Battery Power And Latency Reduction on Android Phone

Prof. Swati Tidke, Bhavna Kukde, Megha Gajbhiye

Dept of Comp Engg, MIET Bhandara, India

Abstract - Smartphone are the basic needs in today's life many people are using the Smartphone because of their application but the major issue of the Smartphone is that they consume more power for resolving that problem many researches are done on the various interference like Wi-Fi, Bluetooth but these are the different characteristic than the radio interference. We propose use to improve the performance of the android Smartphone in terms of energy consumption and also improve the speed of web browsing and network capability. This paper helps us to focus and resolve the issues because of which the energy consumption in the Smartphone is increasing. Again two methods i.e. Prefetching and caching will also be added for the performance enhancement and reduce the latency of webpage loading.

Keywords- Web Browser, Mobile Computing, Wireless Communication, Portable devices, prefetching, Reading time Threshold, Wireless radio interface.

I.   INTRODUCTION

Smartphone are becoming a key element of our day-today life. We all are connected by the internet throughout the world. Smartphone have tremendous demand in the market because of its amazing applications. There is one issue which is the energy consumption browsing the web. Smartphone based web browsing wastes a lot of power when downloading web pages due to the Special Characteristic of the wireless radio interface.

There are various computations such as HTML parsing, JavaScript code execution, image decoding, style formatting, page layout and the Smartphone cannot do many computations. These computations generally belong to two categories i.e. Data transmission computation and layout computation. In the current web browser two computations are mixed.

There are two types of web pages based on the processing time which is long processing time and short processing time. In the long processing time, the web page should separate the computations to reduce the power consumption. And In the short processing time, the reading time will be predicted so that the next data object should be prefetched.

The computation sequence of web browser will be reorganized to retrieve the data in the web page as fast as possible and the two computations are separately executed

to save the power. If the reading time is greater than the transmission time then the energy consumed is reduces and the state switches are done DCH to IDLE state based on GBRT model which is predicate for user. The prefeching and caching technique are use to overcome the network traffic and increase the network capacity.

The prefetching technique has two main components which are the prediction engine and the prefetching engine. In the prediction engine runs a prediction algorithm to predict the next user's request. The prefetching engine decide to prefetch algorithm or not depending on some conditions like available bandwidth. The prefetching techniques can also be used for reduction of traffic overhead. Web prefetching is a technique for reducing web latency The Web caching is to improve the performance of web-based systems by storing and reusing web objects and it focus on historical information.

II.   SYSTEM MODEL

We identify these special characteristics, and address power consumption issues through three novel techniques.

1.Reorganize the computation sequence

The computation sequence of the web browser will be reorganized for to retrieve all the datain the web page as possible as and the two computations are separately executed to save the power.

2.Predict the user reading time of web pages

If that reading time is greater than the data transmission time, the energy consumption will be reduced because the state switching will be done from DCH to IDLE. The user predicate the reading time.

3.Prefetching and catching

Web prefetching techniques and web caching reduces the web latency that we face on the internet today. Web traffic reduction techniques are necessary for accessing the web sites efficiently with the facility of existing network.

The 3G Radio Resource Control (RRC) protocol defines the following three states for Smartphone to control their wireless radio interface:

IDLE state: In this state the interface of the Smartphone consumes very little power because it do not have any signaling connection with the backbone network, since it cannot transmit user data.

DCH state: In the dedicated channel state consumes highest level of power because backbone network allocates dedicated transmission channels to the Smartphone for uplink and downlink, and hence Smartphone can transmit signaling information and user data at high speed.

FACH state: The forward access channel state requires about half of the power in the DCH state because no dedicated transmission channel is allocates. It can transmit user data at low speed through common shared transmission channels.
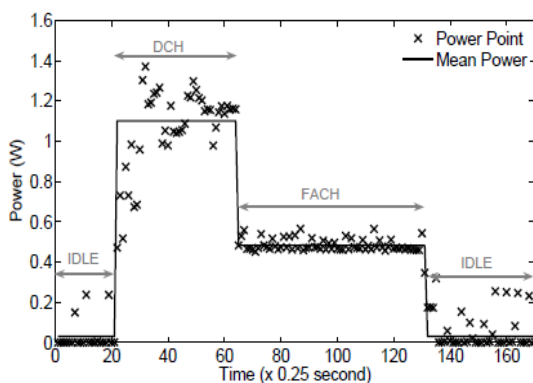

Fig. 1.The power level of the 3G radio interface on smartphones at different states.

