in favor of message forwarding, and forwarded it with very larger probability value this steps increases efficiency of the work. The probability value for message forwarding schema is calculated using the formula (1) when A meet up B and decompose in moment in time as formula (2):

$$P_{(A,B)} = P_{(A,B)old} + (1 - P_{(A,B)old}) \times P_{init} \quad (1)$$

$$P_{(A,B)} = P_{(A,B)old} \times \gamma^k \quad (2)$$

The probability value for message forwarding schema with time t is presented and the length of the source to destination is acquired to forward messages, this is updated use formula with probability ,

$$P(t)_{(A,B)m} \propto \frac{1}{(d_{(A,B)m} - (t - t_{(A,B)m-1}))} \quad (3)$$

$t_{(A,B)m-1}$ denotes the meeting time of A and B, between $m - 1$ and m intervals with distance $d_{(A,B)m}$. On the other hand, designed for the probability of node's meet, $P_{A,D} > P_{B,D}$ earlier than time duration t_1 , $P_{B,D} > P_{A,D}$ for the duration of t_2 to t_3 and $P_{A,D} > P_{B,D}$ among t_8 and t_9 , the above formula is updated as (4)

$$P_1(t)_{A,B} \propto (TCD(A, B)_i - CD(t)_{A,B}) \quad (4)$$

$CD(t)_{A,B}$ is the make contact through period of A and B earlier than the time duration of t , and entire duration make contact through period is represented as $TCD(A, B)_i$. if $CD(t)_{A,B} > TCD(A, B)_i$, $P_i(t)_{A,B}$ is set 0. If the number of cycles increase than the above formula is replaced of cycle k as follows:

$$TCD(A, B)_i = \frac{\sum_{k=1}^j CD(A, B)_{k,i}}{\sum_{k=1}^j k} \quad (5)$$

TEMP forwarding approach mostly include three phase:

- (1) Discover the intermittent neighbor of the destination node,
- (2) Discover the suitable moment in time in favor of message forwarding
- (3) Forwarded it with very larger probability value this steps increases efficiency of the work.

(1) Discover the intermittent neighbor of the destination node, to forward message from source A to destination B, it must satisfies following condition the condition:

$$\frac{(|N(B) \setminus N(A)|)}{|N(B)|} \geq \lambda \quad (6)$$

λ is an adjustable parameter that belongs to value of 1 this reduces redundancy problem then moves to second stage.

(2) Discover the suitable moment in time in favor of message forwarding can be delivered. Then describe the distance among time period i and j as $dis(i, j)$, which is designed according to formula (7) as follows:

$$dis(i, j) = \begin{cases} j - i & j \geq i \\ j + s - i & j < i \end{cases} \quad (7)$$

S time slot in the completion of one whole cycle, if $dis(k, i) > dis(k, j)$, Then goto next step 3.

(4) Forwarded messages with very larger probability value in the right duration of time. Consequently if the when A meet up B and decompose in moment in time as formula $P_i(t)(B, D) > P_i(t)(A, D)$.

Copy Management. To reduce the redundant and irrelevant messages during data transmission or communication process, in this work presents a new step called copy management, the major aim is to decrease the redundant packets based on defining the following two aspects.

(1) In the message diffusion phase follows message forwarding procedure from source to destination that is source original station and destination need to the ending receiver in WiFi interfaces. The message forwarding schema from source to the destination uses a multi-copy strategy. That is several numbers of carriers in the communication save the same copy of the content of the message. The objective is to formulate contact with destination through the multi-copy strategy.

(2) In the second step of the copy management the carrier is created through the destination. It is forwarded in a particular duplicate copy to remaining carriers to analysis the unauthorized users. Then an unnecessary and unrelated message is deleted and forwarded to suitable user in WI-Fi interfaces.

