Implementation Challenges in Rich Communication Suite-enhanced (RCS-e)

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Abstract - **Everything is going mobile. This evolution is driven by video, cloud-based services, the Internet and machine-to-machine connectivity. It changes how people behave and how they leverage mobility to communicate and to improve their daily lives, through new and existing services. Users now demand connectivity anywhere and anytime with innovative services at minimal cost. Mobile service providers are exploiting the speed of 3G radio networks to offer new SIP-based interactive communications apart from basic Voice over IP (VoIP) services. One of these new emerging initiatives is Rich Communication Suite-enhanced (stated as RCS-e henceforth) which aims to seamlessly unify the communications experience by integrating traditional mobile telephony with new interactive services like presence, instant messaging and content sharing enabled by the enhanced address book of the mobile phone. This paper elaborates the challenges in implementation and roll-out of RCS-e technology, which includes combination of technical and business constraints. Finally, this paper not only compiles the unique challenges but it also touches upon the ways to deal with the implementation hurdles and using various studies and surveys it infers that RCS-e might well be the ideal combat technology against Over The Top applications (OTT apps) which are current leaders in the mobile telephony arena.**

Keywords-RCS-e; Mobile Phone Apps; Rich Communication Suite; Implementation challenges in RCS-e; OTT apps; IMS

I. INTRODUCTION

In today's world of converged enterprise and consumer-oriented network services for triple play [1], there is a need as well as an opportunity before the operators to provide higher value add in terms of advanced collaboration services and monetize investments in high data intensive networks like IMS (IP Multimedia Subsystem) [2] and LTE (Long Term Evolution) [3]. RCS (Rich Communication Suite) is one of such initiatives led by network operators; network and device vendors that are expected to leverage SIP [4]-based IMS core infrastructure to provide advanced communication and collaboration. RCS shall provide users with an experience beyond voice and Short Message Service (SMS) by providing them with instant messaging, live video sharing and file transfer across any device on any network and with anyone in their mobile address book which is capable of handling RCS enriched data [5]. Figure 1 gives an idea of the future broadband subscription trend. Fixed narrowband voice subscriptions are expected to drop down

from near 1100 million subscription lines in year 2008 to 800 million subscriptions in the year 2017 while in the same time period mobile broadband subscriptions are expected to rise steeply from mere 200 million subscriptions to 5 Billion subscription levels.
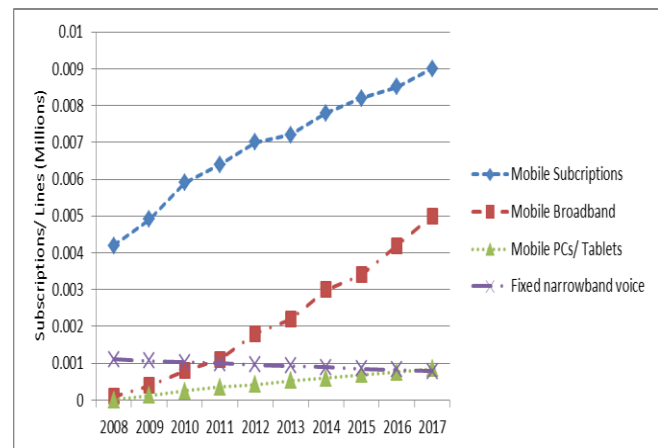

Figure 1-Mobile broadband subscription by 2017 [6]

Looking at the potential opportunity of 5 Billion mobile broadband subscriptions by 2017 [6] and growth in mobile data traffic by 20 times, the network infrastructure vendors are gearing up to this challenge and RCS is one of the technologies which provides a framework to monetize such investments. The RCS Initiative, catering to current growing interests in mobile applications and services, aims at providing an interoperable, convergent and rich communication environment. It uses an incremental and iterative methodology to continually add features, define interoperability conditions and reference guidelines. RCS reuses the capabilities of 3GPP specified IMS core system as the underlying service platform taking care of issues such as authentication, authorization, registration, charging and routing. The interests of the mobile network operator (MNO) or service provider and enterprise are aligning to tap this opportunity for VoLTE (Voice over LTE) as well as roll-out interoperable innovative communication services like rich call, video and social presence.

