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Social Network Chatting Apps Network Traffic Optimization

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Abstract

Objectives: This paper proposes a method to improve the energy efficiency delivery of instant message group chat messages. A user interaction with instant messenger using in smart phone causes high power state due to undisciplined network transmission between network interface (3G or Wi-Fi) and networking operator. **Methods/Statistical Analysis:** We investigated messaging network traffic pattern in social network chatting apps. In our experimental findings, instant messaging group chat messages (multi-user chatting between friends, colleagues family etc.) delivered by chat server is not energy efficient by We Chat. In our dataset, we found problem in pending group chat messages and not cached play songs in instant messaging app. An energy efficient friendly network traffic is to fetch contains like sound, text, images, video running on smart phone operating system possibly in low power and acquire operating system go back to sleep as soon as possible. In our case user does not participate in group chat. Instant messaging chatting apps like We Chat, QQ messenger. Social network chatting apps are replacing use of regular Short Message Service (SMS) service by mobile carriers, because of free to use them. In recent many researchers proposed bundled, batched and aggregate a data transmission technique to overcome undisciplined data transmission power wastage. In instant messaging app a simple greeting messages cannot have bundled, because user cannot to errant to delay messages. **Findings:** We had two case studies traffic pattern offline user scenario and online user scenario case. To achieve this goal, we achieved firstly, to reduce smart phone network interface active time by intimate user by light weight push message about group chat pending messages notification in 3G environment. Secondly, instant messaging apps received songs keep in pre-cached to reduce data packets requests in 3G. **Application/Improvement:** In our propose model, we delayed group chat traffic pattern and play songs in 3G connectivity. In addition, its play songs and receive group chat messages in Wi-Fi connectivity which cause lower energy battery drain in smart phone.

Keywords: Energy Efficient, Network Interface 3G or Wi-Fi, Network Traffic, Social Network Apps

1. Introduction

In current new trends satisfy needs of smart phone users. The latest smart phone capabilities have increased tremendously. For instance Samsung galaxy S4 faster processor 1.6 GHz quad-core high screen resolution internal storage up to 64GB, memory 2GB RAM and along with Wi-Fi, Bluetooth, GPS and NFC[1]. A smart phone is powered by battery with limited energy capacity[2]. Smart phones are changing people life. Now it can do tasks using apps (applications) which cannot possibly using desktop laptop computers like GPS. Unfortunately, as demand usage of smart phone increase, so do problem about battery life[3]. One of most energy hungry part is net-

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work interface in smart phone. A network interface keeps connect smart phone user to Wi-Fi and 3G network. Due to latency effect in 3G usage scenario, other technique is periodic data scheduling in which we send data in burst form to bundle different request together. In instant messaging chatting apps case this cannot be happen in most cases. Due to user cannot tolerant delay receiving message from their mate etc. Everywhere around the world, the most popular message apps WeChat, QQ and Viber etc. replacing use of regular message service by mobile carriers. A customize group chatting is a chatting one person to a group of people at a periodic interval of time. We found network interface power consumption activities with real time chat apps the 3G network access network interface mode consumes greater amounts of energy than Wi-Fi[4]. In networks UMTS, 4G LTE, EVDO, GPRS or EDGE and other type of similar trade off network, In[5] RRC is employed between the UE User Equipment and the Radio Network Controller (RNC) in the access network. RRC has three states IDEL, RRC DCH (Dedicated Channel) and RRC Forward Access Channel (FACH). Idle mode (no connection) when User Equipment UE is not active with net Wi-Fi interface, it enters RRC IDEL mode it is attached to the network but is not actively engaged in data transfers. When an RRC connection is established, the terminal switches to connected mode, transition from IDEL to DCH occurs. DCH mode in CELL DCH state more power is consumed; network resources are reserved for longer, but the user receives higher nominal data rate. FACH mode Cell FACH state low data throughput rate and Qian et al. (2011) radio state power of FACH is 55% to 75% of that at DCH. Tail effect refers to waste energy 3G interface will keep at high power states for a long time even after the completion of data transmission.

