I J C T A, 9(37) 2016, pp. 719-723

Wi-Fi Technique To Charge Your Battery

Pankhuri Priyam[*], Sweety Sinha[**] and V. Vishnupriya[***]

Abstract: Gone are the days when you charged your phones and forgot when you charged it last. With the technology getting smarter everyday, came up the smart phones, this smarter version of phone had PDA, media player and GPS, thousands of applications, and supported ios, android and what not? But it has one major flaw. The battery backup of such upcoming smart phones is questionable.

"Beep! Beep! Your battery is getting low. Connect to your charger." Would be one of the most annoying message your phone beeps. Now how far you can carry those tangled charging cables and power banks with you? With furtherance in science, don't we need advancement in the methods to harness the problems too? So our paper focuses on how with Wi-Fi (wireless fidelity), your phones' only life pumping organ can live longer without the recharging process. This concept is new and popular right now. However we claim that the battery might not get charged upto 100%, but it won't even dip down, till you are under a Wi-Fi centralized area. The working principle, efficiency and drawbacks(if any) are explicated in our paper. The radio wave once used to transmit data can now be efficiently tapped to charge your smart phone.

So next time your phone beeps, don't get alarmed or annoyed, just sit back and relax and continue doing your work because your Wi-Fi will now do the needful.

0. SITUATION

Lets take a very genuine example; last night you were busy with some work and you forget to charge your Smartphone, before you went to sleep. Or a sight we come past in airports when the flight is delayed by few hours, You would probably encounter a swarm of people clinging around the charging ports and realize that the ratio is 10:1 (For every 10 passengers, 1 charging port available).

1. INTRODUCTION

Wi-Fi is a wireless computer networking confined to local area technology that allows electronic devices to connect to a network. It uses 2.4 GHz (12 cm) UHF and 5 GHz (6 cm) SHF (super high freq) ISM radio bands

ISM radio bands: The industrial, scientific and medical radio **bands** are portions of the radio spectrum reserved internationally for the use of radio frequency.

In the year 2000, many cities round the world announced plans to construct city-wide Wi-Fi networks. This plan got many successful examples,one among them is, Mysore;in 2004, Mysore became India's first Wi-Fi-enabled city. WiFiyNet, a private venture company has set up hotspots in Mysore, covering the complete city and a few nearby villages.

A **WiFi** hotspot is created by installing an access point to the internet connection. The access point transmits a wireless signal over a short distance. It at large covers around 300 feet. When a **WiFi** enabled device such as a Pocket PC confronts a hotspot, the device can then be connected to that network wirelessly.

[*] B.Tech: Department of Telecommunication SRM University,Kattankulathur. *Email: pankhuri.new@gmail.com*
[**] B.Tech: Department of Telecommunication SRM University ,Kattankulathur. *Email: sinha.sweety@gmail.com*
[***] B.Tech: Department of Telecommunication SRM University , Kattankulathur. *Email: vishnupriya106 @gmail.com*

Popular WiFi access protocols are:

The **802.11a, that** will transmit data at a frequency of 5GHz.

You can transmit a maximum of 54 megabits of data per second.

The **802.11b** transmits data at a frequency of 2.4GHz, which is a relatively slow speed.

We can still transmit a maximum of 11 megabits of data per second.

The **802.11g** transmits data at 2.4GHz but can transmit a maximum of 54 megabits of data per second as it uses an OFDM coding.

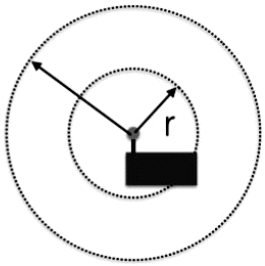
The **802.11n** is most advanced one and can transmit a maximum of 140 megabits of data per second, which uses a frequency level of 5GHz.

Feasibility:

Scientists have recently harvested energy from Wi-Fi signals to power a simple temperature sensor, a low-resolution camera and tracking bracelet.