GSM Association (GSMA) [7] and Open Mobile Alliance (OMA) [8] are the key standard bodies creating specifications for RCS. The RCS documents created by GSMA provide a common, unambiguous reference point for

operators and vendors alike to base their RCS implementations on. Up till now, five releases of RCS have been released which have incrementally added features in the RCS portfolio.

For example, RCS Release #1 laid the groundwork for further versions/releases by introducing the concept of voice and chat enrichment and a common evolved address book which facilitates chat and content share. RCS Release #2 aimed at extending the same features as RCS Release #1 to broadband users. RCS Release #3 allowed broadband access devices to be used as the primary devices in absence of mobile devices. RCS Release #4 extended the feature set to Long Term Evolution (LTE) and RCS Release #5 aimed at global interoperability. The RCS releases keep on enriching the feature set and also and continue to refine on existing implementations.

Probably based on the initial feedbacks, GSMA realized that the bulky feature sets offered by RCS were not alone doing enough to lure more users as well as operators/vendors into the RCS arena. Keeping an eye on the market, RCS-e was introduced.

RCS-e is a pruned version of RCS Release #2 which not only reuses capabilities offered in RCS Release #2 but also optimizes & refines its specifications. Several technical prerequisites which were "mandatory" to meet so as to be conformant with RCS Release #2 were changed to "optional" status, some conditions kept intact and while others were dropped. This was done in order to simplify the entry level technical conditions & prerequisites as much as possible so as to encourage the operators to implement RCS-e. Also, this was done so as to boost the market penetration curve twofold because simpler specs meant more operators were willing to invest in it as it offered more clarity and it reduced the go to market time as lightweight specs meant shorter implementation cycle time.

II. TECHNOLOGY OVERVIEW

RCS-e is based on a simple underlying basis of tying down the various available features and making them available from one single access point. It simplifies user experience and offers an easily available enriched communication experience. RCS-e feature availability and usage is driven from a central location known as Enhanced Address Book which as the name suggests, is an evolved version of the traditional contact book present in today's mobile devices. Enhanced Address Book is a repository of contacts, which can be either RCS-e or the traditional contacts. (Traditional contact is referred to as the contact having just name and number details associated with it, similar to the contacts stored in today's mobile address books/contact lists.) It enables storage of RCS-e contact and Legacy contacts, all at one place so as to avoid an additional burden on user for maintaining a separate contact list for both types of contacts.

The Enhanced address book allows legacy traditional operations such as ability to dial a contact (whether RCS-e or legacy) or sending a SMS. It also allows using advanced features such as starting a chat session with another RCS-e contact and ability to use multimedia content. Also, a service capability indication of each contact stored is provided which indicates the type of communication possible with each particular contact. In the Enhanced address book, as soon as user selects a contact it would be indicated whether that contact is capable of handling chat session, file transfer and video/image share capability or just simple call functions like SMS/call. For example, an RCS-e contact in the Enhanced Address Book might be shown as capable of handling of image sharing or/and chat capable, in the address book. Since, no such capability is present with non RCS-e contact, it would be depicted appropriately say by graying out the image/video share option, so that user clearly knows which contacts on its contact list are RCS-e or non RCS-e contacts and also what all services the user can avail to reach to a particular contact.

IMS core system forms the base for RCS-e services and enables peer-to-peer communication between RCS-e clients. Further, intercommunication between two RCS-e service providers is made possible using Network-to-Network Interface (NNI) mechanisms as explained in PRD-IR.90 (RCS Interworking Guidelines) [9][10].