We purpose delay tolerant real time traffic to reduce a periodic wake up calls over network interface states. The prior knowledge of the network interface data fetching states. Instant messaging chat apps sending data a periodic to invoke network interface can drain battery without transmission data due to latency and other network interface over heads. They presented that 3G data transfer is not efficient than Wi-Fi. The 3G has high tail energy overheads. They developed a protocol that reduces energy consumption of common smart phone apps (applications) such as email, news feeds by delay tolerance and web search by perfecting technique[6]. The increased delays in acceptable background app traffic reduce network interface active mode time and keep network interface in long idle state. The authors use context-aware approach in modern smart phones provides sensors that can be used to describe the current context of the device and its user. Contextual knowledge allows saving battery according to user behavior[7-10]. The authors use the sensors to predict user location and improve the power consumption[11-12]. Power measuring Tool[13] introduce Power Tutor which is a power monitoring application to smart phone hardwarecomponents[14] another tool which is Apps cope and traces power at kernel level. Lot of research work has been done. But less work is done on energy efficient notification of advertisement in apps and in instant messaging social network apps. Our approach will decrease over head on network interface app operating system and increase battery life. We begin by providing an overview on the understand RRC states, state transitions and tail effect in 3rd generation cellular communication.

2. Material and Method

2.1 Application Resource Optimizer (ARO)

To metering power consumption and network traffic in smart phone. We used ARO stands for Application Resource Optimizer. It's a tool which records mobile network interface energy consumption activity such as GPS state, battery state, throughput, CPU usage and Radio Resource Control states. Based on these results we can get conclusion of power energy estimation of different hardware components and of different applications running in smart phone operating system, that how much power and network traffic is consumed by different hardware components in smart phone CPU, cellular, Wi-Fi, display and GPS.

2.2 Experiment Process

To measure the power and data consumption of smart phone, we use Devices HTC Google Nexus one and install ARO shown as in Figure 1 show from time period 0 to 200 sec We chat total bytes. Traffic shows user login in app DCH time and short FACH time and FACH tail effect. User does not receive any pending notification.

The total energy consumed is 88 joules. From time period 200 sec to 350 sec, User login .it receive pending notification high burst state from server contains animated images sound and text. The total energy consumed is 109 joules. From time period 1000 to 1250 sec. the device sending and receiving text messages and total energy consumption is 145 joules. The burst traffic exchanged time occupation time is less compare with small burst traffic. But small burst traffic has long DCH occupation time. The Figure 1 shows real time traffic WeChat app requesting login, images, messages and moments of friends recent events activities like photos songs play on user click. We found pending custom groups received by app keep DCH in long high power state at the time of login. This group messages Real time traffic is delay tolerant. We found multiple logo images duplicate and resizes, which can be bundle in one image to reduce amount of data. When the user visit click the moments of other user and listened recent uploaded favorite songs, we found mp4 format is not cached. Multiple times listen same song consume multiple time battery drain due to not cached available offline, it keeps 3G network increased network usage battery drain and data usage.

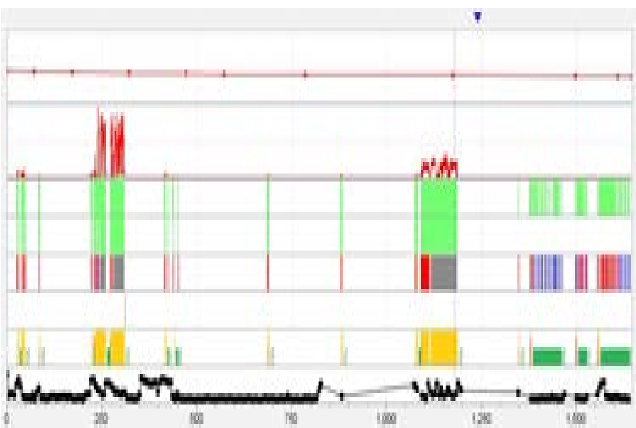

Figure 1. Traffic pattern of WeChat app.

2.3 Problem Statement

In Figure 2 Social network app like WeChat contains group chat traffic. We found after login a sudden high data rate of packets had received which contents friends' family and group messages in form of sound/text /images. The current scenario is energy consumption is high. The easy way to keep in touch with your friends and family, we need to add them in contact list. The contact list in any social network apps contains images to identify user apparently with ID in Figure 3. We found in ARO test experiment browsing WeChat contact list images displayed loading individually. It is recommended Cascading Style Sheet (CSS) sprit programming can combine small images in to one big image. This will reduce the HTTP request and loading images in app.

