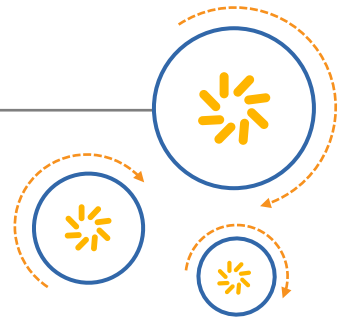




Qualcomm Technologies, Inc.



# RCS Integration Guide

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## Revision history

Revision	Date	Description
A	January 2015	DRAFT release
B	February 2015	Initial release
C	Aug 2016	Numerous changes were made in this revision. It should be read in its entirety.

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# 1 Introduction

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NOTE: Numerous changes were made to this document revision; it should be read in its entirety.

## 1.1 Purpose

This document provides integration guidelines for OEMs using the Qualcomm Technologies, Inc. (QTI) RCS solution to meet China Mobile (CMCC) requirements.

## 1.2 Conventions

Function declarations, function names, type declarations, attributes, and code samples appear in a different font, for example, `#include`.

Code variables appear in angle brackets, for example, `<number>`.

Shading indicates content that has been added or changed in this revision of the document.

## 1.3 Technical assistance

For assistance or clarification on information in this document, submit a case to Qualcomm Technologies, Inc. (QTI) at <https://createpoint.qti.qualcomm.com/>.

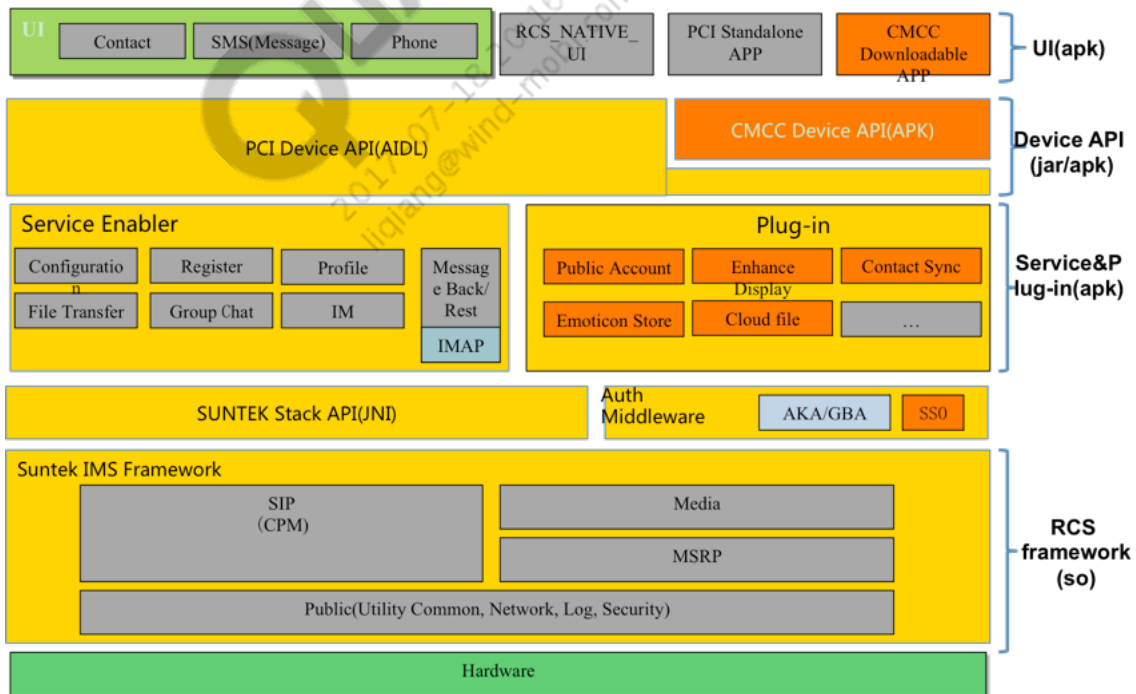
If you do not have access to the CDMATech Support website, register for access or send email to [support.cdmatech@qti.qualcomm.com](mailto:support.cdmatech@qti.qualcomm.com).

## 2 RCS architecture

The RCS system architecture can be divided into five layers. The main functions of each layer are:

- UI – Responsible for UI render/presentation to interact with the user
- Device API – Responsible for interacting with the RCS service by way of AIDL
- Service and Plug-in – Responsible for handling the most basic RCS service logic and encapsulating the plug-in of CMCC
- Stack API – Responsible for the interaction of the RCS adaptation layer and RCS protocol layer by way of JNI
- RCS framework – Responsible for the RCS transport protocol

The RCS system architecture is shown in [Figure 2-1](#).



