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Messaging in an all-IP world

Five years from now, the messaging landscape will have evolved dramatically. Driven by connectivity, communities, content and commerce, the traditional ways of composing, sending and receiving messages will become seamless, facilitating a very high-level user experience based on the concept of "it's just there, it just works."

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The transformation in the messaging landscape will be brought about through faster, better and global connectivity and by a new generation of socially connected subscribers using mash-ups, online real-time content aggregation, targeted advertising, masses of apps, and reduced entry level through APIs – the list is endless. Players with limited telecom-services experience but extensive web-app experience are generating such strong competition that some operators have become little more than bit-pipes to over-the-top (OTT) players. Both the game and the playing field have changed.

Background

The success of SMS as a communication service caught most experts by surprise. The technology was originally designed to use idle signaling-channel bandwidth for notification messages – for example, to alert users to new voice mail. Nobody forecasted that SMS would become the globally successful near-instant messaging service it is today. Adoption of SMS was slow. The first SMS was sent over a live network in 1992, more than a decade after the specification work had started. In comparison, the popularity of Facebook (launched in 2004) grew from nothing to more than 500 million users in just over six years[1], benefiting from several decades of IP infrastructure expansions implemented by fixed, cable and wireless operators. With the addition of a chat function resembling instant messaging (IM), Facebook became just one of many OTT services that rely on IP connectivity to succeed. Many others also exist. These include Bobsled for voice calls and messaging; and Skype for voice and video calls as well as messaging. Each of these services encourages users to move away from existing telephony services or infrastructure, eating into operator revenue bit by bit.

In December 2011, the Dutch operator KPN issued a statement reigniting a controversial debate that had begun earlier in the year, with several other European operators protesting that various web giants do not sufficiently contribute toward the cost of expanding and operating the wireless networks that carry their services[2]. The revival of this issue appears to have been triggered by the rapid uptake of the WhatsApp Messenger mobile-IM-application service in the Netherlands, and the subsequent major blow to SMS revenue. Network costs and traffic loads incurred by Apple iMessage and Google Talk were also cited as catalysts for the debate. In the 12 months prior to KPN's statement, the vast majority of the operator's subscribers stopped using KPN's SMS services, switching to the WhatsApp OTT application despite the drawbacks: WhatsApp users incur significant data charges when roaming; an unlimited data plan is required to ensure the best user experience; and before being able to use the app, users need to go through a lengthy setup process to create a new account, download an application and register phone numbers manually.

Current messaging landscape

Although today's messaging landscape, shown in **Figure 1**, is clearly

BOX A Terms and abbreviations

3GPP	3rd Generation Partnership Project
A2P	application-to-person
API	application programming interface
CPM	Converged IP Messaging
GCF	Global Certification Forum
GSM	Global System for Mobile Communications
GSMA	GSM Association
HSPA	High-Speed Packet Access
HTTP	Hypertext Transfer Protocol
IETF	Internet Engineering Task Force
IM	instant messaging
IP	Internet Protocol
IR.nn	GSMA specifications for interworking and roaming
joyn	GSMA brand for RCS services
M2M	machine-to-machine
MDN	Mobile Device Number
MMS	Multimedia Messaging Service
MMTel	multimedia telephony
MSISDN	Mobile Subscriber Integrated Services Digital Network
NVAS	network value-added services
OEM	original equipment manufacturer
OMA	Open Mobile Alliance
OMA DS	OMA Data Synchronization
OneAPI	set of APIs supported by GSMA that expose network capabilities
OTT	over-the-top
QoS	quality of service
RCE	Rich Communications Ecosystem
RCS	Rich Communication Suite
RCS-e	RCS-enhanced
REST	Representational State Transfer (an HTTP-based API mechanism)
SIMPLE	SIP for Instant Messaging and Presence Leveraging Extensions
SIP	Session Initiation Protocol
SMS	Short Message Service
UI	user interface
VoHSPA	voice over HSPA
VoIP	voice over IP
VoLTE	voice over LTE

fragmented, it could be viewed as primarily an OTT landscape. While legacy messaging services and technologies remain relevant, it has become more difficult to derive business value from them – partially because of the no-fee services provided by OTT players.

