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Energy Consumption in Mobile Phones using WIZI cloud with Zig-Bee technology

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Abstract:-

Now days motivated by user preferences towards carrying smaller devices Hence, Laptops, smart phones and Tabs are rapidly replacing computers as the most commonly-used Internet-access devices. This has resulted in much higher energy consumption and consequently, a reduced battery life of a wireless device.

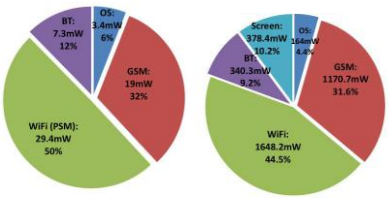
Cloud, a system that utilizes a dual WiFi-ZigBee radio on mobile phones and Access Points, supported by WiZi-Cloud protocols, to achieve ubiquitous connectivity, high energy efficiency, real time intra-device/inter-AP handover, that is transparent to the applications. It mostly runs on android phone, tab n all
Power consumption is less occurs in WiZi-Cloude, and a low delay for better n fast communication.

Keywords:-
Energy Efficient, 3G, Wi-Fi Hotspot, cool-spot,WiZi-cloud,GSM,Cellular networks ,Wi-Fi, Power measurement, Energy savings.

1.INTRODUCTION

In now a day 2016 Smartphone, tab, laptops are more powerful device for communication one channel to other. And their used is not just telephony purpose or corporate purpose now they are part of our lifestyle. And this smartphone contains lots of application, which 90% are Internet base, such as Whatsapp, Facebook, hike, Google, M-Indicator. These technologies are reliable and global Internet access. WiFi networks can significantly help scale wireless access, in cooperation with Smartphone technologies, especially within metropolitan city . WiFi architecture are well defined and also well knowing that the WiFi interface on mobile devices suffers from high energy consumption even in smartphones.

Although the new smartphones is developed new technology for better power consumption , the following Fig. 1 of Android Power Consumption Breakdown on Android phone shows that, for both idle and active modes. Particularly, it shows that WiFi is very inefficient when no traffic is occurring or when the traffic load is low.



(a) Radios Idle, Screen Off (b) Radios Active, Screen On

Fig. 1.Android Power Consumption Breakdown[4].

2. ZIG-BEE TECHNOLOGY

The latest all hand set have all facility which connect to the Internet, all application support system, call and location finder using GSM system, the current commercial mobile phones already have WiFi, Bluetooth, and GSM. So more power consumption is created . Now to handling this problem WiZi-Cloude use Zigg-Bee technology for more flexibility.
The ZigBee link we propose will co-exist with the smartphone interface. Each of these network interfaces having different characteristics like energy consumption, capacity, and coverage. The mobile phone should be able to determine which network interface to carry the packets according to its traffic demands and other system conditions. The ZigBee link we first examine in WiZi-Cloud is an ultra-low power link, but has a limited bandwidth compared to WiFi interface. It is particularly designed for Smart phone applications

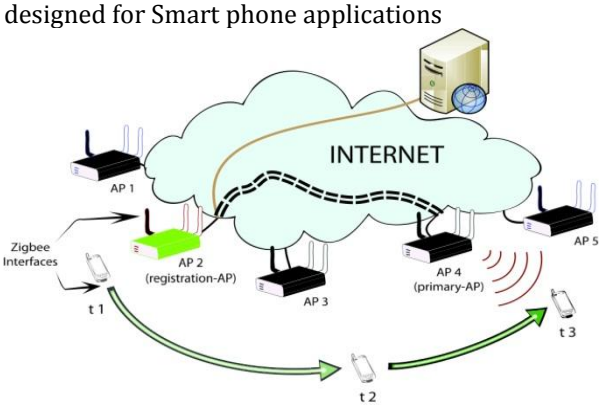


Fig. 2. Dual radio mobile device moving ac-cross the WiZi-Cloud system [2]

As per research in organization is stated that WiZi-Cloud achievesmore than a factor of 8 improvement in energy consumption in comparison with energy-optimized WiFi, and a factor of 5 in comparison with GSM. WiZi-Cloud has a better coveragethan WiFi, and a low delay resulting in a good Mean Opinion Score (MOS) between 3.87and 3.97 for a VoIP ZigBee technology was invented by Texas Instruments Incorporated on 14th, 2011, the experiment was done on Android 2.2 Software development platform Smartphone.
After successful experiment on smartphones then this technologies are enabled to manage commands on smart TV or other utilities through mobile devicesThisachievement leads to maximization of the mobile devices' functionality and mobility for the users.

