Analysis of WhatsApp IM

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1. INTRODUCTION:

WhatsApp is proprietary software for the purpose of cross-platform instant messaging client for smartphones. It uses internet instead of the traditional cellular network signal to send text messages, images, video, user location and audio media messages. According to the recent data (September 2015), the number of users of WhatsApp has crossed over 900 million users. It is most popular messaging application at this age. Initial release was in 2015.Operating system supported includes iOS, Android, BlackBerry OS, Windows phone, Symbian, Tizen and Firefox OS. Developers registered under the name of WhatsApp Inc. The target community is the smart phone users. Among IM applications for smart phones, WhatsApp (WhatsApp Inc., 2013) is accredited to be the most widely spread one. The service handles more than 600 million photos and 64 billion overall messages everyday [1].

2. FEATURES:

WhatsApp is an instant messenger that allows you to send texts, images and videos through the internet. A user can allow sending his/her location to the chat partner or through group chat. Personalize WhatsApp on the users end through adding group icon or avatar picture. Group chat alerts and notifications can be controlled. Message delivery notification through double ticks in blue. The WhatsApp application can go into a suspended state if there is a memory leak on the device. Many other features are discussed in the analysis section of the paper.

WhatsApp Web:

WhatsApp Web [7] was introduced in January 2015, it is an extension of WhatsApp in phone. The web browser mirrors conversation and messages from your mobile device.

3. TECHNOLOGY:

The OS used is 'FreeBSD'[5]. FreeBSD is an advanced computer operating system used to power modern servers, desktops and embedded platforms. The programming language used is Erlang programming language developed by Ericsson Since the Erlang language is used the web server to go with this is YAWS [5]. YAWS can be embedded into other Erlang-based applications. The sever application used is 'custom ejabberd' since the protocol used is XMPP-Extensible Messaging and Presence Protocol. The database used is 'mnesia' and the encryption may vary depending on what is being transmitted but in general it is RC4. WhatsApp provides its users with various forms of communications, namely user-to-user communications, broadcast messages and group chats. Apart from user to user communication, two forms of collective communication is: Broadcast i.e., one to many and group chats i.e, many to many communication service.

Technical Analysis:

When communicating, users may exchange plain text messages as well as multimedia files, contact cards and geolocation information. Each user has a WhatsApp profile with a set of information that includes his/her WhatsApp name, status line and avatar. The profile of each user is stored on a central system from which it is downloaded by other WhatsApp user that includes that user in their contacts [2]. The protocol used is the customized version of the open standard extensible messaging and presence protocol (XMPP). WhatsApp messenger has the following artifacts contacts database, chat database, backups of the chat database, avatars of contacts, copies of contacts avatars, log files, received files, sent files and user settings and preferences these are present in the memory of the phone.

Contact's database:

The contacts database wa.db contains three tables namely wa_contacts, that stores a record for each contact, android_metadata and sqlite_seqence both storing housekeeping information [2]. Each record stores the WhatsApp ID (field jid) of the contact, a string structured as 'x@s.whatsapp.net, 'x' is the phone number of the contact. When a given user has been added to the contacts database it can be deduced through analysis of log files which is in the directory /data/data/com.whatsapp/files/Logs. The events that occur when adding a new user are as follows a) the discovery that the user is not yet present in the contacts database b) the queries to the central system to fetch various information about the contact and c) the completion of the download of the corresponding avatar picture.

Contact cards:

Contact cards are sent in the messenger in a standard VCARD format.

Geolocation coordinates:
Geographic coordinates of the current location of the current user can be seen by others in the contacts or when explicitly shared.

Timestamp in WhatsApp:
According to Wikipedia "A **timestamp** is a sequence of characters or encoded information identifying when a certain event occurred, usually giving date and time of day, sometimes accurate to a small fraction of a second." There are different timestamps in WhatsApp. They are received_timestamp, receipt_server_timestamp, receipt_device_timestamp, send_timestamp, photo_ts, thumb_ts, photo_id_timestamp. Each message carries its own unique id in the key_id field.

Blocking contacts:
WhatsApp allows user to block specific contacts as per user's discretion, identifying users through WhatsApp id. A user can remove the contact from the corresponding record from the wa_contacts table when a user deletes the contact information.
WhatsApp stores all the messages that have been sent or received into the chat database msgstore.db.
WhatsApp Messenger usually generates various copies of the msgstore.db database. [2]Backups are encrypted with AES 192 algorithm.

Multimedia files:
These files are copied into the "sent files" folder. Then WhatsApp uploads the file to the server of WhatsApp that sends back the URL of the corresponding location. Then the sender sends to the recipient a message containing the URL and an acknowledgement is sent when the URL is received. The image is stored as a binary large object (i.e: blob).The algorithm used for transmission is base64-encoded SHA-256.

4. USE CASE:

WhatsApp follows a store and forward mechanism for exchanging messages between two users. When a user A sends a message it travels to WhatsApp server where it is stored. Then the server repeatedly requests the receiver- User B to acknowledge receipt of the message. As soon as the message is acknowledged the server drops the message and it is no longer available in database of server.
A user can

1. Create a User Group

User can create a user group by adding the contacts that is on the phone. The software recognizes the contact's saved on the phone and looks in the WhatsApp database to check for the WhatsApp user. If the intended user is present in the database and has an WhatsApp Id the users can share messages to start the conversation.