When the Smartphone wants to transmit the data, it has to be switched from IDLE to the DCH state. It first establishes the signaling channel and then obtains the dedicated channel for the transmission. This process requires lot of message exchanges. To determine when to release the dedicated transmission channels allocated to the Smartphone, the backbone network uses timers.

III.　　PREVIOUS WORK

The issues in the Smartphone are resolved by using many researches; some of the researches are done on interferences like Wi-Fi or Bluetooth. Some of the researches on the radio interferences and cellular interference like 3G, 4G LTE have different characteristics from other interferences and they consume much more power.

There are various prefetching and caching techniques used to reduce the latency of web browsing. Web prefetching acts complementary to caching, it can significantly improve cache performance and reduce the user perceived latency, [2] Prefetching is a fundamental technique for improving application performance and also it increases

the traffic in the network and collision occur in the network. Prefetching is done on the two main things in which first the prediction are made on previous experience and the second is prefetching engine decides what data is prefetched.

The web Browser is a color adaptive that renders web pages with power-optimized color schemes for that purpose uses the organic light emitting diode (OLED). We know that the largest power consuming component is display in the modern mobile device. The OLED display does not require backlight because pixels are emissive. Each pixel consists of several OLEDs of different colors there are the three common which is red, green and blue, which have very different efficiencies; the color of a pixel directly impacts its power consumption. With the help of OLED display make a web browser which is more energy efficient for mobile device, not only web browser but also the most used Smartphone applications according to recent studies.[3] OLED Smartphone showed that different OLED displays may have different color-power characteristics. There is no single color scheme that is optimal for all OLED displays. OLED technique provide much better dynamic color, contrast and a much thinner, lighter panel than conventional LCDs. In contrast, illumination of backlight, not color, determines the power consumption by an LCD. Chameleon, introduce a color-adaptive mobile web browser to reduce the energy consumption by OLED mobile system and to reduce the system power consumption of OLED Smartphone by over 41% for web browsing.

The one type of prefetching is IMP which is very simple interface that hide the complexity of prefetching decision. IMP uses a cost-benefit analysis to decide when to prefetch data. The informed mobile prefetching system considers three different concerns performance, energy usage, and wireless data consumption as well as it is concerned about the multiple prefetching for reducing the energy usage. Mobile computations provide the explicit prefetching which supports all application and we call informed mobile prefetching in our prototype system. [4] The most important term for designing the IMP is Transparent informed prefetching (TIP) which is using a shadowing strategy to predict hit rates for different prefetch depths. The IMP include some advance mobile prefetching and it could be built on any layer that provides such services, also currently uses Intentional Networking for the network traffic control mechanism which is different than the TIP.

IV.　　PROPOSED METHODOLOGY

In the current web browser the two computations are mixed which are Data transmission computation and the layout computation which is shown in the fig.1.If the two

computations are mixed then the computation burden on the web browser increases. Because of that the power consumption for radio interference increases as well as the web traffic increases. The power consumption reduces due to design complexity of web browser. Hence these two computations will be separated to minimize the computation burden and to increase energy consumption. To save power on Smartphone reorganizes the computation sequence of web browser. This can also increase the network capacity and it releases the radio resource earlier.
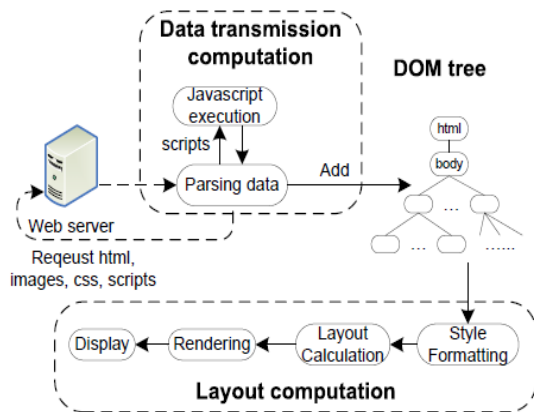

Fig. 2: The workflow of webpage processing in Smartphone web browser.

