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Comparing the Quality of Service Performance of Iphone X and Samsung S9 Plus Smartphones with WhatsApp Messenger

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Abstract

The study compares the quality of service performance of iPhone X and Samsung S9 Plus smartphones on WhatsApp Messenger platform. There is a growing debate over the performance of Apple Inc. and Samsung related products. This paper does performance with the use of WhatsApp messenger as a common app that runs on both devices to ascertain the way the WhatsApp Messenger performs when used on either platforms. This study compares the energy consumption, speed, and quality of messages of both smartphones. The features and functionalities of iPhone X and Samsung S9 Plus using WhatsApp Messenger were tested and suggestions for improvement were made. Results of this research show that due to the battery capacity, the S9 Plus is more efficient than the iPhone X. Also the iPhone X has a slower processor speed compare to that of the Samsung S9 Plus and can process a lesser amount of tasks at a time though the User-interface of the iPhone X is unique and the hardware of the device is stronger than that of the Samsung S9 Plus. Although there were no ways to access the details of photos and videos on the iPhone X, the specifications of the Samsung S9 plus show that the image quality of images are higher than that of iPhone X. The findings of this study are beneficial to users of these products as well as the producers of the smartphones and also to other researchers carrying out similar works.

Keywords: *Mobile devices, smartphones, software performance, quality of service*

1. Introduction

Communication is an essential part of human existence, we need to communicate in other to co-exist and grow [16]. As the need to communicate is one thing, the method or the form in which this communication takes place is another thing [16]. Over the years, communication has evolved from having to move and sometimes even travelling miles to a different location to speak to someone else in person, to sending messages by post, to being able to make telephone calls and have a conversation; not having to type lengthy messages with all you want to say at once and wait for a week or more to get a reply, to sending e-mails from a desktop computer in a particular location while your messages are received by the intended person in another location, down to having mobile devices where one can send messages and make calls on the go [13]. Companies over the years have come up and have produced different brands of mobile devices and have constantly improved on the technology used on for these devices to aid better communication. Today the most used form of communication is texting. Texting has also evolved over the years to what it is now, where people can have a quick and short or even lasting back and forth real-time conversation through sending of messages; this is called instant messaging. Many Instant messaging applications have been developed which offer more features than just sending of texts, now people can send images, videos, audios, contacts, documents, locations and so on. In as much as these mobile devices

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and instant messaging applications have made communication so much easier and better, there are other factors that come to play, factors which include the simplicity to learn how to use these devices and applications, the ease at which they can be used, and the satisfaction derived while using them [5]. As earlier mentioned, there are companies that produce different brands of these mobile devices with different operating systems (OS) running on them and most time, if not all the time, instant messaging applications are designed for the for specific devices or the OSs. People like ease, simplicity and maximum satisfaction and will generally go for the brand and the applications that meet their needs [5].

Today there are two most used brands of mobile devices; iPhones and Samsung S series smartphones and a single most used instant messaging application; WhatsApp Messenger. Just as every other commodity in every market, there is always some sort of competition between products. With ease, simplicity and maximum satisfaction being the case and since instant messaging applications are designed according to specific phones and their OSs, there is a necessity to examine the functionality of these devices [5]. To this end, the most recent mobile devices or smartphones of Apple Inc. and Samsung was examined using an instant messaging application to know the level at which they meet and satisfy users' needs.

The original iPhone was created in 2007 by Steve Jobs. iOS was the operating system that ran on the device and still is the operating system running on current Apple Inc. products like iPhone X. iMessage, an instant messaging platform peculiar to Apple Inc. products, was introduced in 2011 [9], the same year iPhone 4s was released. iMessage allows users to send texts, documents, photos, videos, contact information, and group messages over Wi-Fi, mobile phone Internet access, or other forms of Internet access to other iOS or Mac OS users, thus providing an alternative to standard SMS/MMS messaging for most users with devices running on iOS [9]. A series of improved iPhones have been manufactured over the years along with improved versions of the iOS, to the most current, as at 2018, the time of this research, being iPhone X released in 2017 with iOS running on it. Apple Inc. sold 77.3 million iPhones in the last quarter of 2017 [1]. Samsung, on the other hand was created by Lee Byung-chul, and developed its first mobile phone (or "hand phone" in Korea), the SH-100 in 1988. Samsung continued to release new cell phone models every year, each model being an improvement of the former with correction of the short falls, up until 2010, when it produced the Samsung Galaxy S, the first device in the S series, which marked the beginning of Samsung's journey to being one of the world's high ranked and demanded mobile phones. The operating system on these S series devices was and still is the Android OS [14]. In 2011, Samsung released the Samsung Galaxy S2, the model that really put Samsung on the map. It was in this same year that ChatON, an instant messaging application, was introduced by Samsung Electronics to its Samsung phones. The application, though being peculiar to Samsung Galaxy smartphones and Android, was also available on other devices if operating systems like Android, iOS, BlackBerry and Windows ran on them. The application had features which included voice/video chatting, translation, PostON, animated icon, animated message, theme customization, group chats, SMS/MMS exchanging feature, as well as basic services such as buddy registration, chatting and multimedia sharing. Though ChatON services were discontinued, Samsung produced more S series phones with the most current product, as of the time of this research, being the Samsung Galaxy S9 Plus released 2018 with the android version 9.0.In the last quarter of 2017, Samsung sold 74.1 million units of phones [1].