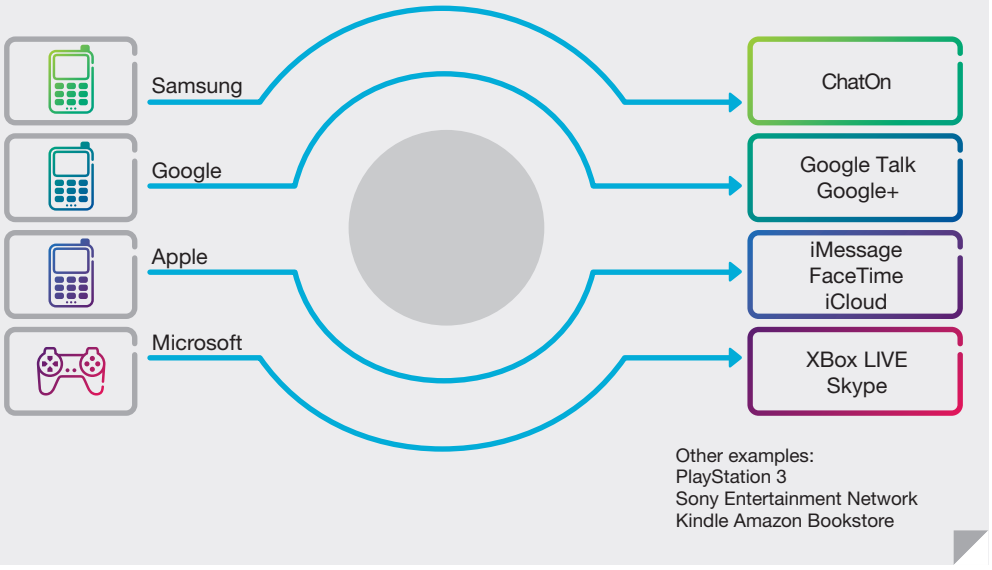
The messaging landscape is being shaped by developments in three areas: device technology, ecosystems, and content and application value.

New types of devices that offer highly advanced features – which were still in the research lab just five years ago – are now available and becoming more affordable. From the basic e-reader to sophisticated tablets, improvements in battery life, screen size, capacitive sensing, processing speed and power consumption have provided consumers with a wide variety of hardware to choose from. Of all these technological improvements, capacitive sensing appears to have been the most disruptive technology as it enables new ways of interacting with messaging devices; new device form factors; new types of displays and new ways to input information. For example, the once-universal text on nine keys (T9) predictive text technology has largely disappeared from even the smallest touch devices and has been replaced by virtual keyboards, swipe capabilities and other innovative text-entry methods.

In terms of ecosystems, the app-store concept has become more than just a delivery platform. App stores now also provide policy enforcement, license management, and developer access control for messaging applications. Apple's iTunes concept pioneered the way for new distribution mechanisms and business models for content and applications. Driven by user demand for advanced messaging capabilities, the evolution of messaging ecosystems will create a dramatic rise in the need for storage[3]. Capabilities such as deferred delivery for offline subscribers, message and conversation history, and ultimately, long-term personal content storage all contribute to rising demands for storage, where message archiving may represent significant business value in the enterprise domain.

Messaging traffic is expected to grow significantly in the next five years, with the highest growth in application-to-person (A2P) messages[4]. However, in terms of content and application, the value of messaging has changed, as has the role of the consumer in generating that value. Users are more than just consumers of messaging content. People use message content to create blogs, to tweet, to report breaking news, and to provide social commentary on their lives and the lives of others – famous or not. As content creators, people use multifunction devices to record videos and sound, take pictures and make comments, sharing content with each other directly as well as through online repositories such as YouTube and Flickr. The messages people send and receive become new sources for revenue, social graphing (how people are related to each other on the web) and information analysis. As the world becomes a more open place and as each new service is launched, privacy and security concerns become more and more apparent and need to be managed.

FIGURE 1 A playing field increasingly dominated by OTT services



What's in a message?