IV. EXPERIMENTATION RESULTS

A WiFi radio encodes the amount of data with the intention to communicate to ZigBee propagation all the way through sending a succession to Wi-Fi package with a permanent communication velocity. This predetermined value of the packets or data size is directly taken from our message delivery schema. The packet size of each one of the data are determined by the Zigbee radio based on consumed energy and attain the amount with the intention of the Wi-Fi radio wants to require to convey data transmission communication. The experimental work is estimated based on the direct communication among 802.11g Wi-Fi nodes. Thus, experimentation also performed under various connections among the nodes (radio) based on data transmission. Experimental backdrop transfer with bandwidth beginning 1 MB/s to the flooded bandwidth (30 MB/s) through a step measurement of 3 MB/s.

The message delivery scheme needs to be consistent for Wi-Fi radio in the zigbee clients which detects WiFi-ZigBee messages sent from client without delay and false alarm messages. It results that the accurateness of the proposed schema have more accurate than the existing zigbee protocol for all number of the clients in Wi-Fi interfaces which must probable to identify delivery messages. Perform an experimental to assess the dependability and the accurateness shows of the employed message delivery scheme for Wi-Fi environments are implemented in network simulator ns2. The proposed zigbee with message delivery is more dependable and accurateness performances for various background traffic. The proposed message delivery mechanism in zigbee protocol consists of major three steps: Discover periodic client from source to destination, establish the exact time between nodes and forward the original packets to server in Wi-Fi interfaces with high probability until all client request in zigbee protocol is completed.

Measuring the results of methods and network life time the following parameters plays major significant role in the following parameters such as consuming energy, packet overhead and throughput achievement. The quality of the proposed system is measured based on the above mentioned parameters that corresponds to less energy consumption, lesser packet overhead and higher throughput achievement between all number of client and server in Wi-Fi Interfaces for zigbee protocol with efficient data transmission from source to destination nodes.

Fig.1 shows the performance comparison energy consumption of the existing zigbee and the proposed data transmission with zigbee protocol, between the numbers of nodes in x axis and energy consumption results are evaluated in y axis, it experimented that the performance accuracy of the proposed zigbee with efficient data transmission method consumes lesser energy and considerable same energy level if number of nodes in the zigbee radio is increased than the existing method.