Today the most preferred form of communication is texting, and there are multiple applications that have been developed for sending text messages apart from the normal SMS/MMS facility that come with mobile devices. As at 2018, according to Larry [10], the most used application for texting was the WhatsApp Messenger. WhatsApp messenger is a freeware and cross-platform messaging and voice over IP (VoIP) service founded in 2009 by Brian Acton and Jan Koum and acquired by Facebook in 2014 [17]. The application allows the sending of text messages and voice calls, as well as video calls, images and other media, documents, contacts and user location. WhatsApp messenger runs from a mobile device but is also accessible from desktop computers. In August 2009, WhatsApp messenger was released for iOS, the following year, 2010, the android version was released. The application runs on operating systems like

iOS, Android and Windows [17]. In 2014, WhatsApp had just 450 million monthly active users and 315 million daily active users [8]. By 2017 to 2018, the application had more than 1.5 billion users worldwide [10], making it the most used instant messaging application in the world. From the creation of the application, it has constantly been improved and modified; undergoing addition and removal of features, the most recent update of this application, at the time of this research, was done in 2018 [17]. According to online ratings and statistics, Apple Inc. and Samsung are the two major vendors of smartphones in the world [4] and as expected in any market, there has been a level of competition between the mobile devices of these companies, from the type of hardware being used and the design of their devices, to the kind of software being used in their devices, to user interfaces and interactivity and so on [4]. Though there are various angles one can look from when trying to compare the two smartphones, this study used texting, using an instant messaging application (WhatsApp messenger), to make a comparison between the Apple Inc. iPhones and Samsung smartphones. Incidentally, the quality of service of mobile devices and apps affects user experience [2-3][6-7][11-12][15][19-20]

This study indicates that there exists a difference in the comparative assessment of the performance of WhatsApp Messenger on the Iphone X and Samsung S9 Plus mobile phones. No previous study has done any such evaluation in the past. In addition, this scope of this covers smartphones; particularly, Apple Inc. iPhones and Samsung smartphones that were produced between September 2017 and March 2018. This time span is significant to this research because it was the period the most current mobile devices for the two companies at the time of this research where produced; iPhone X and Samsung S9 Plus to be specific. The paper was also delimited to the most current version of WhatsApp messenger (2.18.380) and the study was carried out in Veritas University, Abuja, using mainly students of the University that are within the age range of 18-23.

2. Methodology

Selection of Tools/Materials: iPhone X and Samsung S9 Plus: iPhone X and Samsung S9 Plus were used for the used. The Operating systems (OS) that run on these devices are the iOS and Android respectively. The selection of the iPhone X and Samsung S9 Plus devices was due to the fact that at the time of this research these particular smartphones were the latest products of the Apple Inc. and Samsung respectively. The devices had the latest technology from the companies that produced them with the latest versions of iOS and Android running on them, thus, ideal for carrying out the comparison, considering that they have been in a market competition over the years. Table 1 shows the key specifications of both phones used that are relevant to this paper.

Specifications	**iPhone X**	**Samsung S9 Plus**
OS	iOS 11	Android 9.0
PROCESSOR	2.39GHz Hexa-core	2.7GHz Octa-core
RAM	3GB	6GB
STORAGE	64GB	64GB
DISPLAY	5.80-inch (OLED)	6.2 Inches (AMOLED)
RESOLUTION	1125x2436 pixels	1440 x 2960 pixels
REAR CAMERA	Dual – 12MP + 12MP	Dual – 12MP + 12MP
FRONT CAMERA	7MP	8MP
BATTERY CAPACITY	2716 mAh	3500 mAh
DUAL SIM	NO	YES
4G/LTE	YES	YES

TABLE 1. Specifications of iPhone X and Samsung S9 Plus

WhatsApp Messenger: WhatsApp Messenger instant messaging app was used in this study. The version of WhatsApp Messenger application chosen for the study was v2.18.380, since it was the most current version at the time.

