Paradigm shift in Mobile Communication Carriers

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Abstract— Language is an important and integral part of human culture. There are many aspects that make up communication, but humans are unique in that we have an organized spoken language, which allows us to communicate on a deeper, more personal level. The technology has taken us from face-to-face and letter writing communication, to inventions such as the telephone, the cell phone, online chat rooms, and now to Mobile Applications, one of the newest and fastest growing forms of communication with text messaging, audio and video communication. The citizens across the world are increasingly turning to mobile technology because of ease of communication and the different modes it presents like text, audio, video, etc. in which communications can be made very easily. Earlier mobile users use the conventional data communication channels such as Short Messaging Services as for text data, voice calls, but the rapid proliferation and ubiquity of mobile and more and more availability of smart devices in the consumer market has driven the software engineering community to quickly adapt to new development approaches conscious of the novel capabilities of mobile applications. There has been a rapid increase in online communication in the last 7-8 years especially using mobile devices and the mobile application using the internet which is replacing the conventional communication channels. In this paper, we have described how mobile applications over the web have replaced the conventional modes of communication and have also described some case studies.

Keywords—Instant Messaging (IM), Over-the-Top (OTT), Peer to Peer (P2P), Session Initiated Protocol (SIP).

I. INTRODUCTION

The new age smart mobile devices run on their own Operating Systems, and are personal computer in their own right by all benchmarks. The most important among these are the Smartphone’s and the Tablets [8]. Over the years, the increase in the processing power and computational speed of mobile devices has made them significantly more multi-functional, progressively extending their utility beyond voice communication to simple text messaging followed by Internet browsing and emailing, onto multimedia messaging and multimedia entertainment (playing music, running video clips etc.), on to video communication on the mobile device, to running a variety of applications. As a result of the increased penetration of smart phones and smart OS (like Android, iOS, J2ME), the mobile application ecosystems in developed markets [1] open up new ways of communication over the conventional mobile data carrier protocols. Instant Messaging, Internet Protocol (IP) calling mobile applications, information fetching application over internet reduces the uses of these conventional carriers. From a past survey, Instant Messaging on chat apps has overtaken the traditional SMS text message; according to research firm Informa, almost 19 billion messages were sent per day on chat apps in 2012, compared with 17.6 billion SMS texts [2]. Carriers are also faced with huge upheaval: A transition to what is known as Next Generation Networks (NGN) is apparent in telecommunications companies on an industry-wide and worldwide basis in which a standardized IP-based infrastructure for voice and data is replacing conventional provider networks. Carrier companies are interested above all in saving costs as they are making move towards NGN. The providers in the carrier equipment sector have also announced that they are no longer supporting conventional technologies, making a changeover unavoidable [3]. With the ubiquity of the internet, and increasingly reliable high-speed, low cost access and high end mobile computing makes mobile application with Instant Messaging (also called as Over-the-Top (OTT) messaging), Voice over Internet Protocol (IP), video calling as the suitable and acceptable substitute over the conventional carriers.

The paper consists of 6 sections. Introduction is followed by Section II where we have taken case studies which describe how Over the Top messaging is replacing SMS. In the Section III, we have described how VoIP based applications are replacing conventional voice calls. Section IV and V describes the drivers and challenges involved. We conclude our paper with a conclusion section.

II. CASE STUDY: OVER-THE-TOP (OTT) MESSAGING REPLACING SMS

A growing mobile application ecosystem has provided various options for text-based communications very rapidly and a number of rich User Interface (UI) highly interactive low-cost and even free alternatives to SMS have increased rates of use of mobile applications for text based communication. Two different OTT alternatives have emerged: OS-specific communication systems such as iMessage and Blackberry Messenger, and third-party applications such as WhatsApp and Viber, which are often cross-platform. Generally speaking, both sets of applications
promise a richer user experience at a price materially lower than traditional SMS messaging [4].

A. Survey Facts of OTT (Over-the-Top) Messaging

In this section, we will be discussing some of the surveys conducted on how Over the Top messages have overtaken the conventional SMS.

A. Portio Research (February 2012): Over-the-Top (OTT) messaging traffic hit 3.5 trillion messages in 2011 and will continue to grow at a CAGR of 42.2 percent and will reach 20.3 trillion by the end of 2016. But SMS traffic (and revenue) will continue to grow.

B. Juniper Research (May 2011): By 2016, application-to-person (A2P) messaging will overtakes person-to-person (texting) messaging, being worth more than US$70bn. A2P messaging includes messages to or from an application to or from a large number of customers in financial services, advertising, marketing, business administration, ticketing, television voting, etc. [9].

C. Analysis Mason (Mobile and Digital Economy): Mobile and Digital Economy [13] by Analysis Mason shows that OTT IP messaging has overtaken conventional SMS. Fig. 1. shows the remarkable growth of Mobile Instant Messaging (IM) worldwide. These facts show that growth of OTT messaging applications have halted the growth of SMS if not slowed down. The Instant Messaging mobile applications with additional multimedia features provide better user experience over conventional SMS.

D. Fig. 2. shows the SMS trends in India. According to Telecom Regulatory Authority of India (TRAI) performance indicators quarterly reports [10], the SMS based P2P messaging are decreasing.

The above facts clearly show that OTT based messaging is fast replacing the conventional text based communications channels such as SMS. There are various factors that are driving this change; we will discuss some of them factors in Section IV.