Figure-3.ZigBee applications in various industries [5]

3. WIZI-CLOUDE FEATURE

Figure-4.Protocol Feature

• **PowerfulEnergy-efficiency** : WiZi-Cloud system is well efficientfor maintaining connectivity in smartphone and other well system application such as VoIP in terms of power consumption.

• **Hand On Control of existing HW/SW**: WiZi-Cloud runs on off the side of smart phones and wireless routers without hardware/ Software modifications.

• **Flexibility**: The network interface used is determining my smartphones according to client – specified policy in WiZi-Cloud design. WiZi-Cloud provides the flexible switch between current system and possible available system i.e. To switch between WiFi and ZigBee interfaces.

• **All-in-one used** : WiZi-Cloud system and its protocols is completely crystal clear in there used in the applications running on the smartphones and peer entities in the Internet.

4. SYSTEM DESIGN AND PROTOCOL

This project will involve in the architecture at the application layer, as shown in Figure-5. The API involve only mobile devices, at the rage of Android software and beyond, while the security and network layer will be provided by the ZigBee dongles.

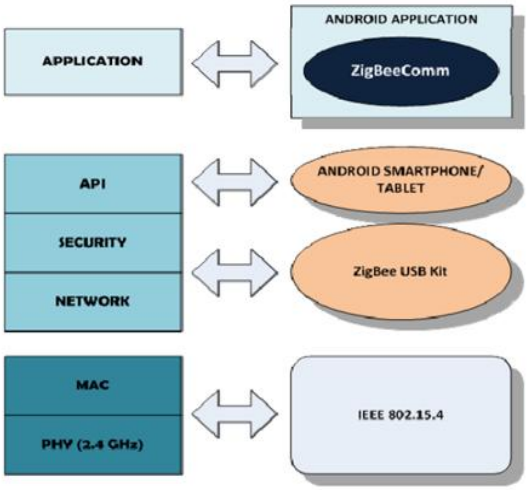


Figure-5.Protocol layer overview[5]

4.1 HARWARE SPECIFICATION

The technology is used in this dongle are manufactured by SZHOMA. Its range is apx 2.4 GHZ ISM frequency band, based on the IEEE 802.15.4 protocol development, and it is low cost wireless transceiver product unit. The mainly used of this device is monitoring and control and also data acquisition and transmission. This converter provides a USB serial interface, enabling it to be used with computer equipment. For this technology is used with Android devices, the Device, where it is included in the application package .apk file. The enactment parameters of the technology are as shown following figure. For connecting ZigBee dongle in your android device via a USB OTG Cable which used USB connection in your mobile cell [5]

SZHOMA ZigBee USB gateway HCV105[5]

Parameters	Details
Input voltage	USB 5V input
Baudrate	9600 BPS (default), can be installed 19200 BPS, 38400 BPS, 57600 BPS, 115200 BPS
Radio frequency	2.4 GHz
Wireless protocol	ZigBee 2007 / PRO
Transmission Distance	LOS of 100 meters
Emission current	280 mA (maximum)
Receiver sensitivity	-97 dBm
Temperature range	40oC to 85oC

5.FLOW CHART OF SOFTWARE

The Android device first detects the USB dongles that is plugged onto it and get it into used for customer. The user is given the choice to

1] Start the File Sharing activity

2] File Receive activity

3] Message Broadcast activity.

In each of the activity, the data are sent and received via the connected ZigBee, which then will communicate with another party over the ZigBee.

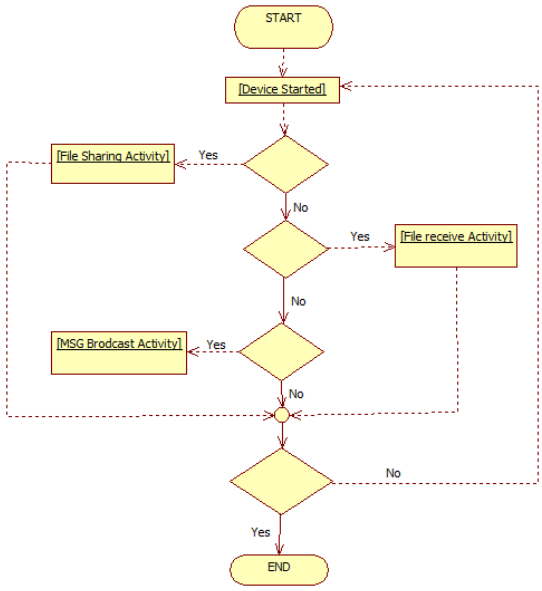


Figure-6.Flow Chart.

