Next-Generation Converged Communication (V2)

China Mobile

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1 Preface

With increasing market demands and technical evolution, China Mobile proposes Converged Communication strategy with three core concepts of “New Call”, “New Message” and “New Contacts”. China Mobile has released the white paper of Next-Generation Converged Communication in Barcelona this February, to upgrade basic communication services in collaboration with industry partners.

This white paper is based on the previous version and further clarifies China Mobile’s technical requirements of Converged Communication on network, platform, terminal and other key aspects for the 2014-2015 time frame. It serves as a guideline for industrial stakeholders to plan in advance to roll out the necessary solutions and products in a timely manner.

2 Core Concepts and Visions

While keeping current user communication habits, worldwide accessibility, and carrier-class service quality, Converged Communication introduces “New Call”, “New Message”, and “New Contacts” with full-range service and improved user experience, as an upgrade to the existing “Call, Message, and Contacts” services entrance on the terminal.

The “New Call” service enables a higher-quality user experience by VoLTE technology. “New Message” enables seamless integration of multiple message types (i.e. SMS, MMS, Instant messaging) and multiple media and formats under a unified front based on GSMA RCS. Finally, based on network address book, “New Contacts” extends contacts types to provide personalized services with “Me”, third party information

services and entrance of Internet of Things (IOT) devices.

China Mobile hopes to cooperate with the industry to achieve the following four goals:

- "Three New" becomes global basic communication solutions and accelerates the maturity of VoLTE HD voice, converged messaging, enhanced address book solutions and standardization process;
- Interoperability and seamless roaming of "Three New" services across global operators;
- “Three New” terminals’ mature and commercial adoption in large scale;
- "Three New" service’s commercial launch in 2015.

3 Service and Functionality Requirements

3.1 New Call

1) Existing call service of operators shall be inherited, including basic call, multi-party call and supplementary call services.
2) It shall support HD voice call, HD video call, and enhanced multi-party call based on VoLTE; it shall support voice call continuity, and provide more extensive user experience.
3) Messaging during a call: users can send/receive text, picture, location, and other multimedia messages during a call.

3.2 New Message

1) Various types of message services: supports 1-to-1 chat, 1-to-M messaging and group chat, and shall provide sending report and delivery report.
2) Enhanced group chat and group management: group members

can configure the receiving and storage policies of group chat. The capability of management for group owner has also been improved.

3) Various media types: the content of a message can be text, audio, video, picture, emoticon, vCard, geo-location, burn-after-read etc.
    a) For a message containing picture or video, the thumbnail shall be displayed on the receiver's terminal firstly, and the original content can be fetched on-demand.
    b) After receiving a vCard object, the receiver can retrieve the detailed information and save it as a new contact to its local address book.
    c) After receiving a geo-location message, the terminal shall retrieve the map of the target area from a related map service according to the geographical latitude and longitude information contained in the message and display it on the screen.
    d) The content of a burn-after-read message can be text, picture, audio and video.
4) Backward compatible to SMS/MMS: a unified user interface shall be provided. It shall support preference, converting and interworking between IM and SMS/MMS according to service policy and network access mode. It shall support seamless message interaction between Converged Communication subscribers and non-Converged Communication subscribers or other operators' subscribers.
5) Official accounts service: subscribers following an official account can interact with the account to access public services.

6) Message sending policies: IM is preferred and SMS/MMS shall not be sent when IP connection is available. If the terminal has no IP connection and only attaches to CS network, it will follow the user experience of traditional 2/3G message services.
7) Message receiving policies: in general, for the incoming IM/SMS/MMS, it shall be treated as is. For the incoming IM, if the terminal has IP connection, the message shall be sent via IM; if the terminal has no IP connection and attaches to CS network, a text-only incoming IM should be converted to and sent via SMS; and for a multimedia incoming IM, a SMS will be sent to notify the receiver.
8) Message history storage: network-based message history storage and restore shall be supported. Subscribers can backup, download, retrieve and delete the message history.

3.3 New Contacts

1) New contact types, including:
    a) “Me”: the entrance of personal information setting and portal of self-service, through which the subscriber can configure and publish his/her personal information such as a portrait and vCard, and enquire the billing/traffic information, etc.
    b) Official account: the entrance of accessing public services. Subscribers can follow an official account by searching, QR code scanning or recommendation.
    c) Group: the entrance of social group communication and group service.
2) New contact features, including:
    a) Various ways of adding contacts: Support adding contact via QR code scanning, vCard from received message, etc.

b) Blacklists management: message and call blocking according to subscribers' blacklist, and malicious caller identification.
c) Cloud services: contacts information (e.g. address book, call log) backup in and restore from the network and synchronization among multiple terminals.