In the data transmission computation the browser process script codes like JavaScript which is embedded in HTML documents and CSS which is the Cascading Style Sheets use to provide styles of a webpage such as, color, fonts and layout. The Document Object Model (DOM) is an interface that allows programs and scripts to update the content. This approach can process more objects and add them to the DOM tree. It processes all the objects and builds the complete DOM tree.

In the layout computation, it can do the style formatting and layout calculation on the web page. The rendering is done which is in two ways top to bottom and bottom to top in that computation bottom to top is done. The original web browser can display partial webpage content on the screen that it keeps generating data transmission.

V.   CONCLUSION

This proposed system will be helpful to increase battery performance of Android phone and reduce latency. Hence it will improve the performance of Android phone. This technique increases the performance by enhancing the browsing speed of a browser in terms of display and various interfaces. Again it works on the latency of webpage loading. Hence, it reduces the latency of the browser. This technique will improve the performance of the android Smartphone in terms of energy consumption, loading time and network capacity. The technique of

perfeching and caching is combined to reduce loading time and web latency. This approach will save the energy up to 40%. The latency will also be reduced and hence the network capacity is an increased.

REFERENCES

[1] Bo Zhao, Wenjie Hu, Qiang Zheng, and Guohong Cao"Energy aware web browsing on smartphone" in proc. of IEEE IEEE Transactions on Parallel and Distributed Systems, 2014.

[2] Dinesh Kumar, Reena Patel, "An Efficient Approach For Optimal Prefetching to Reduce Web Access Latency"In International Journal Of Scientific & Technology Research Volume 3, Issue 7, July 2014

[3] M. Dong and L. Zhong, "Chameleon: a color-adaptive web browser for mobile OLED displays," in *Proc. ACM MobiSys*, 2011

[4] Brett D. Higgins Jason Flinn T.J. Giuli, "Informed Mobile Prefetching," in Proc. of the 16th International Conference on Networking (IV), July 2012, pp.445-453.

[5] B. Zhao, B. C. Tak, and G. Cao, "Reducing the delay and power consumption of web browsing on smartphones in 3g networks," in *IEEE ICDCS*, 2011

[6] Abhinav Parate, Matthias Bohmer, David Chu "Practical Prediction and Prefetch for Faster Access to Applications on Mobile phones," in the Proc. of the 13th international conference on The 8th International Conference on Computer Science & Education, June 2013.

[7] Sandhaya Gawade 1, Hitesh" g Gupta2"Review of Algorithms for Web Pre-fetching and Cachin in proc. Of International Journal of Advanced Research in Computer and Communication Engineering Vol. 1, Issue 2, April 2012

[8] W. Hu, G. Cao, S. V. K. , and P. Mohapatra, "Mobility-assistedenergy-aware user contact detection in mobile social networks," in IEEE ICDCS, 2013.

[9] J.-H. Yeh, J.-C. Chen, and C.-C. Lee, "Comparative analysis of energy saving techniques in 3GPP and 3GPP2 systems," in IEEE transactions on vehicular technology, 2009.

[10] A. J. Pyles, Z. Ren, G. Zhou, and X. Liu, "Sifi: exploiting voip silence for wifi energy savings insmart phones," in ACM UbiComp, 2011.

[11]K. Paul, and T. K. Kundu, "Android on Mobile Devices: An Energy Perspective, " IEEE International Conference on Computer and Information Technology, 2010.

[12] R. Rynkiewicz, "Discharge and charge modeling of lead acid batteries", Proc. Appl. Power Electron. Conf. Expo., 1999

[13]CascadingStyle Sheets 2.1. http://www.w3.org/TR/CSS2/. W3C.DocumentObjectModel(DOM).http://www.w3.org/DOM/

[14]W3C.DocumentObjectModel(DOM).http://www.w3.org/DOM/

[15] Reflows & Repaints: CSS performance making your JavaScript slow. http://www.stubbornella.org/content/2009/03/27/reflows-repaints-css-performance-making- yourjavascript-slow/

[16] K. Paul, and T. K. Kundu, "Android on Mobile Devices: An Energy Perspective, " IEEE International Conference on Computer and Information Technology, 2010.

[17] R. Rynkiewicz, "Discharge and charge modeling of lead acid batteries", Proc. Appl. Power Electron. Conf. Expo., 1999