Measuring the power consumption of social media applications on a mobile device

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Abstract. As fully connected social media applications become popular and require all time connection, the power consumption on mobile device battery increases significantly. As power supplied by a battery is limited, social media application should be designed to be less power consuming. This paper reports the power consumption measurement of social media running on a mobile device. Experimental circuit was developed by using a microcontroller measuring an android smartphone on a 802.11 controlled network. The experiment results show that whatsapp consumes the power less than others in stand by and chat. While other states are dominated by line. The blackberry consumes the power the worst.

1. Introduction

Mobile device application progresses very rapidly. Fully connected applications such as social media become daily needs. As battery supplying the power on a mobile device is limited, social media should minimize its signaling to maintain low power consumption. As an initial study, this paper reports the measurement schema to determine the power consumption by the social media towards a green social media application.

Previous work measures TCP energy consumption on a mobile device [1]. Details on mobile device power consumptions have also been explored in [2, 3]. Some efforts on decreasing power consumption have also been performed, such as power saving mode [4], routing [5] and transport protocol [6-8]. This paper reports the measurement of power consumption of a mobile device when running a social media application.

The assessed social media are line, whatsapp and blackberry messenger. Whatsapp is a messaging application that enables users to exchange text, image, video, voice call and video call. Initially, it was designed for IPhone but now is available for BlackBerry, Android, Windows and Symbian phones, as well as desktop application [3]. Line is also a messaging application that works for various platforms, designed by a Japanese company. It also works for Mac and Windows. Blackberry messenger is initially for blackberry phones but now is available for various platform.

2. Method

In order to measure the social media power consumption, a circuit controlled by arduino has been developed. The circuits periodically measure voltage and current absorbed by a mobile device (Advan Vandroid). The circuit diagram is shown in Figure 1 and the implementation is in Figure 2.
Figure 1. The employed circuit

DC voltage sensor measure the voltage across the mobile phone’s terminal, while the ACS712 current sensor measures current flows to mobile phone. The assessed mobile phone is Advan Vandroid. The arduino measure the voltage and current, multiply them to get power in Watt (W). The measurement results are sent to computer by the arduino though USB connection.

Figure 2. Measurement device

The power consumption is evaluated for stand by, chat, voice call, video call and image transmissions. In order to get stable connection, the 802.11 access point provides the internet connection.

The evaluated social media applications are line, whatsapp, and blackberry messenger. The measurement is last for 60 second. Stand by state is conditioned to have minimum background process.

The mobile device is connected to the internet through a 802.11 access point, but only for the social media application. The 802.11 network is set to work alone, so that no other access point interfere the frequency. However, the other node is connected to internet via mobile data network which has unknown network traffic and queue. As the other node is out of the supervised network, this is the limitation of the research.
Every social media is treated similarly. Battery is ensured to be filled at the same percentage, so the energy consumption is fair enough.

3. Measurement results

Stand by state is a condition where no transmission occurred. Chatting or text transmission uses the same text to be send. So does voice call and other services. The measurement results are plotted in Table 1.

| No. | States       | Line   | WhatsApp | Blackberry |
|-----|--------------|--------|----------|------------|
| 1   | Standby      | 0.91 W | 0.88 W   | 0.97 W     |
| 2   | Chatting     | 1.05 W | 0.98 W   | 1.19 W     |
| 3   | Voice Call   | 1.03 W | 1.06 W   | 1.07 W     |
| 4   | Video Call   | 1.21 W | 1.39 W   | 1.42 W     |
| 5   | Image transmission | 1.04 W | 1.12 W   | 1.13 W     |

In stand by state, whatsapp has the smallest average power consumption about 0.88 W. While the line and blackberry messenger are 0.91 W and 0.97 W subsequently.

In chatting states or text transmission, whatsapp also has the smallest power consumption, about 0.98 W, followed by line 1.05 W and blackberry 1.19 W.

Voice call produces different rank where line generates the lower power consumption, 1.03 W, followed by whatsapp 1.06 W, and blackberry 1.07 W.

Video call energy saving is dominated by line, 1.21 W, followed by whatsapp, 1.39 W and blackberry 1.42 W.

Image transmission power consumption is also dominated by line, 1.04 W, followed by whatsapp 1.12 W and blackberry 1.13 W.

4. Conclusions

In stand by state and chatting, whatsapp has the lowest power consumption. However, when operating actively for voice call, video call and image transmission, line is the most in conserving power. Blackberry performs the worst as it consumes the highest power in all states.

The measurement is conducted without extracting the details of the transmission signal. Future works may consider capturing the signal flows in the internet and determine what signal consumes the most and the less power, so that future application may consider it to achieve a greener application.

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