4 Terminal Requirements

4.1 Requirements on User Experience

The terminals that support Converged Communication should inherit the existing interaction styles and ensure to comply with exiting user habits. The interfaces of "New Call", "New Message" and "New Contacts" shall replace the old ones and serve as the entrances for call, messaging, and contacts, while reducing the difficulties of learning and using the new features. Converged Communication should use the mainstream technologies, which would bring convenient, efficient and user-friendly experiences.

4.2 Requirements on New Call

"New Call" is provided by VoLTE. Display of the calling and called party's personal information stored in local address book shall be supported. Enhanced multi-party call shall also be supported.

For detailed VoLTE requirements, please refer to "China Mobile VoLTE White Paper (V2)".

4.3 Requirements on New Message

Converged IM, SMS/MMS shall be supported in "New Message". Detailed requirements for terminals are described as follows:

1) “New Message” shall be based on OMA CPM standards.
2) Pager Mode, Large mode, and Session mode shall be supported; new message structure for interaction with official accounts shall be supported.
3) Multimedia message shall be supported based on MSRP.
4) Multiple Feature Tags shall be supported for enhance messaging (i.e. “burn-after-read”).
5) SIP Options shall be supported for capability discovery before sending “burn-after-read” message.
6) Receiving and display of multimedia messages from official accounts shall be supported based on HTTP, including audio, video, picture, etc.
7) Backup and restore of message shall be supported based on IMAP.
8) Message sending policies are described as follows:
    a) IM is preferred when Converged Communication service is available.
    b) SMS over IP is preferred if Converged Communication service is not available but the device is connected to VoLTE IMS network.
    c) SMS over CS domain is used for other scenarios.

4.4 Requirements on New Contacts

“New Contacts” will replace the original address book of the device. Detailed requirements for terminals are described as follows:

1) Personal information management shall be supported based on XCAP/OMA S-CAB.

2) Backup and restore of contacts shall be supported based on OMA SyncML.
3) New contact types including “Me”, network-based group and official account shall be supported.

4.5 Requirements on IP Connection Management and Concurrent Connection

Converged Communication devices shall support concurrent data connections management:

1) Concurrent connections of multiple PDNs, at least support the following two scenarios:
   - Concurrent connection of IMS APN and CMNET APN shall be supported;
   - Concurrent connection of IMS APN and WiFi.
2) Concurrency of IPv4 and IPv6 shall be supported, and different IP address families can be used on different APNs or WiFi.

4.6 Protocol Requirements

1) SIP/IMS protocols and dual registrations to IMS shall be supported;
2) SIP over TCP/UDP shall be supported, multiple security technologies including TLS/IPSec shall be supported;
3) IMS AKA and GBA authentication mechanism shall be supported.

4.7 Requirements on Provisioning and Management

Device shall automatically retrieve service provision information from

the server, including user ID, IMS core network parameters (such as SBC/P-CSCF address, IMS authentication mechanism, etc.), service platform parameters (such as the address of contact server), etc. when Converged Communication service is active for the first time.

4.8 Requirements on Device Upgrade

1) Device vendors shall support OTA upgrade of Converged Communication software in the terminals.
2) It is recommended that the devices support mandatory upgrades (with users' acknowledgement) and recommended upgrades.
3) Devices shall support self-protection and rollback features in the update process, making sure it can roll back to the previous available version in case of failure.

4.9 Requirements on Open Interface of Terminal Capabilities

China Mobile will specify requirements on the open interfaces of basic communications for capability exposure. Device vendors shall provide API/SDK to authorized developers with these basic communication capabilities of "New Call", "New Message" and "New Contact". While ensure the terminal's basic Converged Communication functions' stability, the open interface should realize the enhancement, optimization and customization of user experience on terminals.

5 Platform Requirements

The platform's technical requirements are specified in this section, while functional requirements can be referred to Chapter 3.

5.1 Requirements on New Call

For detailed VoLTE related platform requirements, please refer to China Mobile VoLTE White Paper (V2).

5.2 Requirements on New Message

1) Based on OMA CPM 2.0, three message modes including Pager Mode, Large Mode and Session Mode shall be supported; the extension of message body brought by official accounts shall also be supported.
2) MSRP based file transfer shall be supported, based on which, voice clip, customized emotion and official account services can be provided.
3) It shall support gateway function of IM-SMS interworking, interconnecting with SS7 network, acting as user to initiate SMS MO process, realizing point-to-point SMS.
4) It shall support CMPP interface, to provide SMS-based system notification, 1-M messaging and other services.
5) It shall support service mechanism based on Feature Tag, by which enhanced message features (e.g. burn-after-read, official account, etc.) can be provided.
6) It shall provide IMAP interface to realize network message storage based on OMA CPM.
7) It shall provide official accounts services based on HTTP, to realize multimedia messages sending, including voice, picture, video, etc.
8) It shall support the access of third party applications based on customized interface, to provide message channels between user

and service provider through official account services.