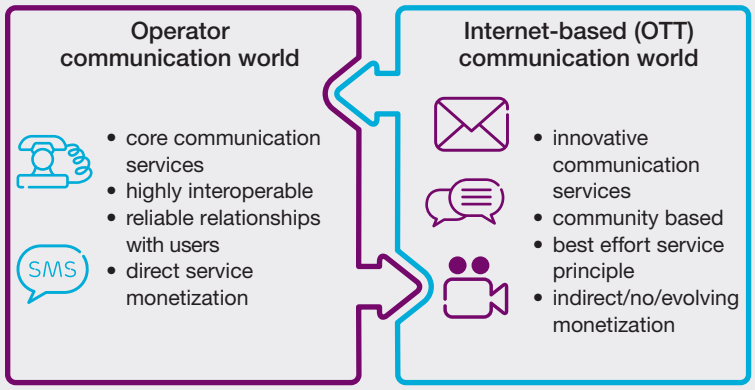
The distinction between sending an SMS and sending an MMS has largely disappeared as unified message-composers and messaging inboxes have changed the way people use and understand these technologies. In the past, it was necessary to distinguish between the two as the message type affected the bearer and network resources that were needed to carry it, how to price it, and ultimately the user experience. With conversational-view inboxes, SMS has become a one-to-one chat experience, while MMS, which once had advanced message-composition capability, has become merely a transport mechanism for pictures and short videos.

E-mail, however, is still considered to be in a category of its own because of its similarity to letter sending through the regular postal service. IM became more popular as it moved out of chat rooms and online bulletin boards into the realm of OTT services.

Today, the content of a message determines which communication technology is best for sending it. For example, instant messaging is the most suitable method of communicating short, time-sensitive snippets of information between two people who are both online. Longer messages that are not time-sensitive and do not depend on the recipient's whereabouts or online status are best communicated via e-mail.

SMS and MMS are still unique in the messaging landscape, as users know that when they send a message, it will be received almost instantly (assuming that the recipient has their phone switched on and they are within range of a cellular network). The future of messaging will combine the OTT

FIGURE 2 **The changing landscape and the future**



experience of instant-messaging chat with a delivery guarantee that the message will be sent to any of the recipient's devices, over any network.

Freedom of choice

Consumers want choice, but today's OTT offerings are like walled gardens. People may be free to pick whatever services they like, but once their choice has been made, they become locked in. Ironically, given the abundance of solutions on the market, users often have to choose multiple "walled gardens" – multiple OTT services – to ensure that they can reach and communicate with all of their contacts. However, their popularity indicates that some OTT services offer clear benefits such as enhanced usability, convenience, a consumer-centric approach, as well as constantly updated interfaces and innovative features.

Technology improvements inevitably lead to changes in business models. It was once standard procedure to charge per message, or to structure price plans with a monthly cap and offer advantages for messages sent within the operator's network. But consumers now want volume-based data charging, with an all-inclusive no-data-cap flat-rate model. People no longer want to decide which technology to use to send a certain type of message; they want better visual convergence – all messages of all types, with multiple accounts in a single, easily accessible view.

Towards the end of 2010, Facebook announced that it planned to launch a seamless messaging service[5], with messages being delivered using the communication method determined by the recipient. Users would receive messages in the way that was most convenient to them at any given time – as a Facebook message, an e-mail, an instant message or an SMS. On an opt-in basis, users would be given an @facebook.com address to communicate with others using only e-mail as their means of electronic communication. On the Facebook blog[6], software engineer Joel Seligstein, even hinted at the idea of adding voice to this service: "Relatively soon, we'll probably all stop using arbitrary 10-digit numbers and bizarre sequences of characters to contact each other. We will just select friends by name and be able to share with them instantly".

In December 2011, Facebook reported 845 million users[7]. About 350 million of those people use the platform's internal messaging system, sending 4 billion messages a day. The average person spends more than 55 minutes a day on Facebook, whose "like" button creates particularly high volumes of messages – a message is sent every time a user "likes" something. Notifications and chat conversations generate large numbers of messages, and any website can include a "like" button with Facebook APIs.

As with almost any landscape (or perhaps any jungle), threats are part of the picture. As infrastructure, device technology, subscription pricing models, and application and content ecosystems converge, the major operators have created new opportunities, which has allowed OTT service providers to use global connectivity and the evolved mobile network infrastructure to deliver services free of charge.