Selection of Evaluators: Ten students within the age range 18-23 were used for the evaluation. Also, protective and security measures were taken to avoid any damages or disappointments as the phones used for this research were owned by students and were quite expensive. The 10 evaluators were at close proximity to the devices and the owners of the devices.

Data Collection: Below are the metrics used to capture data and to make comparison:

i. Launch time: this metric was to check the amount of time both devices would take to launch the WhatsApp Messenger application. A stopwatch was used to check the time. To do this, every other application running on the phones were closed and the phones were restarted. The application was then tapped to launch at the same time the stopwatch was tapped to start timing and as soon as the application was fully opened the stopwatch was tapped to stop timing. This was repeated 5 times for both phones to ensure precision.

ii. Battery durability: this metrics was used to check how many percent out of a 100 percent charged battery on both phones would be exhausted after using the application constantly for a given period of time. To check this, with all other applications still closed, WhatsApp Messenger was used continuously for 10 minutes on both devices and an extra 5 minutes for precision, making a total of 15 minutes.

iii. Delivery time: this metrics was used to check for the amount of time it would take for a text message to be delivered from both devices to a recipient. To carry out this test, the 4G feature on both phones were turned on and at time of good network service strength to ensure there would not be any delivery delays (both devices were subscribed to the Airtel network), and a short message of "hey, what's up" with an emoji preceding it was sent to another device using 4G and subscribed to Airtel as well. A stopwatch was tapped to start timing, at the same time the send button on the devices were tapped and as soon as the message was received on the recipient device the stopwatch was tapped to stop timing. Now this was repeated at least 5 times to ensure precision as well.

iv. Quality of multimedia: sending as well as making videos, photos and audios is a feature of WhatsApp Messenger. In this metrics, each type of multimedia would be made and sent using the application on both phones to see the quality each phone would produce and quality the multimedia would retain when sent and received by the recipient. To carry out this test for each multimedia the following was done:

- Photos: the camera feature of both phones was opened through the WhatsApp Messenger application, and then a picture was taken and sent to a contact/recipient. Photos taken or received through WhatsApp Messenger are usually automatically saved in the device's gallery in a folder called "WhatsApp Images"; the photo just taken and sent was saved there as well. The details of this photo were then accessed and assessed on both the sending and receiving devices to see its resolution and size which would determine its quality. Secondly, a photo not taken through WhatsApp Messenger was accessed through the application and then sent to a contact to see how much quality the photo would retain when it is gotten by the recipient.

- Videos: the same procedure for photos was followed, except that in this case, to make a video, when the camera feature is opened, the capture button is tapped and held to record the video. Also the videos taken and received through WhatsApp Messenger are saved in a folder called "WhatsApp Videos". To run this test a 30 seconds video was made on both phones.

- Audios: to check for the quality of audio files, a song folder on the device was accessed through WhatsApp Messenger, an audio file was selected and sent to a contact. Audio files received through WhatsApp Messenger are usually saved in the WhatsApp Directory in a folder called "WhatsApp Audio". The details of the audio file was assessed on both the sending and receiving phones to see its size (in megabytes) before it was sent and its size when it was received to determine the quality it retained.

3. Results

In this section, the results obtained in each test carried on the iPhone X and Samsung S9 Plus are detailed and discussed as well as other findings during each test. Below are the results for each test:

i. Launch time: with all other applications on both phones closed to make sure that the devices were not processing any other task and sharing processor time, the Samsung S9 Plus launch the WhatsApp Messenger application in approximately 0:00:77s, while the iPhone X launched the application in approximately 0:01:01s. These launch times are due to the speed of the processors in the devices. A high processor speed means the faster the execution of a task and less time taken to execute the task. Also the number of processors in the devices is a factor. The iPhone X has 6 processors in it while the Samsung S9+ has 8 processors in it, which means task or process threads can be assigned to different processors to be executed concurrently, hence, the reason why the Samsung S9 Plus lunches the application faster than the iPhone X and hence more efficient in terms of time.