6.Working Mechanism of WIZI Cloud

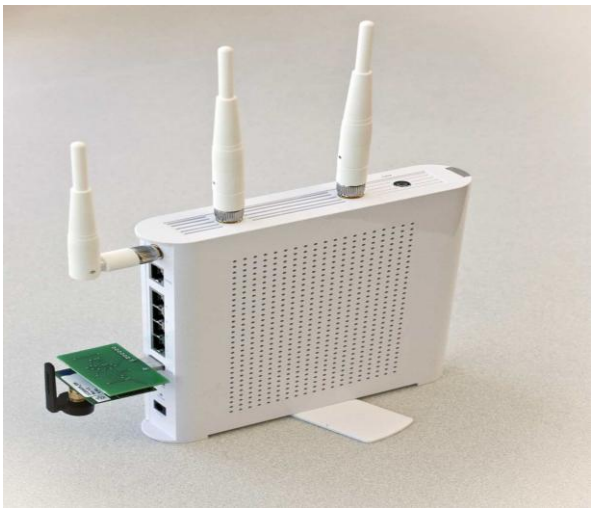
The WiZi-Cloud system extends the hardware and network stack of existing WiFi access points and mobile devices with a set of protocols and mechanisms to support an additional low power air interface for less energy charges in your smartphone system. We chose ZigBee because of its zero-time connection establishment, and good radio range. ZigBee is also available as a low cost System on Chip with an integrated low power microcontroller. The important feature of this technology is allowing the mobile phone to be in sleep mode while the microcontroller handles the wakeup and some of the network functionality.

(a) Phone Dongle

(b) Laptop Dongle

Fig. 7 WiZi-kit: fully custom made ZigBee modules[2]

a) With UART connection



b) With USB connection

Fig 8. Extended routers of the WiZi-Cloud system[2]

6.1 HARWARE STRUCHTURE

On the mobile device the ZigBee is integrated as a low cost accessory, in our case interfacing with an Android phone using the serial link. This could be made more compact by using a ZigBee microSD card. We have prototyped a hardware module, *WiZi-kit*, which integrates TI CC2530, on-board PCB antenna, and connectivity interfaces including UART and FTDI-USB. WiZi- tool kit can be attached to mobile phones and laptops as a small dongle .On theAP, we use OpenWrt compatible access points which gives us hundreds of choices from many manufactures . Our current prototype runs on two particular models, Linksys WRT54GL, and Planex Wireless USB router MZK-W04NU.On WRT54GL, the ZigBee is integrated by soldering four wires on the router board. On the Planex router, the ZigBee dongle can be attached to the USB host.

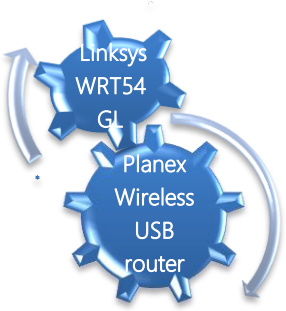


Fig. 9.Hardware Models.

6.2 SOFTWARE CONFIGURATION

The network stack of the access point is extended to maintain connectivity with the mobile devices through the ZigBee interface as well as to organize with patrician APs to locate mobile devices.
The network stack of the mobile device is extended using a virtual network interface through which all traffic is directed. Stack network connectivity maintains at low energy cost and seamlessly switches between the WiFi and ZigBee links using an intra-device assignment mechanism depending on the network lode traffic. It also chains assignment across a network of WiZi-Cloud access points as the mobile phone roams around. The network stack extensions are designed to be transparent to the application.
While several previous work considered multi-radio interfaces for energy efficiency in wireless networks, and as we discuss in the related work section, no previous solution achieves our target design objectives in terms of seamless
communication, low delay, energy efficiency, and minimal hardware/software modifications. To demonstrate the feasibility and advantages of the proposed
approach, we implemented our solution, built a hardware/ software prototype, and carried an extensive set of experiments

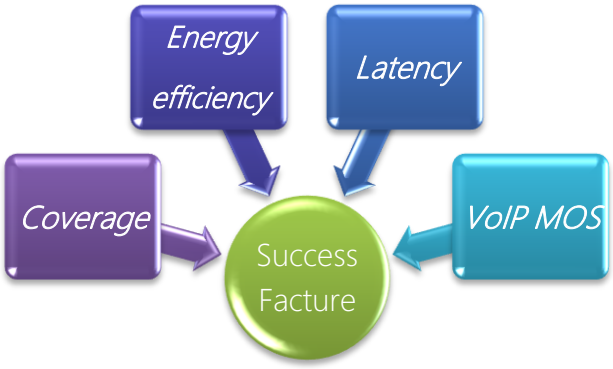


Fig. 10 Softwre Success Factor.