**Figure 2-1 RCS system architecture**

## 2.1 RCS component list

Table 2-1 lists the modules (components) of the RCS system.

**Table 2-1 RCS component list**

Product location	Usage	Owner	Release to OEMs
system/framework/rcs_service_aidl.jar	Definition of the common AIDL of rcs_service_api and rcs_service	PCI	Source code
system/etc/permissions/rcs_service_aidl.xml	Used to dynamically load rcs_service_aidl.jar	PCI	Source code
system/framework/rcs_service_api.jar	Used for all RCS interfaces of the UI	PCI	Source code
system/etc/permissions/rcs_service_api.xml	Used to dynamically load rcs_service_api.jar	PCI	Source code
system/framework/device_api.jar	Device API interface	PCI	binary
system/etc/permissions/device_api.xml	Used to dynamically load device_api.jar	PCI	binary
system/framework/rcs_plugin_aidl.jar	Definition of the common AIDL of rcs_service and rcs_plugin	PCI	binary
system/etc/permissions/rcs_plugin_aidl.xml	Used to dynamically load rcs_plugin_aidl.jar	PCI	binary
system/vendor/ChinaMobile/system/app/DeviceApiService/DeviceApiService.apk	Device API service	PCI	binary
system/vendor/ChinaMobile/system/app/RcsGbaProxy/RcsGbaProxy.apk	GBA authentication middleware	PCI	binary
system/vendor/ChinaMobile/system/app/RcsService/RcsService.apk	RCS service logic implementation, which acts as a bridge to connect the protocol stack and the UI	PCI	binary
system/vendor/lib/librcs_jni.so	RCS protocol stack	PCI	binary
system/vendor/ChinaMobile/system/priv-app/BiaoQingStore4Rcs_APK/BiaoQingStore4Rcs_APK.apk	Emoticon store plug-in	CMCC	binary
system/vendor/ChinaMobile/system/app/OnlineBusinessHall/OnlineBusinessHall.apk	Online Business Hall plug-in	CMCC	binary
system/vendor/ChinaMobile/system/app/RcsMap/RcsMap.apk	Map plug-in	PCI	binary
system/vendor/ChinaMobile/system/app/CaiYinRCS/CaiYinRCS.apk	Enhanced screen plug-in	CMCC	binary
data/app/cmccsso/cmccsso.apk	SSO authentication service	CMCC	binary
data/app/RcsPlugin/RcsPlugin.apk	Integrate plug-in function to provide service to the UI	PCI	binary
system/vendor/ChinaMobile/system/app/RcsSystemService/RcsSystemService.apk	Set RCS enable/disable	PCI	binary

## 2.2 Changes to the RCS UI module

The RCS UI is divided into two parts – one part is an Android open source-based UI, such as Contacts, Dialer, MMS, etc., which is integrated with the features of RCS.

[Table 2-2](#) lists the UI modules in which RCS has changed the open source code.

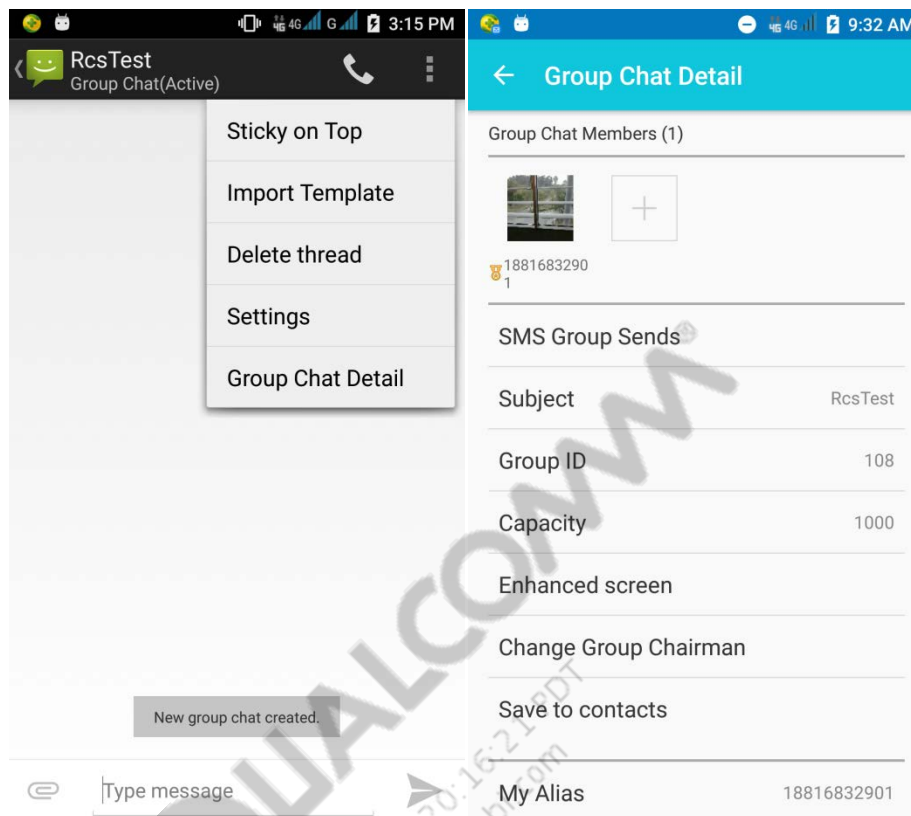
**Table 2-2 UI changes based on the QTI Android platform**