The problem is how to compete with OTT players. Is there a way to leverage the strengths of operator services and networks to improve the messaging experience for everyone? The simple answer is yes. OTT solutions will continue to exist and are indeed even necessary as part of the innovation sphere, but in the long term, all individual messaging solutions must be bridged, and a global solution that can be used by all users on all devices is needed. Such a global solution can be produced using new standards from the Open Mobile Alliance (OMA), and reusing existing IETF and 3GPP standards. Through an industry alliance via the GSMA, a converged solution can be deployed based on a common set of services that provide a rich user experience while encouraging interoperability and service

BOX B

RCS-e

It's just there

- Natively integrated by OEMs – in-device UI communication flows
- Maximum attainable service penetration – similar to voice and SMS, including open-market devices
- Automatic service discovery – users discover new services in the right place, in the right context

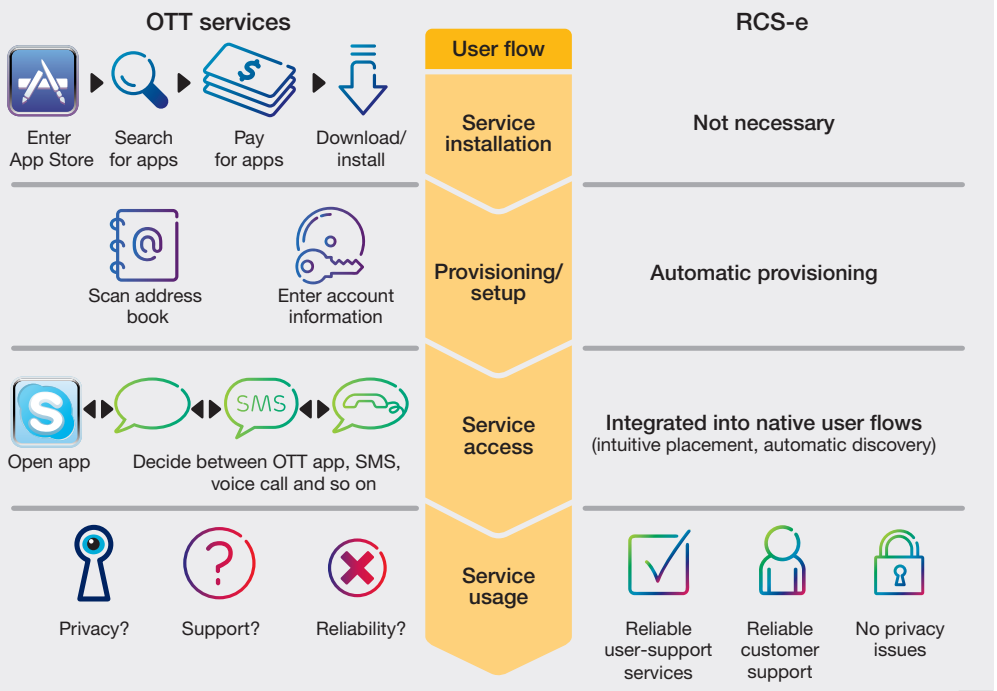
It just works

- Dynamic capability discovery – only relevant and available services offered
- Interworks across operators and devices
- Just like SMS

FIGURE 3 **What is RCS-e?**

innovation. This changing landscape is visualized in Figure 2.

FIGURE 4 The power of a service that's "just there"



Next-generation messaging

The future of messaging bridges two traditionally separate, landscapes: the rich user experience (offered by OTT applications and service providers) and ubiquity and security (offered by telecom operators). The combination of these two landscapes has generated a new suite of services referred to as rich communication.

Rich Communication Suite

This concept is a complete family of services designed from the ground up to deliver the richness and ubiquity that subscribers want. The roadmap for the Rich Communication Suite (RCS) includes:

- R1: OMA Presence for RCS social presence; OMA SIMPLE IM for one-to-one chat, group chat and file transfer; OMA DS for the network address book; GSMA IR.79 for image-sharing; and GSMA IR.74 for video-sharing;
- R2: users can connect with RCS mobile clients or a broadband-access client;
- R3: broadband-access devices can also be designated as a user's primary device; content-sharing improvements (GSMA IR.84); services such as "Who can I invite?"; and network value-added services (NVAS);
- R4: OMA CPM; social-network integration; OMA network APIs; first phase of VoLTE alignment;
- RCS-e: based on RCS R3, but adds store-and-forward functionality and delivery/display notifications for one-to-one chat (similar to OTT services); and
- R5: alignment with GSMA IR.92/IR.58 for VoLTE/VoHSPA, IR.94 for Video Call, IR.65 for MMTel/RCS PS interconnect and roaming; OMA CPM with a commitment to bring store-and-forward functionality for chat, group chat, and file transfer back into OMA CPM.