Our Wi-Fi routers create electromagnetic radiation uniformly in all directions..For phone charging this electro magnetic power in all direction ought to be directed in one course.

$$A = 4\pi r^2$$



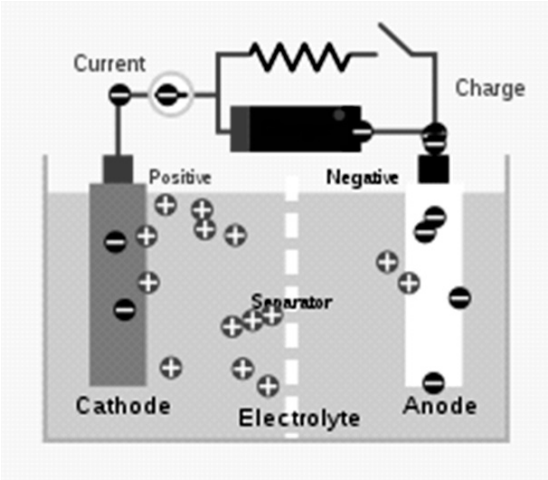
Also,Power Over WiFi(PoWiFi) has transformed the vicinity of a Wi-Fi routers into a wireless charging hotspot for devices such as wearable activity trackers already. The feasibility of this,has been demonstrated using the general-purpose USB charger. What they do is,the system consists of a 2 dBi Wi-Fi antenna attached to a custom harvester for higher input power. After that Jawbone UP24(wearable activity trackers) device and placed 5-7 cm away from the PoWiFi router. It is found that the charger could supply an average current of 2.3 mA and actually charge the Jawbone UP24 battery.

2. CONVENTIONAL CHARGING IN PHONES:

Secondary cells in phones:

Working:

Our phone battery can get charged and recharged many number of times. The positive active material is oxidized, producing electrons, and negative material is reduced,consuming electrons. These electrons then constitute the current flow in the external circuit. The term "accumulator" is used here, as the cell accumulates and stores energy, through a reversible electrochemical reaction. The energy used to charge these rechargeable batteries usually comes from a battery charger using main AC electricity. Electrolytes like lead–acid,nickel cadmium (NiCd), nickel metal hydride (NiMH), lithium ion (Li-ion), and lithium ion polymer (Li-ion polymer) are used in such secondary batteries. The voltage output of the source must be higher than that of the battery, but not much higher: because the larger the difference between the power source and the battery, greater the risk of damaging the battery.



Working Principle of Wi-Fi Charger:

A wireless network too uses radio waves, just like our cell phones, televisions and radios do. The communication over a wireless network is same like two-way radio communication. Here's what happens:

- A computer's wireless adapter converts data into a radio signal and transmits it using an antenna.
- The signal is received and decoded by wireless router and it then sends the information to the Internet using a physical, wired Ethernet connection.

Estimates show that the number of mobile phone users is forecasted to reach 4.77 billion the very next year, 2017. 4.77 billion users isn't huge, so we can probably not ask the billions of user to get their phone

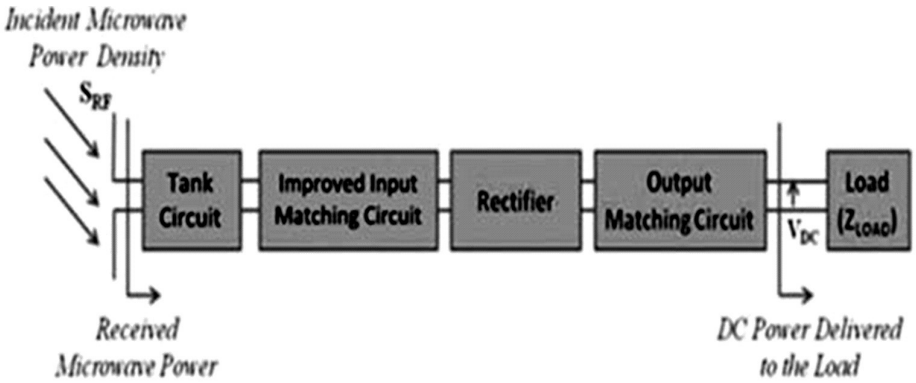
updated ,instead the one firmware update in the existing routers,to match the protocols; of both phone and Wi-Fi router, making them compatible can turn our ordinary routers into wireless chargers.