Module	Main changes
frameworks/opt/telephony	The permission for rcs_service to write SMS is added
packages/apps/Contacts	Profile, RCS capability discovery, QR code scan, and Enhanced screen
packages/providers/ContactsProvider	Newly added field that supports RCS data storage
packages/apps/ContactsCommon	UI change of the contacts
packages/apps/Mms	Text message, file transfer, 1-1 chat, 1-n chat, group chat
packages/providers/TelephonyProvider	Newly added field that supports RCS data storage
packages/apps/Dialer	The entry of Blacklist and Send Message are added
packages/apps/InCallUI	Enhanced screen
vendor\qcom\proprietary\qrdplus\ChinaMobile\apps\Firewall	RCS message intercept
vendor\qcom\proprietary\qrdplus\ChinaMobile\res\Mms	Whether MMS supports to set the toggle (enable/disable) of RCS message storage under CMCC mode
vendor\qcom\proprietary\qrdplus\ChinaMobile\res\Telephony Provider	Whether telephonyProvider supports RCS field under CMCC mode

The other part is the newly-added RCS UI. To reduce the coupling with the Android original system UI, these UI changes are placed in a separate APK to be installed in the handset. The interaction between UIs is done by the Intent mechanism.

For example, in the group chat UI of MMS, clicking the Group Chat Detail jumps to the group management UI of the original UI, as shown in [Figure 2-2](#).





**Figure 2-2 Jump from Mms.apk to NativeUI.apk**

The newly-added UI APKs are listed in [Table 2-3](#).

**Table 2-3 Newly-added UI APKs**

Module	Main changes
vendor/qcom/proprietary/qrplus/ChinaMobile/apps/Rcs/rcs_native_ui	Newly added RCS UI
vendor/qcom/proprietary/qrplus/ChinaMobile/apps/Rcs/rcs_public_account	Public account message

## 2.3 Changes to the RCS DB

The SMS table is extended in the SmsProvider of TelephonyProvider to store the fields related to new RCS messages. The changes are listed in [Table 2-4](#).

**Table 2-4 Newly added fields in the SMS table**

Field	Data type	Field name	Description
favorite	INTEGER	Added to favorite or not	0: Not added; 1: Added
rcs_message_id	TEXT	Message ID	
rcs_file_name	TEXT	Attachment name	
rcs_mime_type	TEXT	Attachment type	Text, image, audio, video
rcs_msg_type	INTEGER	Message type	
rcs_msg_state	INTEGER	Message state	Sender: Sending, Sent, Delivered, Sent Fail, Read, Burnt Receiver: Unread, Read, Burnt
rcs_chat_type	INTEGER	Conversation type	1-1, 1-n, n-n
rcs_conversation_id	TEXT	RCS conversation ID	
rcs_contribution_id	TEXT	RCS contribution ID	
rcs_file_selector	TEXT	File description	
rcs_file_transferred	TEXT	How many bytes have been transferred	
rcs_file_transfer_id	TEXT	File transfer ID	
rcs_file_icon	TEXT	File thumbnail	
rcs_burn	INTEGER	Burn after reading	-1: Do not burn after reading Other: Burn the message N seconds after it is read
rcs_header	TEXT	From, To date in received message	
rcs_file_path	TEXT	File path	
rcs_is_download	INTEGER	Download or not	
rcs_file_size	INTEGER	Attachment size	
rcs_thumb_path	TEXT	Attachment thumbnail path	
rcs_burn_body	TEXT	Burn message body	
rcs_ext_contact	TEXT	Extend contact information	
rcs_file_record	INTEGER	Recorded file or not	Used to determine whether the file being transferred is a recorded file or not 1: Recorded file 2: Not a recorded file

Table 2-5 lists the changes to the thread table to store information related to group chat and top.