The fundamental assumption of RCS services is that the communication process starts with a user selecting a contact from their address book. Before the GSMA started working on RCS, there was no easy way of visualizing how to use the tools available through IP: presence, messaging, and discovery and capability exchange. OMA has now produced standards for these tools, with the first release in 2008, followed by a number of revisions in rapid succession. However, it was not until this point – when the RCS experience was first articulated and understood – that these features could begin to be incorporated into devices.

The enhanced suite

In Q4 2010, the big five of European telecoms (Vodafone, Telefónica, Deutsche Telekom, Orange and Telecom Italia) decided that they needed to be able to offer RCS-like services to remain a relevant provider of such services to their subscribers. The group agreed that RCS R2 and R3 functionality was a good start, however, as the OMA SIMPLE IM enabler did not include recovery of messages lost due to connectivity issues, the group decided that this level of functionality wasn't enough and so they created RCS-e (see Figure 3). RCS-e endorses a subset of the RCS R2/R3 functionality with a simplified service-capability exchange instead of presence, which was enhanced with store-and-forward functionality for chat – brought into the GSMA under the Rich Communication Ecosystem Technical Specification Group and which is now being brought into the OMA SIMPLE IM v2.0 enabler.

In the meantime, North American operators were ready to move forward on the OMA CPM functionality as endorsed in RCS R4, but they were also eager to include the store-and-forward functionality. Both North American and European operators wanted:

- the OMA CPM message store;
- store-and-forward functionality for chat, group chat and file transfer;
- group chat that is closed to new participants;
- resumption capability for file transfer; and
- use of file transfer for new services such as location-sharing and contact-information sharing.

The transatlantic collaboration resulted in the RCS R5 specification, with version 5.0 containing most of the wanted functionality. The upcoming version 5.1 will include the closed group chat concept and the functionality for store-and-forward for group chat and file transfer. The RCS R5 specification is aligned with the VoLTE/VoHSPA GSMA

specifications. All the new messaging functionality will be brought into the OMA CPM v2.0 enabler. To promote service exposure of the RCS functionality, OMA has aligned the specification with the GSMA OneAPI set of REST-based APIs to provide network APIs for the rapid development of value-added services.

The focus for the RCS-e specification is to extend the principles of voice calls and SMS to deliver an advanced set of interoperable data-centric communications services in a simple and secure way. The aim of RCS-e is to focus on the actual services[8], "providing legitimacy to the role of the operator as a trusted communications provider." Consider an example in which OTT player A offers voice services over operator B's network. OTT player A is not required to comply with any regulations; that responsibility lies with operator B, who faces regulatory pressure to provide a rock-solid, reliable and universal experience. Obviously, such a service cannot be provided free of charge, and in reality, the service provided by OTT player A is not free – the revenue comes from sponsored advertising and from the reuse and resale of non-specific user-identifying data.

RCS-e services are not new. What is new is that RCS-e provides a seamless user experience across all operators – very similar to the user experience for voice calls. Most importantly, it just works, and it's just there.

RCS-e resolves the issue of walled gardens, while fully supporting users' choices of operator, device vendor, and add-on services. All of these are guaranteed to interoperate – they just work.

The capability discovery feature is a fundamental part of RCS-e. It enables a device to determine which features have been installed on another device, and thus only permits people to communicate using the common-denominator functions that are supported by each device and network.

Consider the scenario where a user, Alice, selects a contact, Bob, directly from the address book on one of her devices, or from her personal contacts stored in the network by her operator. Alice's RCS client requests capability information from Bob's client, and if Bob has a device registered in the network, the requested information will be sent back to Alice's client.

Capability information can include functionality for chat, voice over IP, video over IP, and image- and file-sharing. If Bob does not have a registered device, Alice can still call him over the traditional circuit-switched network, or send a chat message if her operator provides the store-and-forward functionality, or send him a basic text or picture message. In this example scenario, Alice communicates in a simple, straightforward manner. She doesn't have to set up an account, log in, use multiple numbers for Bob, or punch in extra digits: it just works (see **Figure 4**).