5.3 Requirements on New Contacts

1) It shall support personal information management function based on OMA S-CAB. XCAP protocol shall be supported to provide personal information management function, including configuration, authorization and publish, and to provide the access of other contacts' authorized information.
2) It shall support QR code card function, which supports generating and updating of QR code card based on personal information.
3) It shall support backup and restore of contacts information based on SyncML protocol following OMA DS, to provide backup and restore of contacts information and local groups information.

5.4 Requirements on Service Management

1) It shall provide service configuration to the terminal for automatic service provisioning.
2) It shall support interaction with the provisioning system for service subscription, and it shall support online and offline charging with the billing system.
3) It shall support interaction with OMC system for management requirements.
4) In case of multi-site deployment of service platform, it shall support centralized service monitoring and service data configuration.

5.5 Requirements on Deployment and Implementation

Converged Communication platform shall meet the requirement of multi-site deployment, centralized management and operation. It shall support geo-redundant deployment for disaster recovery, to grantee the reliability of the service. In the future, the platform shall be able to be deployed on general purpose computer system, as well as cloud-based infrastructure, to improve the system capability and performance, and to cut down the cost of deployment and operation.

5.6 Requirements on Open Interface of Platform Capabilities

The platform shall provide open interfaces in the form of Network API to application developers to access Converged Communication services and charging capabilities.

6 Network Requirements

6.1 Requirements on New Call

For detailed VoLTE requirements on IMS core network, please refer to China Mobile VoLTE White Paper (V2).

6.2 Requirements on New Message

1) Zh interface shall be supported by HSS to provide the authentication data for AKA.
2) SMS over SGs shall be supported by EPC.
3) Flow charging of new message shall be supported by EPC.
4) SMS over IP shall be supported by IMS network.
5) SS7 network and SMSC shall support interconnection with Converged Communication platform to allow the platform to

initiate SMS MO process acting as the user, and messages coming from Converged Communication platform shall be marked in SMSC CDR.

6.3 Requirements on New Contacts

No special requirements.

6.4 QoS

The network shall be able to provide dynamic QoS guarantee for Converged Communication services under PCRF's control.

7 Operation Support System Requirements

7.1 Requirements on Service Provisioning

The subscriber shall be able to use this service directly on Converged Communication terminals, without onsite service subscription procedure. When the user actives Converged Communication terminal for the first time, Converged Communication system shall check whether the user has subscribed this service, if not, the system will automatically trigger a service provisioning.

For technical requirements of VoLTE service provisioning, please refer to China Mobile VoLTE White Paper (V2). For service provisioning of "New Message" and "New Call", the OSS shall write user subscription data in Converged Communication system.

8 Interoperability and Roaming Requirements

8.1 Interoperability

8.1.1 Requirements on New Call

For interoperability requirements of VoLTE, please refer to China Mobile VoLTE White Paper (V2).

8.1.2 Requirements on New Message

“New Message” shall support interoperating with those operators that deployed RCS services, the interworking shall be based on standard GSMA RCS.

Interworking gateway devices shall be deployed at China Mobile's IMS network boundaries, and it should support the following features:

1) Integration of signaling gateway and media gateway functions to process signal and media interaction between operators.
2) Protocol translation between OMA CPM and OMA SIMPLE, to ensure the interaction between other operators who apply OMA SIMPLE as message protocol.
3) Network topology hiding, security, QoS guarantee, CDR generation.
4) Support either one-to-one direct interworking with other operators’ gateway, or interworking with multiple operators via IPX.

8.1.3 Requirements on New Contacts

No interoperation requirements.

8.2 International Roaming

8.2.1 Requirements on New Call

For detailed roaming requirements of VoLTE, please refer to China Mobile VoLTE White Paper (V2).

8.2.2 Requirements on New Message

For international roaming China Mobile subscribers, if the terminal is in PS roaming mode, “New Message” service shall be routed back to China Mobile’s network using CMNET APN, and be served by home domain Converged Communication system.

If the terminal is not connected to PS network, legacy SMS solution shall be chosen. If the terminal is attached to 2/3G network, CS based SMS shall be employed; if the terminal is attached to 4G network with IMS APN only, SMS over SGs or SMS over IP shall be chosen, based on the roaming network’s capability.

8.2.3 Requirements on New Contacts

If the international roaming terminal has IP connection, “New Contacts” service can be provided through CMNET APN by home domain Converged Communication system.