Apart from the IMS core system many network entities form the RCS-e ecosystem. For instance, Presence server provides RCS-e clients with the current state information of the buddies in its buddy list. The IM server coupled with message store service provides the RCS-e client with a mix of traditional service such as chatting along with latest services like deferred messaging which ensures that no message sent by the RCS-e client is lost by delivering the message at a later time when the recipient party becomes available [11, 12]. In the same way, the Secure User Plane Location element could be used to exchange geo-location information, as part of Social Presence Information, which is an optional service for RCS-e [13].

A typical protocol message sequence flow for image share as an example is depicted below in Figure 2. User A, wants to share an image file, with Contact B present in its contact list and hence selects it. As soon as the user performs this action, the capability checks followed by session establishment processes are initiated with the help of Session Initiation Protocol. Once the session setup is complete, Message Session Relay protocol is used to send the intended image file from user A to User B. Once, the entire content is transferred from User A to user B, the session is gracefully ended using BYE, a Session Initiation Protocol method.
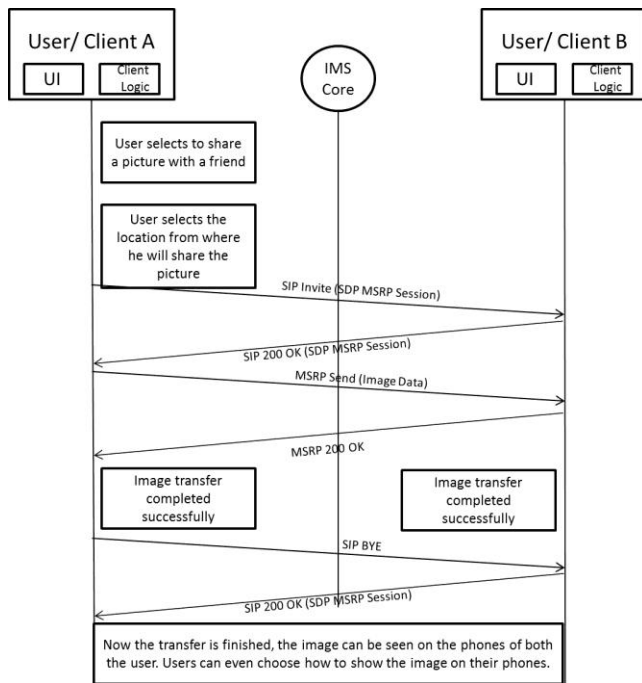
Figure 2-Message sequence flow for image share scenario

RCS-e as a service, offers a wide mix of traditional and advanced features, which could not only cater to existing needs of mobile users but also offer additional edge in terms of feature availability and ease of use. Going by its portfolio, RCS-e offers a lot of things which are not correctly or fully implemented at present and there are several challenges to be dealt early for successful roll-out. Section III below elaborates some of these challenges.

III. IMPLEMENTATION CHALLENGES

A. Binding to SIM Card

Since, the RCS services are bound to the SIM card in use, the use cases such as roaming appear as serious challenges. Say if a user decides to continue using RCS-e services while in roaming area, he or she might be subjected to heavy roaming data charges on accounts of the RCS-e services he or she is using on the go. Why would then a normal user, who can use his Whatsapp account to connect to a local wifi and use it for messaging at no charge at all, use RCS-e to communicate? In contrast, the Over The Top (OTT) apps are on cloud so as to say and hence their access is not limited or bound by the SIM card which is a clear advantage and a vital one too. It remains interesting to see that how, the current roaming pricing model is tweaked to counter such obvious shortcomings when RCS-e is pitted against OTT apps.

Similarly, in the case where the user makes use of multiple SIM cards based on network availability and tariff needs, multiple RCS-e account information will need to be managed; for example, to have the same buddy list appear on different SIMs and many more associated complexities like these.