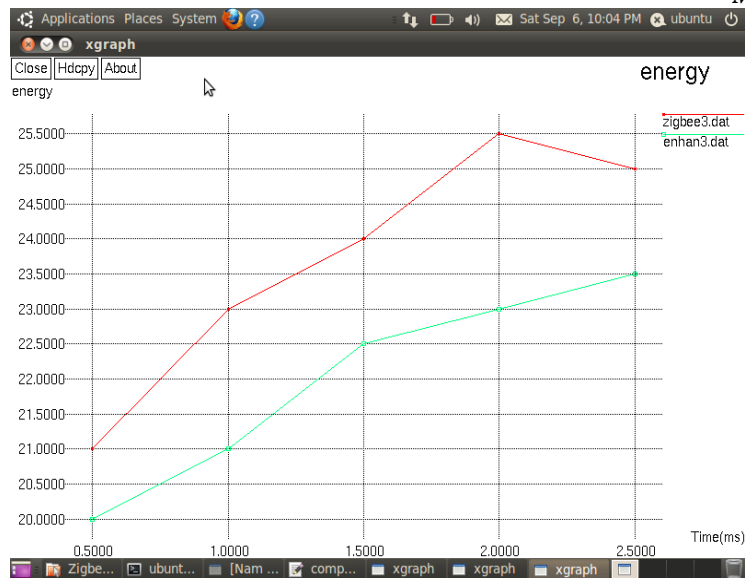


Fig .1. Energy consumption vs methods

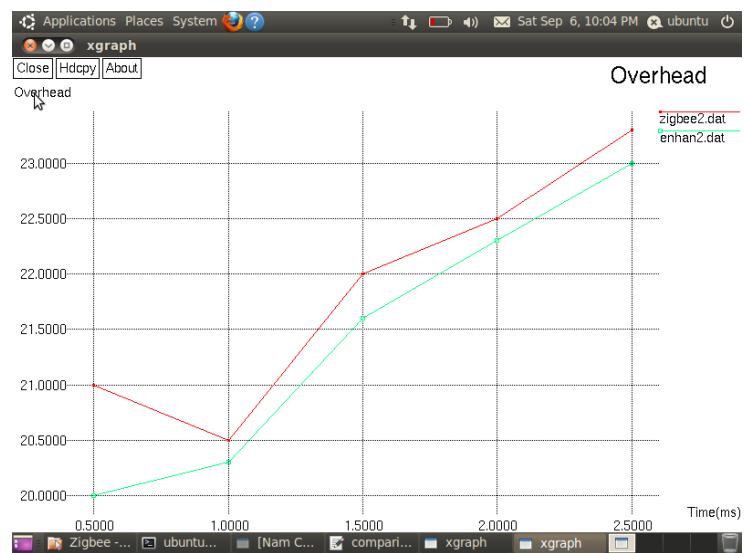


Fig.2. Packet overhead vs methods

Figure 2 shows the performance comparison results of packet overhead to existing zigbee and the proposed data transmission with zigbee protocol, between the numbers of nodes in x axis and packet overhead results are evaluated in y axis, it experimented that the performance accuracy of the proposed zigbee with efficient data transmission method achieves lesser packet drop than the existing methods.

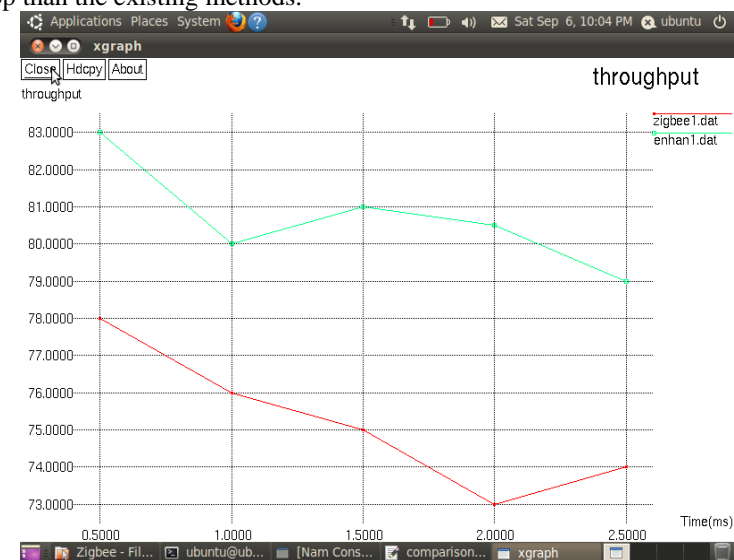


Fig.3. Throughput vs methods

Fig.3 shows the performance comparison throughput results of the existing zigbee and the proposed data transmission with zigbee protocol, between the numbers of nodes in x axis and throughput results are evaluated in y axis, it experimented that the performance accuracy of the proposed zigbee with efficient data transmission method achieves higher throughput results when the number of nodes in the protocols is increases.

V. CONCLUSION AND FUTURE WORK

In this paper presents an efficient energy and data transmission schema for WiFi interfaces by proposing Zigbee protocols in four different points of view: scanning, standby and standby wakeup, data transmission schema. The proposing of novel data transmission schema plays major important other than that all the remaining parts so in this work we majorly focus on the efficient data transmission schema is known as TEMP to save energy and best data transmission. In proposed data transmission schema consists of two major steps: message forwarding and copy management approach. In message forwarding schema separates the number of data from Zigbee protocol into to several numbers of time slots and it is delivered to radios. Our extensive simulation result of the proposed data transmission with ZigBee performs precisely and constantly achieves best power designed for WiFi devices. Simulation results are analyzed that the proposed methods have produces higher results in terms of message delivery ratio, throughput and less packet drop ratio with sustainable accuracy of energy consumed during data transmission process respectively. Thus, in our future work; desire to learning a quantifiable and self-adaptive population discovery algorithm to support the message forwarding. In community detection method node's mobility partiality is always connected through the geographic information.

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