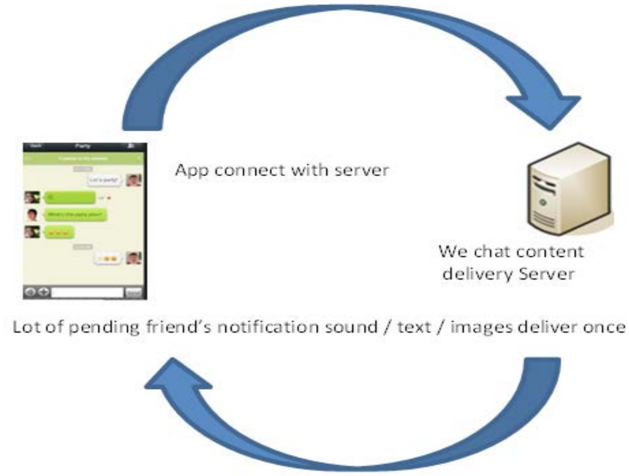

Figure 2. Current scenarios we chat instant messaging apps.

Figure 3. We chat display Contact list small images individually loading images in app increase HTTP request.

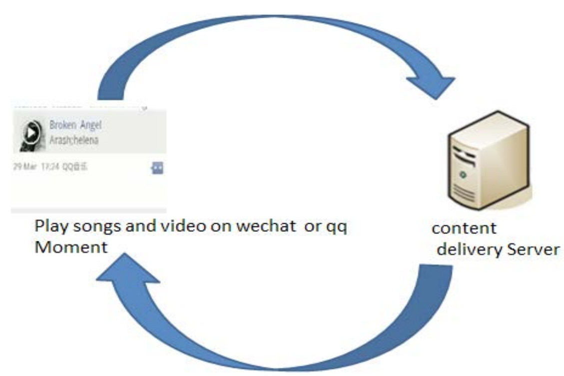

Figure 4. The songs and video play is not cached, which consume lot of power by network interface fetching duplicate data traffic.

In social apps we chat, QQ and etc. In Figure 4 watching video and listening to music for an hour generally means you will use up a lot of battery. We found playing shared by friends favorite song on we chat moments is not cached and multiple times playing songs caused drain multiple times power drain by network interface 3G.

3. Result and Discussion

3.1 Energy Consumption

The power consumption values per network interface state are shows in Figure 5. It shows comparison measurement result of cache data verses not cached data song play of RRC state machines in 3G. The cached song played bar shows values of total RCC states 50.9% less than not cached song. The played song 2times not cached consumes almost double power consumption comparison with cached played song. The Figure shows power measurement results of network interface states in 3G during sign in WeChat app. The Group chat traffic bar in Figure 6 shows power consumption of sign in and received pending messages from customized group chat members. The Non Group chat traffic bar shows 70 % less power consumption of login in WeChat app.

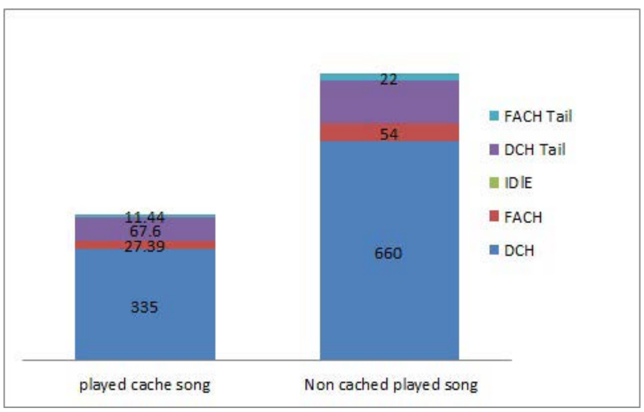

Figure 5. Power consumption of RRC states playing song.

It contains no data pending from group chat during come online in WeChat app. The network interface consumes less power as data is transmitted at a lower rate (delaying group chat messages).

3.2 Proposed Social Network Design

The Figure 7 shows the conceptual difference between original traffic and traffic filtration. The traffic is categories Log in traffic: when user sign in app Group pending traffic: when multiple online users sent messages to each other in case of any user offline during offline period of time. It is stored at chat server and transfer at time of user come online. Play song traffic: when user click to play song on WeChat /QQ moment. Images traffic: app data of images displayed Text: app data of text messages. Not cache traffic: app data not cached duplicate contents, Original traffic: shows based on findings of experiment results few images have not cached during display and few images cached. But they played song is not cached.

