Comparing web and mobile based power consumptions of Whatsapp applications

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Abstract. Whatsapp is a popular social media application. More applications are developed, but the green one is expected as battery technology is limited. This paper evaluates power consumption by Whatsapp applications when sending texts, images and videos, in both mobile and desktop applications. The patterns are compared. Experiment results show that mobile application consumes 62.5% higher power than desktop when sending texts, but it uses 74.6% and 66.5% lower power when transmitting images and videos.

1. Introduction
Information technology keeps developing in both infrastructures and user applications. All limitations become transparent and user oriented as social media applications blooming [1]. Social media helps personal communication as well as commercial uses. One of social media applications that are popular is Whatsapp [2]. Whatsapp can be used either in mobile devices or desktops.

Previous research has concerned with this application power consumption compared to other social media applications [3]. This paper concerns with Whatsapp power consumption pattern in delivering texts, images and video files in both mobile and desktop devices. This is necessary to examine as traffics determine how long battery can survive or how much power is needed [4]. By identifying the traffics that are about to send, either text, image and video, than the approximated amount of energy can be determined so that further step may be taken for future Whatsapp power reduction [5].

2. Research method
In order to obtain power consumption in both mobile and desktop applications, steps as described in Figure 1 are taken. Initially, the traffic types are extracted to determine number of bytes to be transferred. To do so, texts, images and videos for several sizes are prepared. In order to measure power consumption in desktop, Joulemeter is employed [6], while Accubattery is employed for mobile devices. Measuring the power consumption using hardware is considered inefficient as background processes are not separated [6].

Next step is setting the measurement software following the data types. Finally, data transmissions are performed for each text, image and video by using the 802.11 ad hoc network. Data transmissions are performed by using hundreds iterations and the power consumptions are measured.

The collected data is then analyzed and compared for each data types, mobile and desktop pattern based on data size.
Figure 1. Research steps

Besides measurement software, mobile Whatsapp apk and web based Whatsapp are employed, running on two devices connected by an 802.11 ad hoc network. Data is sent continuously. Measurement calibration is performed before data is transmitted. Pattern is analyzed regressively.

3. Experiment results

3.1 Power consumption pattern in desktop

By sending texts from 1 byte to 10 bytes subsequently, the average power consumption by Whatsapp application is plotted in Figure 2a. The application consumes total about 1.2 watts per minute when sending 1 byte data, increasing exponentially to about 2.39 watt for 1 minute sending 10 bytes text.

(a). Text power consumption

(b). Image power consumption
Power measurements vary to increasing image size, but regressively increase following logarithmic trend. At 6.52 kb, consumption is about 2.18 Watt, and reaches its peak at 197 Kb, 18.57 Watt (Figure 2b). Power consumption for video transmission is about 12.7 Watt for 1.59 Mb video size, increasing gradually to 15.02 Watt at 8.19 Mb as shown in Figure 2c.

3.2 Power consumption pattern in mobile device
Power consumption on mobile device increases more rapidly compared to desktop application (Figure 3). The highest text power consumption is 5.53 Watt. The highest image power consumption is 5.19 Watt, and the highest video power consumption is 8.41 Watt. The power consumption patterns in mobile device are quadratic. The power consumption differences are significant. Text increases from 1 byte to 10 bytes results 5 times increment, so dose image. Video experience more than 8 times increment.
3.3 Comparisons web and mobile based Whatsapp applications

As shown in Figure 4, in average, text transmission by using mobile application is 62.5% higher than web based application. It consumes power 1.35 Watt higher. However, image transmission by using mobile application is much lower about 9.08 Watt (74.6%) lower than desktop application. Likewise, video transmission on mobile device is 66.5% (9.28 Watt) lower than desktop application.

![Web based and mobile based Whatsapp power consumptions](image-url)
4. Conclusions
This paper has observed power consumption patterns of WhatsApp application both on desktop and mobile devices for transmitting texts, images and videos. Power consumption on mobile device increases significantly when traffic length increases, while in desktop application, power increment is gradual. Mobile application consumes 62.5% higher power than desktop when sending texts, but it uses 74.6% and 66.5% lower power when transmitting images and video.

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