B. Inter-operability between operator networks

Wider and large scale IMS deployment, interoperability between different terminal vendor RCS clients and RCS service interworking between operators are the key aims of the RCS Initiative. Looking from a competition perspective, interoperability hasn't been much of an issue for OTT application market leaders since long. Whether it is Facebook, Whatsapp or Twitter, these apps are tested well and thoroughly by the app developers themselves and hence can boast of high level of interoperability. In fact, some of these apps come pre-embedded into the devices much like what RCS-e proposes to do in future. So, what additional RCS-e can offer to the users in terms of interoperability would be a thing to watch.

Though a common set of GSMA specifications shall be followed by RCS-e enabling operators and application developers, a longer launch cycle time shall be needed due to multiple checks to be performed by the operator to validate inter-operability among different vendor solutions. Longer launch cycle time for RCS-e provides greater opportunity for OTT players to innovate and further impact RCS-e market penetration.

C. Packaging of RCS-e services v/s existing Unified Communication applications

In an enterprise world, equipment vendors and service providers are already investing in unified communication applications which provide mobility. These applications provide inherent capability to make use of advanced collaboration features when the user is in "office mode" or "work mode". The Unified Communications framework provides a seamless access to IM, Presence, Voice, Video, Social networking, and others on a desktop or mobile device for a registered enterprise user in secured fashion, thereby enhancing productivity and mobility.

RCS-e services for enterprises shall require different packaging and billing model to compete with the Unified communications reach and growth. In some cases there could be overlapping solutions to cater to both personal and official needs.

D. Delay in availability of open APIs

Availability of standard and well known development environment or the Application Programming Interface (APIs) is an essential element in success of any platform or application. A very good example is Android operating system which provides seamless open source access to global developer community to contribute, share and simplify application development and deployment process. This encouraged developers, vendors and operators to flaunt new apps and generate huge interest in Android.

In the same way, RCS-e needs to provide Open APIs to capture the market quickly and offer similar developer experience/reach. Though the RCS-e APIs were made available for developer community just recently, it has to catch –up quickly with tested and scaleable APIs which can provide the required performance.

E.   SIP Inter-Op Issues

Figure 3 depicts a summary of SIP Inter-op issues in development and launch of new SIP devices across 5 leading original equipment vendors. Though SIP specifications are stable for more than 5 years now, this is actual implementation data for development between 2009 and 2012.

This data gives a historical view of all kind of issues that may originate while introducing extensions to SIP which shall also impact RCS-e devices and associated services.

F.   Lack of standard test specifications or test tools for RCS-e clients

Original equipment vendors or chipset vendors themselves need to validate the protocol stack compliance with latest set of standards which are still evolving. Availability of standard test specifications and automated test tools remain a challenge for the vendors. One of the silver linings here is that SIP or IMS test frameworks can be extended for the RCS-e standard for control plane validation.

IV. SUMMARY

The key competition to RCS-e is the OTT service. RCS-e forum members, handset equipment vendors, chipset vendors and MNOs have to play a key role in success of RCS journey. In today's business context and increasing pressure to quickly monetize investments and enhance average revenue per user (ARPU) and user experience it is imperative for stakeholders to collaborate and come up with quick solutions to challenges described above.