B. Some reasons that make IM Mobile Applications popular

There are various reasons that make Instant Messaging mobile applications more popular over conventional SMS. Most of the IM mobile applications support Multi-Tasking, Identity Formation and Creation of the Self: Screen Names, Profiles and Buddy Lists, Away Messages and Greetings/Closings [6] which make them very popular. Simple and multi dimensional GUI Audio and Voice messaging provide more interactive and user friendly screens and many of which can be customized as per user preferences. Most of the IM mobile applications use Internet as communication medium which is cost effective.

III. CASE STUDY: VOICE OVER IP BASED MOBILE APPLICATIONS REPLACING CONVENTIONAL CELLULAR VOICE SERVICES

These days, Smartphone’s with high speed internet connectivity are easy to find, and more consumers are using mobile applications which support VoIP. According to Juniper Research’s press release, by 2017 there will be more than 1 billion people using VoIP through free smart phone apps [5]. The conventional telecommunication systems – such as Private Branch Exchanges (PBX) are being replaced by IP-based systems (IP PBX). These days Voice over IP is being used in the local network (LAN) of many companies [3]. The VoIP based systems provide various features because of which companies are increasingly shedding their legacy TDM telephony infrastructure and migrating toward IP telephony solutions. VoIP based systems have lowered the infrastructure and communication costs as compared to conventional system;
additionally, they enable secure voice connections which are location-independent. However, the quality of service of VoIP remains under scanner since the implementation of VoIP is prone to jitter and latency problems.

Fig. 3. World Wide VoIP subscribers (million) in quarters.

Fig. 3. shows how voice traffic has increased over last couple of years with the rise of mobile VoIP applications. We expect to see VoIP start to displace mass market, legacy mobile voice infrastructures. Figure 4 shows the projected growth of Mobile VoIP users.

Fig. 4. Projected Growth of Mobile VoIP Users.

As described above, both case studies show how mobile application ecosystem is gradually replacing the conventional mobile data carrier ecosystem. The growth of high speed internet and availability of smart phones are the primary reasons for this change.

IV. FACTORS DRIVING SHIFT FROM CONVENTIONAL MOBILE DATA CARRIERS TO MOBILE APPLICATIONS OVER WEB

Conventional data carriers will always have a place in the industry and was once a great cash generator for mobile network operators; but the ways to communicate has changed a lot in past decade. Mobile applications over web have provided consumers different ways to communicate where consumer cannot just communicate through text and voice, but also can share pictures and video. Some of the factors that are driving industry to move from conventional data carriers to mobile applications over web are discussed below:

A. High-speed Internet

Countries with 3G or better networks are the most likely to have a wide distribution of these type of mobile applications. The text based Instant Messaging applications require low Internet speed. The countries where high speed internet is available, VoIP based application has better acceptance.

Fig. 5. Top 5 VoIP countries.

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B. Smartphone Penetration

Most of the VoIP and OTT based mobile applications require smart phone to run on and countries with high availability of smart phone penetration are the most likely to have a wide distribution of VoIP and OTT based users. The top 5 countries as shown in the Figure 5 also have very smart phone penetration [14].

C. Cost effective

Compared to conventional mobile data carriers the mobile applications over the web with OTT messaging and VoIP alternatives often provide very low cost or free and user needs to pay only data usage charges. The high cost of SMS in some
markets make consumer switch to inexpensive OTT technology which runs on very low speed internet.

V. CHALLENGES

The mobile applications over web are fast becoming very popular and have overtaken conventional text based messaging and fast replacing cellular voice services through VoIP based application. Though mobile applications over web offer numerous benefits like real time communication, text as well as multimedia messages etc. over conventional data carriers, there are various challenges such security issues, slow internet speed in developing countries, etc. that need to be addressed to sustain this growth. In this section we will be discussing some of the challenges:

A. Security Issues Associated with OTT Messaging and VoIP

The security of the OTT messaging and VoIP based services lies upon the underlying network security. These services use open internet and depend upon the underlying security as provided by the network [12]. The OTT and VoIP service providers have to make necessary security arrangements to overcome the security issues.

B. Inconsistent Internet Services in developing countries

As per VoIP Statistics – Market Analysis Q1 2013 [11], United States, Japan, France, South Korea and China account for 70% of the VoIP subscribers and top 10 countries account for over 90% of the total VoIP subscribers. Though the text based messaging applications are getting very popular in developing countries as they can run on low Internet speed, the acceptability of VoIP based application is still very low as they require high Internet speed for good quality voice calls.

C. Low Smartphone & Tablet Penetration in rural areas in developing countries

In developing countries, the overall Internet penetration is very low and access to smart phones is also limited to small percentage of people. It is a major challenge to create mobile application for basic feature phones through which OTT messaging and VoIP based services can be made accessible.

VI. CONCLUSION

The case studies presented above conclude that the Mobile Application over web is growing rapidly and is replacing the conventional mobile data carriers. The high availability of smart phones and low cost internet as compared to conventional channel cost are the major driving force. As the cost of smart phone continue to decrease and more and more people have started using these phones, the number of people using these applications over web will continue to grow. In rural areas in developing countries where the reach of smart phones is very limited, it is a major challenge to make these services available on basic feature phones.

The mobile applications over web are fast replacing conventional mobile data carriers, but more work need to be done in Voice over IP applications so that they can work on even low speed and inconsistent internet. More work can be done to make these services available on the basic feature phones as vast number of people in developing countries still uses basic feature phones.

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