**Table 2-5 Newly added fields in the thread table**

Field	Data type	Field name	Description
rcs_top	INTEGER	Top conversation or not	
rcs_top_time	INTEGER	Top time	
rcs_number	TEXT	The other party's number	For 1-1, it is the other party's number; For 1-n, it is a list of numbers
last_msg_id	INTEGER	ID of the last message	Used to update the snippet display
msg_chat_type	INTEGER	Conversation type	Group chat or 1-1
last_msg_type	INTEGER	Type of the last message	Used to updat the snippet display
rcs_unread_count	INTEGER	Unread message count	

In the raw\_contacts table of ContactsProvider, local\_photo\_setted is used to determine whether a local photo is set.

Field	Data type	Field name	Description
local_photo_setted	INTEGER	Whether a local photo is set	In the code, it is used to determine photo updates in different situations

## 3 Integration steps

---

### 3.1 Download the latest version

Get the latest version from the Qualcomm ChipCode website.

### 3.2 Verify that the configurations are correct

device/qcom/{\$TARGET}/BoardConfig.mk

```
TARGET_USES_PCI_RCS := true;
```

device/qcom/common/base.mk

```
#RCS
RCS := rcs_service_aidl
RCS += rcs_service_aidl.xml
RCS := rcs_service_aidl_static
RCS += rcs_service_api
RCS += rcs_service_api.xml
PRODUCT_PACKAGES += $(RCS)
```

vendor/qcom/proprietary/qrdplus/ChinaMobile/product.mk

```
ifneq ($(TARGET_USES_PCI_RCS),true)
#RCS in ChinaMobile folder
RCS := NativeUI
RCS += PublicAccount
#RCS in other folders
RCS += librcs_jni
RCS += rcs_plugin_aidl_libs_gson_static.jar
RCS += rcs_plugin_aidl
RCS += rcs_plugin_aidl.xml
RCS += RcsService
RCS += RcsSystemService
RCS += device_api
RCS += device_api.xml
RCS += DeviceApiService
#RCS no ship
RCS_NO_SHIP += libbinaryByFounder
RCS_NO_SHIP += libqrcodedecoder
RCS_NO_SHIP += RcsPlugin
RCS_NO_SHIP += RcsGbaProxy
```

```
RCS_NO_SHIP += cmccsso
RCS_NO_SHIP += OnlineBusinessHall
RCS_NO_SHIP += CaiYinRCS
RCS_NO_SHIP += BiaoQingStore4Rcs_APK

PRODUCT_PACKAGES += RCS
PRODUCT_PACKAGES += RCS_NO_SHIP
endif
```

Continue the compilation after all the configurations are verified to be correct.

## 3.3 Verify the newly added RCS components

### 3.3.1 Libraries

system/vendor/lib/librcs\_jni.so

### 3.3.2 Permission files

system/etc/permissions/rcs\_service\_aidl.xml  
system/etc/permissions/rcs\_service\_api.xml  
system/etc/permissions/rcs\_plugin\_aidl.xml  
system/etc/permissions/device\_api.xml

### 3.3.3 Framework jars

system/framework/rcs\_service\_aidl.jar  
system/framework/rcs\_service\_api.jar  
system/framework/device\_api.jar  
system/framework/rcs\_plugin\_aidl.jar

### 3.3.4 APKs

system/vendor/ChinaMobile/system/app/RcsService/RcsService.apk  
system/vendor/ChinaMobile/system/app/DeviceApiService/DeviceApiService.apk  
system/vendor/ChinaMobile/system/app/RcsSystemService/RcsSystemService.apk  
system/vendor/ChinaMobile/system/app/NativeUI/NativeUI.apk  
\* system/vendor/ChinaMobile/system/app/RcsGbaProxy/RcsGbaProxy.apk  
\* system/vendor/ChinaMobile/system/priv-app/BiaoQingStore4Rcs\_APK  
\* system/vendor/ChinaMobile/system/app/OnlineBusinessHall/OnlineBusinessHall.apk  
\*data/app/RcsPlugin/RcsPlugin.apk  
\*data/app/RcsMap/RcsMap.apk

- \* data/app/cmccsso/cmccsso.apk
- \* data/app/CaiYinRCS/CaiYinRCS.apk

The components that are marked with \* are plug-in functions. Refer to Chapter 4 if they are needed.