ii. Battery durability: all other applications were closed, to make sure the devices were not running other tasks that were extra energy-consuming; the application was used continuously for 10 minutes on both devices. Out of a 100% charged battery, 2% was exhausted from the Samsung S9 Plus and 5% from the iPhone X. Also, extra 5 minutes was added to the use of the application to check for precision, 1% was exhausted from the Samsung while 3 % was exhausted from the iPhone X. This shows that the Samsung S9 Plus uses less energy to perform more work, hence is more efficient than the iPhone X. This is because the Samsung S9 Plus has a 3500 mAh battery capacity, and a higher mAh rating will give a longer run time and better charges.

iii. Delivery time: at a period of strong network signals and with the 4G feature on both devices turned on. The Samsung S9 plus takes approximately 0:00:76s to 0:01:09s to deliver a message while the iPhone X takes approximately 0:00:77s to 0:01:07s to deliver a message. This also implies that the Samsung S9 Plus was more efficient in delivery time than iPhone X.

iv. Quality of Multimedia:

Photos: images taken on the Samsung S9 Plus using the preinstalled camera application usually have a 4032x1960 or 4032x3024 resolution and a megabyte size of approximately 2.30, however when images are taken from the WhatsApp Messenger camera feature the images usually have a 4032x2268 resolution and megabyte (mb) size of 1.40. When the WhatsApp image was sent to a contact, the resolution reduced to a 1008x567 resolution and the size reduces to 42.46 kilobytes (kb). Secondly, an image selected from the iPhone's gallery with a resolution of 1672x2844 and a 1.06mb size was sent to a contact. On the recipient's device the image had a reduced resolution of 634x1080 and size of 40kb. **Videos:** with the same procedure for photos followed, the videos from the Samsung S9 Plus camera (30 seconds duration) usually have a resolution of 1920x1080 and an approximated size of 51mb, while videos taken on WhatsApp Messenger have a resolution of 800x450 and an approximated size of 6mb. When the WhatsApp video was sent to a contact, the resolution and size were still the same. Also a 9 seconds video of 640x640 resolution and 1.41mb size was selected and sent to a contact which had a reduced resolution and size of 640x640 and 1.39mb respectively. It is important to note that the iPhone X does not have a preinstalled facility to access and view the details of images and videos. All attempts to find a possible

way to view the details of these media did not work and so a comparison could not be made in these aspects. This implies that Samsung S9 Plus is more flexible and adaptive than the iPhone X device.

Audios: A song of size 10.37mb was sent from the Samsung S9 Plus, when received on the recipient's phone the size still remained 10.37mb. This test could not be carried out for the iPhone X as Apple Inc. iPhones do not allow the sending of audio files from their devices except Voice Notes on WhatsApp Messenger. This is because iPhone users subscribes to an application called Apples Music that allows them stream songs or another audio files for a period of time, which means the audio files are not really stored on their phones and so cannot be shared. This implies that Samsung S9 Plus is more flexible and adaptive than the iPhone X device.

The reduction in the quality of multimedia files is not a function of the devices but of the WhatsApp Messenger application. WhatsApp has size limit of 16mb for uploading and sending media and 100mb for documents and it also compresses the file before sending which results in the reduced quality or/and size of the multimedia [18]. Generally speaking, it is observed overall that the quality of service of Samsung S9 Plus was better than that of iPhone X.

4. Conclusion

Results in this paper show that the Samsung S9 Plus executes tasks faster due to is higher processor speed and also its larger RAM capacity, though both the Samsung S9 Plus and iPhone X can store the same amount of data in their internal memory. On the aspect of battery efficiency, the Samsung S9 Plus was able to give a longer usage time than the iPhone X while carrying out the same type and amount of work in the same time span. Also, not all multimedia data were able to be accessed on the iPhone X. The study recommends the following: 1) WhatsApp should make provision for sending and uploading files greater than the set size limits. The size limits can either be increased or a charge can be applied to users who want to send or upload files greater than the size limits; 2) There should be provision for iPhones to send audio files; 3) Apple Inc. should provide a means of checking details of images and other media files without its users having to download a third party application; 4) Apple Inc. should also improve the efficiency of their batteries by increasing the mAh ratings; 5) Apple Inc. should increase the RAM size and number of processors of iPhone X to increase its launch, processing and delivery time. However, the following were the limitations of the study: 1) The comparison was done using just texting and a single application; 2) There were no automated ways or methods to calculate time results. Timing was done manually and so results are not 100% accurate; 3) The devices used were not new (fresh out the box) and so, had undergone some hardware depreciations. In sum, this study examined the quality of service performance of Samsung S9 Plus and iPhone X with WhatsApp Messenger and the result shows that the former outperforms the later on WhatsApp Messenger. The paper suggests that iPhone X and its successors should be improved to cater for the observed design loopholes so as to enhance its quality of service.

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