• ***Energy-efficiency*:** We show that WiZi-Cloud solution leads to more than a factor of 3 in energy improvement in comparison with an energy optimized WiFi-based system in standby mode. In active mode, theWiZi-Cloud solution
achieves twice more energy efficiency for some mobile applications such as VoIP, and Email.

• ***Coverage*:** We compare the ZigBee coverage at 4dBm transmit power on channel 26, which is free of WiFi interference, to the 24dBm WiFi coverage when using the most robust WiFi rate (i.e., 1Mbps). This is because the lower ZigBee rate (i.e., 250Kbps) compensates for the lower transmit power. We also show that ZigBee coverage can be significantly improved by using a RF signal booster, which results in a single WiZi-Cloud AP covering a three floors of a 70 ft. by 250 ft. building.

• ***Latency:***When WiZi-Cloud mobile device works in Zig-Bee mode, the radio canwakeup in 0.75ms. The end to-end latency includes the transmission time on UART and ZigBee link, the latency along the end-to-end route, and the latency occurred in UART kernel driver. In our prototype, the average one-way client-AP delay is 27ms, and 33ms when packets are tunnelled through two APs.

• ***VoIP MOS**:* WiZi-Cloud achieves a *good* Mean Opinion Score of 4.26 for a US cross-country communication.

7. WIZI-CLOUD SYSTEM DESIGN

WiZi-Cloud system consists of a server end and a client end software/hardware support. We built a ZigBee link between each mobile phone client and the associated access point as an ultra low power alternative to the WiFi link. In this section, we present the details of our system design.

7.1 System Overview

The WiZi-Cloud system is designed as to run below the Internet Protocol layer in the TCP/IP model, and above the link layer. Fig. 4 shows the WiZi-Cloud system framework which consists of three components, Service Module, WiZi-
Cloud Bridge & UART I/O, and ZigBee Modem.

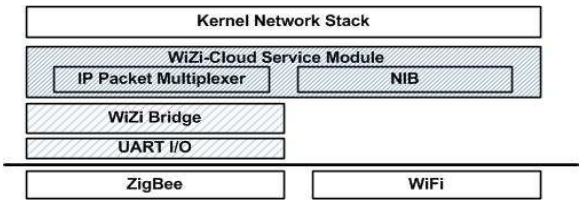


Fig. 11. WiZi-Cloud System Framework[4]

1) Service Module:The main task of this service module is to distinguish the WiZi-Cloud management traffic from generic IP packets and respectively handle them. For regular IP packets, the service module plays the role of a multiplexer
passing packets between the kernel network stack and the active radio interface (either WiFi or ZigBee).

2) WiZi-Cloud Bridge & UART I/O:WiZi-Cloud Bridge Module mainly handles fragmentation for the IP packets. In WiZi-Cloud system, the maximum ZigBee frame payload size used in CC2530 network stack is 116 byte, which is much smaller than the IP MTU (1500 byte in Ethernet). Thus, WiZi- Cloud Bridge chops the IP packets from the Service Layer and get each fragment ready to be transmitted with the ZigBee RF. When receiving an IP packet from the ZigBee interface, WiZi-Cloud Bridge buffers all the fragments, reassembles them and forwards the IP packet to the Service Module.

3) ZigBee Modem:ZigBee Modem provides the host with read and write operations on the ZigBee link. As UART bit streams arrive at ZigBee, ZigBee translates the bits into frame.Upon successful CRC verification, ZigBee sends ACK back to host. The new frame is buffered in egress buffer to be sent through radio to the destination with the following format.

8. CONCLUSION

We propose WiZi-Cloud, a network architecture, set of mechanisms, and HW/SW system solution to achieve an energy efficient, ubiquitous and real time reachability that is transparent to applications. We have prototyped WiZi-Cloud on commodity mobile phones and WiFi APs. Our broad set of experiments demonstrate that ZigBee achieves a factor of 11 better energy efficiency than any other WiFi in Power Saving Mode. With all system energy usage counted, WiZi still can be 2 times more

energy efficient than an optimized WiFi while active transmitting, and standby lifetime can be extended up to 3 times. Similar results apply to GSM, as well. Besides, WiZi-Cloud has better coverage than WiFi within 50ft indoor environment.

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