### 3.4 Install the RCS plugin

Install the following plugins.

```
adb push OnlineBusinessHall.apk /system/app/OnlineBusinessHall/  
adb push BiaoQingStore4Rcs_APK.apk /system/priv-app/BiaoQingStore4Rcs_APK/  
adb install -r RcsPlugin.apk  
adb install -r cmccsso.apk  
adb install -r CaiYinRCS.apk  
adb install -r RcsMap.apk
```

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# 4 Validate the RCS function

## Precondition

A CMCC USIM card that has the RCS service enabled.

## 4.1 Procedure to use the RCS function

Follow these steps to use the RCS function.

1. Turn on RCS toggle

```
adb shell setpropersist.sys.rcs.enabled1
```

2. Push the rcs\_service.properties configuration file.

```
adb push rcs_service.properties/sdcard/Android/data/  
com.suntek.mway.rcs.app.service/rcs_service.properties
```

The followings are examples of rcs\_service.properties with descriptions of the parameters:

```
isTest=true  
isForcedTest=true  
testImsi0=460078132911067  
dms_server_http=http://14.23.86.58:9080/dmsinterface/authen.do  
dms_server_https=https://14.23.86.58:8443/dmsinterface/authen.do  
network_type=0  
sms_port=37273  
sbc_conntype=tcp  
add_dms_header=true  
testMsisdn="+8618816832860  
conf_uri=sip:1252000199@bfaslaxm.gc.rcs2.chinamobile.com
```

[Table 4-1](#) provides the rcs\_service.properties parameter descriptions.

**Table 4-1 Parameter descriptions for rcs\_service.properties**

Configuration name	Mandatory or not	Function
isTest	Optional	Whether to use the configured IMSI. The value is TRUE if no SIM card is installed, in which case testImsi(x) is used
isForcedTest	Optional	Whether to use the configured IMSI mandatorily. testImsi(x) is used no matter if a SIM card is installed or not

Configuration name	Mandatory or not	Function
testImsi0	Optional	If this IMSI is used, 0 indicates the slot number; more than 1 can be configured, such as testImsi1, testImsi2, etc.
dms_server_http	Mandatory	The requested DMS HTTP address
dms_server_https	Mandatory	The requested DMS HTTPS address
network_type	Optional	Set the current network type – 1: Wi-Fi mode; 0: PS mode
sms_port	Optional	The port to monitor OTP and configuration messages
sbc_conntype	Optional	Define the registered transmission mode (tcpudptls)
add_dms_header	Optional	DMS HTTP request header is added, in which the x-up-calling-line-id must use the testMsisdn configuration (used for accessing ZTE DMS)
testMsisdn	Optional	Phone number (used for accessing ZTE DMS)
conf_uri	Optional	ZTE north nodes group (used for testing Fetionfusion)

**NOTE:** When it comes to the commercial stage, `rcs_service.properties` is not mandatory. Currently, due to the consideration of the specification, by default, the RCS service accesses the standard DMS address by domain name. Because there is no account available for the commercial domain name, this parameter must be configured to test the RCS function before the commercial stage.

3. Reboot the handset

```
adb reboot
```

## 4.2 Procedure to provision the RCS function

Follow these steps to provision the RCS function.

1. Set the RCS log level and turn on the RCS log toggle.

```
adb shell setproppersist.sys.rcs.log.level 1
adb shell am broadcast -a
com.suntek.mway.rcs.app.service.framework.ReloadLog
adb reboot
```

2. Export the RCS-related log and analyze the log.

```
adb pull /sdcard/Android/data/com.suntek.mway.rcs.app.service \desktop
```



# A References

---

## A.1 Acronyms and terms

Acronym or term	Definition
AIDL	Android™ interface description language
APK	Android application package
GBA	Generic Bootstrapping Architecture
JNI	Java® Native Interface
MMS	Multimedia Messaging System
QR code	Quick response
RCS	Rich communication services (also, rich communication suite)
SDK	Software development kit
SSO	Single sign-on