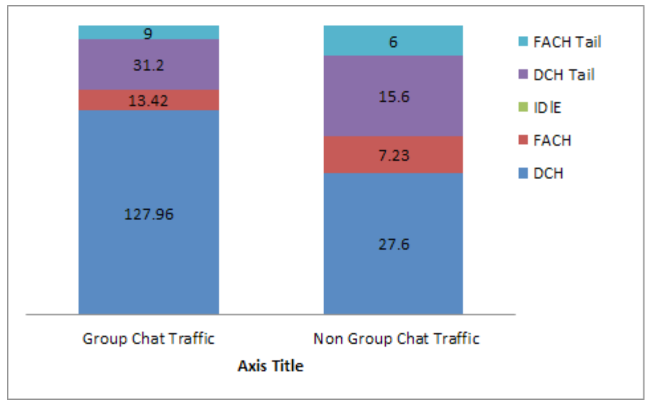

Figure 6. Power consumption comparison of group chat.

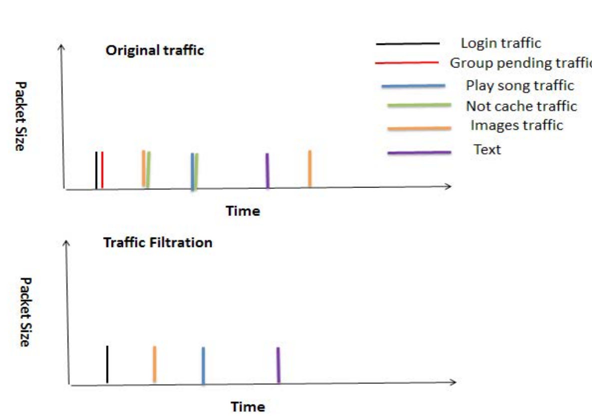

Figure 7. Conceptual model of original traffic and traffic filtration.

Traffic filtration: in Figure 8 shows assumption when user connected to 3G network interface. We delayed group pending traffic and intimate by light weight message contains details about group traffic like user names. For images and songs we cached all of them and no duplicate data in 3G connecting environment and cached in 3G radio environment and cached in 3G radio environment Figure 9 shows messenger client and chat server communication. We proposed traffic filtration of smart phone in 3G environment. The offline users Chat server: Enables users to participate in messaging each other. It has distributed server for database and profiling etc. Traffic filtration: When any user comes online connect with chat server. The server response will filter traffic and delay group pending traffic and intimate by light weight message contains details about group traffic like user names. For images and songs we cached all of them and no duplicate data in 3G connecting environment. This may cause storage problem for old mobile phones running chat messenger app. There are total 6 users. User 1 to 5 connected with 3G network interface. The user 6 connected with Wi-Fi network interface. Smartphone in Wi-Fi network connection: The group chat messages will forward by server if found connection is WI-FI and forward pending group notification. Caching data on smart phones, it was a time when run a program need to save memory. Now a day's object is changed run a program save a battery. New technology devices have loaded with high process power, but with limited battery power. In smart phones storage memory is available from at most 2 GB to 64 GB. This prove high storage even compare with hard disk of old desktop computers. To caching songs in social app smart phone can brought improvement in battery life.

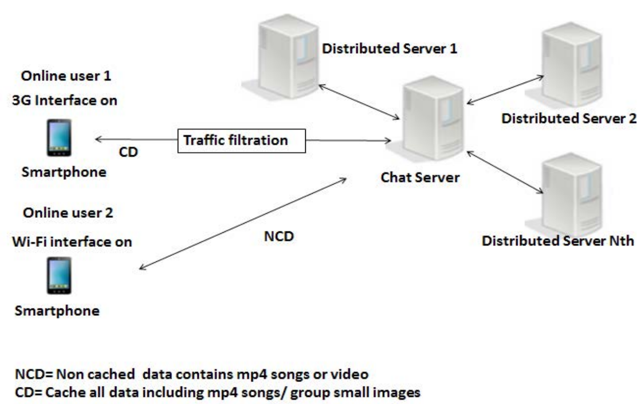

Figure 9. Cached in 3G radio environment.

4. Conclusion

A user interaction with App (social network apps) running in smart phone causes lot of power wastage due to undisciplined data transmission between network interface and networking operator. In our purpose model we delayed group chat messages set by user preference. To achieve energy efficient friendly data traffic in instant messenger app. We simulate a light weight message to notify user about multiple or single group chat messages details. In instant messaging app an everyday chatting message cannot bundle, because user cannot tolerant to delay at any cost. In this paper, we proposed filtration of real time traffic data transmission to save power consumption in 3G radio environment.

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