We know that Wi-Fi transmits a small amount of power to carry data, nearly up to 1 watt. By FCC(Federal Communication Commission) guidelines, in comparison to the 5 watt output of a typical Android charger. This technology captures the power which is already being sent, and puts it to work.

Wireless energy transfer is the process of sending electrical energy from one point to another without the using a conducting environment.

Power over Wi-Fi, tricks routers to send out a constant signal that is then captured and converted into DC power by a harvester.

RF-to-DC Rectifiers



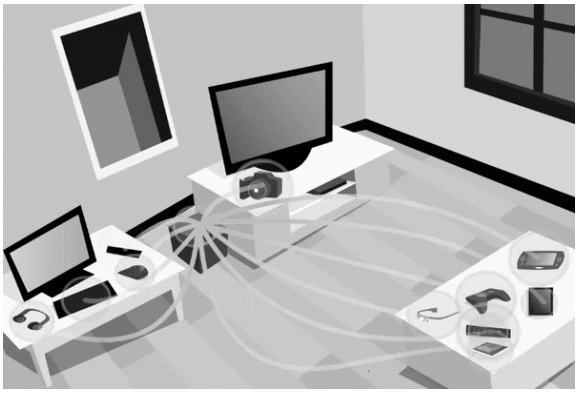
This method uses high frequency (often above 1 GHz) electromagnetic waves for far-field energy transfer. It offers the benefits of allowing both short and long distance power transfer.

Rectenna ("rectifying antenna") uses the incident RF power ,which is captured by the antenna in the form of a high frequency sine wave. This is then converted into DC power by the diode-based converter.

So, instead of having continuous power on one of your Wi-Fi channels, we split it among three non-overlapping Wi-Fi channels,that allows us to deliver nearly the same amount of power without impacting any one of the channel immensely. For this new hardware are required to be installed in routers,and small upgradation in phones.

Our routers give RF (radio frequency) signals, and we add equipment to convert this signal into DC power, this will do!

At Present:



Ossia Inc is a Washington based multinational company ,aiming at challenging possibilities with wireless power. In its recent project "COTA", by Ossia Inc, they are trying to bring our daily use devices like smartphones, remote controls ,smoke alarm, electric toothbrush, to eliminate pluging all these devices to wall ,and is releasing 'Cota Power Charger' for wireless charging. However the cost of manufacturing is way beyond what users have in their pockets and the company is focusing on reducing the underlying cost.

Advantages

- WiFi have lot of advantages. Wireless network are easy to set up and also they are comparatively inexpensive.
- Reduced wear and tear of plugs and sockets - as there is no physical connection.
- Physically the system is simpler and more robust than one with connectors.
- Resilience from dirt - some appliances operate in highly contaminated environments with dust and dirt. As there are no connectors, the system become more resilient to contamination.

Convenience: It just requires the appliance needing charging to be placed where Wi-fi is accessible.

3. CONCLUSION

WiFi can recharge batteries through the air, from up to a range of 28 feet away. Wi-Fi routers, pushes both data and energy simultaneously,so its important that neither of them gets altered at a dire level.

With both running simultaneously, the speed bandwidth will get affected ,but up to controlled limit. So, neither charging nor connectivity goes exteriority.

If it all goes as planned, we might soon see a product that will make our lives much easier. It will expedite us to browse the net without worrying about the battery. Never having to fiddle with cable cords.

So all places like public building(offices), airports recreation sites(shopping malls, restaurants) and educational buildings which are already have Wi-Fi routers installed, can incorporated wireless charging easily, and pacify the public needs.

So, forget your power mats, tangled chargers and power banks; the energy we need is already around us. All we need is to harness it and stay connected, both at the same time.

Reference

1. http://www.radio-electronics.com
2. http://www.qinside.biz/en/support/iswireles/charging
3. https://homes.cs.washington.edu/~gshyam/Papers/powifi.pdf
4. http://ccm.net/faq/298-what-is-wifi-and-how-does-it-work
5. http://www.eurekalert.org/pub_releases/2014-04/tkai-wpt041714.php
6. http://www.dailymail.co.uk/sciencetech/article-3107669/Forget-batteries-phone-soon-powered-WI-FI-Technology-uses-radio-waves-connect-charge-device.html