If the international roaming terminal doesn’t have IP connection, the subscriber shall not be able to use “New Contacts” service.

9 Security Requirements

9.1 General Principles

Converged Communication system shall maintain the security features

of operator communication services such that users can be identified, traceable, etc. Strict privacy protection and security management functions shall be supported.

Converged Communication services shall strictly comply with relevant regulation and management requirements.

Converged Communication shall divide different network domains and set up corresponding security boundary according to different security risk and threaten level.

9.2 Requirements on Service Security

Converged Communication terminals shall work with the Converged Communication system with mutual identity authentication to protect the legitimate users to use “New Call”, “New Message” and “New Contacts”; it shall build confidential communication to prevent from the revealing of signaling and media content; it shall prevent user signaling from being tampered through integrity protection; it shall ensure user information security and avoid the disclosure of user identity through privacy protection.

9.3 Requirements on Network Security

The network shall provide authentication, encryption and integrity mechanisms to protect the legitimate users to safely use Converged Communications services across the network based on the existing network security mechanisms. The network shall support security storage of user information to avoid any loss and disclosure.

9.4 Requirements on Terminal Security

Converged Communication terminals shall provide necessary security capability to protect the security of service and network, and provide the capability of local device security and software security mechanisms to prevent the users from attacks that might cause the disclosure of user data and privacy.

9.5 Requirements on Platform Security

Converged Communication platform shall provide data storage security mechanism and access control scheme to prevent illegal access to the platform; it shall also provide the mechanisms to resist malicious invasion, anomaly traffic, DDoS attacks and network viruses.

9.6 Requirements on Operation Support System Security

Operation support systems shall meet the security requirements of operational management, including user account and password management, authentication and authorization, log, IP protocol, device, 4A management control, etc. Meanwhile, it shall support risk prevention mechanism to resist the operation staff from accessing user private data.

10 Conclusion

Converged Communication is the successor of operator's basic communication services, and it is intended to compete with Internet based ones and provide full range of information services. Converged Communication is China Mobile's strategy service with major resource and efforts investment. It will extend from the consumer market to the home and enterprise markets, continually evolving alongside ever-

changing user requirements and emerging technologies.

In addition to key technical issues to launch Converged Communication services, we also need to accumulate experience in operation, charging, network optimization etc. We look forward to full collaboration with all partners, and making the commercial launch and global roaming of Converged Communication real in the near future.

Annex 1: Abbreviations

2/3G	The 2/3rd Generation Telecommunication
3GPP	The 3rd Generation Partnership Project
4G	The 4th Generation Telecommunication
4A	Authentication、Account、Authorization、
AKA	Authentication and Key Agreement
API	Application Programming Interface
APP	Application Program
APN	Access Point Name
AS	Application Server
BGCF	Breakout Gateway Control Function
BOSS	Business and Operation Support System
CMPP	China Mobile Peer To Peer
CPM	Converged IP Message
CS	Circuit Switching
CSFB	Circuit Switch Fall Back
DDoS	Distributed Denial of Service
DNS	Domain Name Server
DS	Data Synchronization
ENUM	Telephone Number Mapping
EPC	Evolved Packet Core
eSRVCC	Enhanced Single Radio Voice Call Continuity
GBA	General Bootstrapping Architecture
GGSN	Gateway GPRS Support Node
GPRS	General Packet Radio Service
GSMA	GSM Association
HSS	Home Subscriber Server
HTTP	Hyper Text Transfer Protocol
I-CSCF	Interrogating Call Session Control Function
IMAP	Internet Message Access Protocol
IMS	IP Multimedia Subsystem

IP	Internet Protocol
IPSec	Internet Protocol Security
IPX	IP eXchange
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
MGCF	Media Gateway Control Function
MO	Mobile Original
MSRP	The Message Session Relay Protocol
OTA	Over The Air
OMA	Open Mobile Alliance
P-CSCF	Proxy-Call Session Control Function
PDN	Public Data Network
P-GW	Packet Data Network Gateway
PCRF	Policy and Charging Control Function
PS	Packet Switching
QoS	Quality of Service
QR code	Quick Response code
RCS	Rich Communication Suite
SBC	Session Border Controller
S-CAB	Simplified-Converged Address Book
SDK	Software Development Kit
SIP	Session Initiation Protocol
SMS	Short Message Service
SS7	Signaling System No.7
STG	Security Tunnel Gateway
SyncML	Synchronization Markup Language
TCP	Transmission Control Protocol
TLS	Transport Layer Security
UDP	User Datagram Protocol
UE	User Experience
UI	User Interface
URI	Uniform Resource Identifier
VoLTE	Voice over LTE
XCAP	Xml Configuration Access Protocol