Figure 4 gives an idea of how big a threat do operator perceive OTT to be. Nearly three-fourth of the operators surveyed say that because of the usage of OTT IM clients, their revenue takes a hit whereas a mere 12% feel that presence
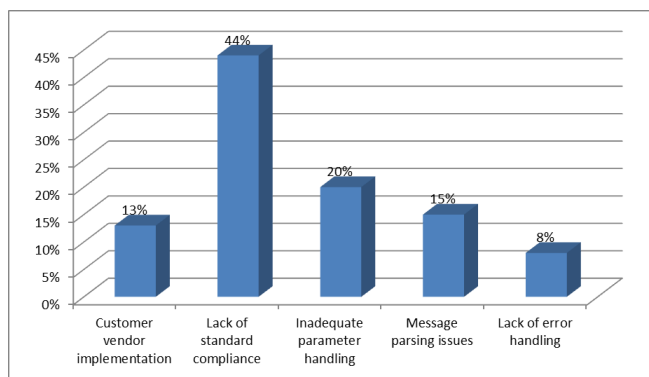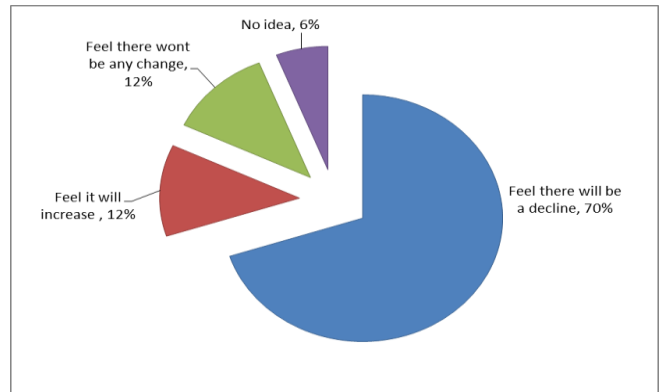

Figure 4-Operators expectation of revenue on usage of OTT IM clients on smart-phones [14]

of OTT in the market hardly changes the revenue front for them. This for sure indicates that growing OTT presence is now clearly acknowledged by the operator community.

Keeping mind that RCS-e enabled handsets would be available somewhere late in the year 2012, at present, various operators seem to be having different approaches to handle the OTT threat. Fig. 5 below shows using data collected in year 2011, how various operators across the world are planning to deploy the RCS-e services to combat the OTT threat. Here again, a clear pattern emerges with regards to the urgency with which RCS-e services are being promised. 39 percent of the operators is readying for 2012 year release and another 16 percent of operators are in the process of deploying them. This further substantiates, that operators seems to be betting big on RCS-e to take on OTT applications.

According to another survey [14], 22.6% of respondents also said that they are either offering their own IM client, or partnering with OTT providers. A minority, 6.5%, are trying to either block access to OTT clients or imposing surcharges for using OTT clients via deep packet inspection technology.

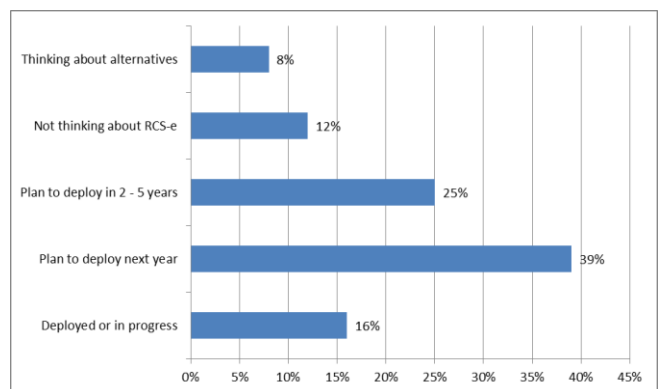Figure 3-SIP Inter-Op Issues Classification

Figure 5-Operators with RCS-e Deployment (as in year 2011) [14]

But, these approaches are only addressing the outer layer of the problem, which is handling the OTT influx and hence is missing the crux of the issue. The solution lies in preparing well in advance and offering innovative services; one example is having the services on Cloud itself.

Based on the current information on GSMA website, most of the leading mobile handset manufacturers of the world seem to making heavy investments in getting their clients accredited for compliance to standards of new SIP devices across 5 leading original equipment vendors. Overall 14 companies have accredited in the February 2012 – October 2012 time period which shows the current priority for manufacturers in this segment and hence the focus needed to address some of these problems.

This business situation also opens up opportunities for software engineering service providers and telecom test vendors to create propositions and solutions around the same. Since, RCS-e technology is still in its initial stages, the approaches RCS-e proponents shall adopt in near future to resolve the implementation challenges would be a thing to observe.

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