2. Chat with a contact:

i. Send text and smileys:

User can click on the WhatsApp contact that they want to send a text and start texting in the private conversation window.Smileys can also be sent by the various smiley option that has been in-built into the WhatsApp.

ii. Send Image/Video/Audio:

User selects the contact he wants to send the image too and then once the private window opens up select the attachment icon at the top right window and pressing the respective option of image, audio and video and once selecting and confirming the media file to be sent User clicks the send button.

iii. Send contact/location:

User selects the contact he wants to send the contact too and once the private window opens the user clicks the top right attachment icon to select the contact option. The same process goes for location option too.

iv. Send Broadcast Message:

Broadcast message is used for group chat Where user once creating a group can connect with all the people in the group at the same time by correctly selecting the contact they want to communicate with and creating the group.

3. Profile Settings

i. Edit Profile Picture
The profile picture can be edited by changing it in the settings section.

ii. Edit Display Status
A user can edit their status through status option.

iii. Privacy Setting
If the User B does not wish to receive messages from User A, User B can block the contacts and when that happens, if the User A tries to send a message it is stored in the server but not delivered to the intended user and the User B doesn't see or acknowledge the message. So the message stays in the server for 30 days and then it is dropped.

iv. Delete Account
A user can delete their accounts through settings option

5. ANALYSIS:

User Interface: User Interface is one of the strongest suits of WhatsApp its easy to use UI makes it a success. We were particularly inspired motivated by the themes section of WhatsApp.
Strengths: WhatsApp is considered as an alternative to SMS service provided by mobile networks. And it has been popular because of the following reasons WhatsApp remains completely ad-free, the cost of using WhatsApp ranges from absolutely none to 0.99$/year, works on multiple platforms like Android, iPhone and Windows, no international charge, It has a "last seen" or "online" timestamp feature, Personalized group messaging.

Weakness: The weakness of the WhatsApp would be its privacy. [7] The primary concern was that the users were required to upload their mobile phones entire address book to WhatsApp servers so that WhatsApp could identify the app users. But it turned out the information of people who are also not using the WhatsApp will be uploaded with their contact information which in turn violates privacy. The other thing is before the introduction of 'Block contacts'. A user can chat with another user and see their avatar picture by just using the intended recipient's number.

The influence and growth of WhatsApp is purely down innovation and change. Innovation in the creation of WhatsApp as an alternative to SMS and change down to the widespread use of smartphones and making use of that technology. The rise of WhatsApp is purely down to the invention of the app itself at the time of peoples need. The easy to use interface, the game changing features as mentioned above and the marketing strategy (mostly through online reviews, blogs and word of mouth). For example In India the number of people who own mobile phones is greater than the number who own personal computers. India's rise in smart phone users over the past few years has been significant. So it is not surprising that [7] with 65 million active users, about 10% of the total worldwide users, India is the largest single country in terms of number of users.
For now the number of users using WhatsApp is fast approaching 1 Billion mark.
Let's look at the software from Model of Coordinated action methodology,

Synchronity: While features like audio call should be synchronous since the nature of audio call is like that and the text function is asynchronous. A user can send text messages anytime and the intended receiver can read the message at anytime once it is received by the device. The message is sent and the acknowledgement that the message is sent and received to the intended user is also received as explained above.

Physical Distribution: Used by people worldwide with approximately 900 million users. Users can interact with people at different locations if the conditions are satisfying.

Scale: The number of people that a single user can connect to with the group chat is 100. So the minimum people would be 1 with the maximum people being 100. As long as a user does not block any contact the intended user can receive any message. While the audio call feature needs two people at any given time.

Communities of Practice: Groups with limit of 100, can be created multiple number of times with different people for different purposes.

Nascence: Updates are done frequently. With last major update bringing the audio call feature to the application.

Planned Permanence: Messages once delivered to the intended user can exist as long as the messages are not delivered by the user.

Turnover: Even though the company was bought by Facebook for 22 Billion USD the company failed to return profit the following year. But the idea is that the application was bought with future of technology, more specifically with internet of things in mind.

6. CONCLUSION:

Because of its growth and rise in popularity, on February 19, 2014 Facebook announced it was acquiring WhatsApp for US$19 billion. Facebook which has its own IM is popular but not as much as WhatsApp and also WhatsApp is far simpler and less obtrusive. The frame of mind when chatting on an IM like WhatsApp is more relaxing compared to Facebook. Then again there is the problem of WhatsApp business model which is very challenging to the mobile network companies. Mobile Network companies in North America have held monopoly over the network communications for decades. WhatsApp has proved to be a game changer in this aspect. [7] Mobile phone networks are selling access to the networks thereby maximizing revenues wherever possible by selling the voice, data and text service. WhatsApp found a loophole and has worked its way through to provide text services under just 1$ per year. WhatsApp future is currently independent of these corporations and should stay the same after being sold to Facebook (who are working towards internet.org). WhatsApp is a game changer.

References:

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