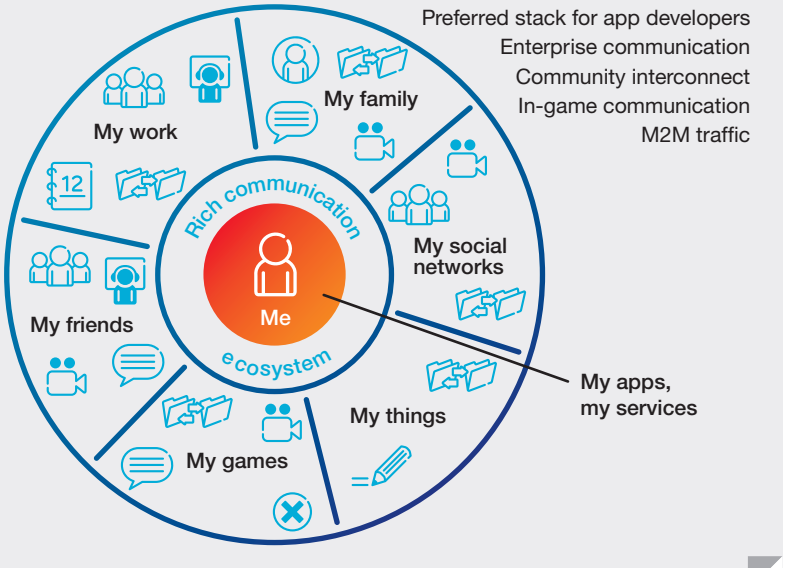
A messaging landscape enhanced with rich-communication services that are as universal and secure as legacy messaging and telephony, and provide the same user experience as OTT services. This illustration highlights the benefits of RCS:

- reach – subscriber phone numbers (MSISDN or MDN) are global, and because RCS reuses these, users are connected immediately and are accessible to any other user in the world;
- device independence – all underlying standards are device-independent, requiring support for IP protocols only;
- flexible chat with offline capabilities and store-and-forward behavior – all complexities are off-loaded to the operator's network, guaranteeing QoS that is on par with current OTT services;
- simple file transfer – files can be transferred without the need for additional clients, web portals or downloaded apps, and the service includes suspend/resume functionality;
- enhanced group chat – users can rejoin a chat session and read messages that were exchanged in their absence; and
- simplified video-sharing – videos and images can be transferred without the need for codec support or the download of additional components or apps.

The focus of RCS is that a message is a message, and users should be able to communicate without having to figure out which technology to use (MMS, SMS or IM). Instead, they simply select a person to communicate with, verify that communication is possible, and then begin communicating.

With its ubiquity, reach and secure ecosystem, RCS will become the preferred messaging stack for developers; enterprise communication will evolve to extend beyond the walled gardens that now exist; communities will begin to interconnect in new and innovative ways; gaming experiences will be enriched so that they transcend device and community borders; social networks will be transformed; new

FIGURE 5 RCS evolution: the next five years



cross-community connections will be possible; and even machine-to-machine (M2M) communication will be enriched by a set of services and deployed in an ecosystem originally intended for human communication (see **Figure 5**).

Interoperability

With an interoperable pool of devices and a set of providers supporting the technology, the industry focus on RCS services is becoming more and more obvious. The consumer mindset relating to RCS (it's just there, it just works) is indicative of the level of interoperability that needs to be attained – service provider interoperating agreements must be equal to the challenge. Achieving this with the implied ubiquity and support for these new services will require a unified industry effort to embrace cooperative initiatives driven by GSMA, OMA and GCF. The GSMA joyn brand and related self-accreditation programs are aimed at reaching this level of consumer adoption and acceptance, and substantial resources have been allocated by service providers and their vendor partners. Ericsson is at the forefront of this initiative through its leadership and participation in these organizations, promoting competition among its industry peers and partners.

The future for operators

Messaging services provided by telecom companies are growing, but their profitability and long-term existence are being jeopardized. There are two main types of requirements for messaging services: reducing opex; and securing long-term revenue – the latter being the most difficult to achieve.

Operators can continue to play an important role in providing communication services on account of their unique ability to:

- **close the functionality gap between traditional and OTT messaging services by introducing RCS-e functionality;**
- **ensure global reach through the flawless interworking of SMS/MMS/OTT messaging; and**
- **promote the service so that it becomes the preferred stack for app developers.**

Conclusion

The pressure on profit margins generated by OTT services, universal connectivity, rapidly changing user behavior and smarter devices are transforming the messaging landscape, creating an opportunity to provide a secure and universal messaging platform offering a superior user experience. RCS provides services that just work and are just there – for all devices and over every operator network. RCS-e provides the basic voice, video and messaging services desired by users, replacing and improving on the OTT experience with simplicity and ubiquity. CPM (incorporated into RCS 5.0) provides the necessary bridge between legacy messaging systems and the future IP-messaging world of rich communication services.

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