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1 Executive Summary

2 Abbreviations

Abbreviation	Explanation
LTE	Indicates TD-LTE and FDD LTE
CDMA	Indicates CDMA1x and CDMA EVDO.

3 Introduction

This standard specifies the technical aspects of LTE/TD-SCDMA/WCDMA/CDMA/GSM(GPRS) multi-mode single-SIM device and LTE/TD-SCDMA/WCDMA/CDMA/GSM(GPRS) multi-mode dual-SIM device, to ensure that the LTE/TD-SCDMA/WCDMA/CDMA/GSM(GPRS) multi-mode device can meet the needs of network operation and business development.

This standard mainly includes card slot requirements, operating mode, frequency band requirements and other technical requirements of LTE/TD-SCDMA/WCDMA/CDMA/GSM(GPRS) multi-mode single-SIM device and LTE/TD-SCDMA/WCDMA/CDMA/GSM(GPRS) multi-mode dual-SIM device, for common use of GTI operators and manufacturers. This standard is compiled with reference to 3GPP international standards and other organizations' relevant standards, and combining with the actual services requirements of operators.

4 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

[1] YD/T 2685 Technical Requirements for the LTE/WCDMA/GSM (GPRS) Multi-Mode Single-Standby Device

[2] YD/T 2687 Technical Requirements and Test Methods for LTE/CDMA Multi-Mode Device Equipment (Single-Slot)

[3] YD/T 1367 Technical Requirements for Device Equipment of 2GHz TD-SCDMA Digital Cellular Mobile Communications Network and General Technical Requirements for TD-SCDMA Device Equipment of China Mobile (R7).

[4] YD/T 1214 Technical requirement of 900/1800MHz TDMA Digital Cellular Mobile Telecommunication Network General Packet Radio Service (GPRS) Equipment

[5]YD/T 1484 Spatial RF Emission Power and Receiver Performance Measurement Methods of the Wireless Device Part 3: CDMA2000 Wireless Device

[6]YD/T 1762.1 Technical Requirements for Cu Interface between UICC and UE in the TD-SCDMA/WCDMA Digital Cellular Mobile Telecommunication Network - Part One: Physical, Electrical and Logical Characteristics

[7]YD/T 1762.2 Technical Requirements for Cu Interface between UICC and UE in the TD-SCDMA/WCDMA Digital Cellular Mobile Telecommunication Network - Part Two: USIM Application Characteristics

[8]YD/T 1762.3 Technical Requirements for Cu Interface between UICC and UE in the TD-SCDMA/WCDMA Digital Cellular Mobile Telecommunication Network - Part Three: USAT Characteristics

[9]YD/T 2524, CDMA digital cellular mobile communication networks technical requirements for UICC-Terminal interface CCAT functionality

 [10]YD/T 2525 CDMA digital cellular mobile telecommunication network UICC-ME interface technical requirement - Characteristics of the CSIM applications supporting OMH

 [11]YD/T 2581 Technical Requirements for the Cu Interface between the Universal Integrated Circuit Card (UICC) and the Terminal in LTE Digital Cellular Mobile Communication Network (All parts)

5 Technical Requirements of LTE/TD-SCDMA/WCDMA/CDMA/GSM (GPRS) Multi-mode Single-SIM Device

5.1 Overview

LTE/TD-SCDMA/WCDMA/CDMA/GSM(GPRS) multi-mode single-SIM device defined in this specification should have the access capability to TD-LTE, LTE FDD, WCDMA/HSPA, TD-SCDMA/TD-

HSPA, CDMA1x/EVDO and GSM/GPRS/EDGE network, can work independently under TD-LTE, LTE FDD, WCDMA/HSPA, TD-SCDMA/TD-HSPA, CDMA1x/EVDO and GSM/GPRS/EDGE mode and provide telecommunication services to users.

Single-SIM device in this specification indicates LTE/TD-SCDMA/WCDMA/CDMA/GSM (GPRS) multi-mode single-SIM device except other expressions.

5.2 Card Slot Requirements

Single SIM device provide only one card slot, and the card slot can support the insertion of USIM card, SIM card, UIM card or USIM+CSIM card.

5.3 Frequency Bands Requirements

Refer to'4G Multi-Mode Multi-Band Device Requirements and Architectures，A GTI White Paper, May, 2016'.

5.4 Operating Mode

Single-SIM device shall support the operating mode and LTE voice-solution listed below, and shall choose following operating mode automatically according to card type inserted and the attributed operator's information:

- LTE/TD-SCDMA/GSM(GPRS) mode, and CSFB from LTE to GSM
- LTE/WCDMA/GSM(GPRS) mode, and CSFB from LTE to WCDMA/GSM
- LTE/CDMA mode, and SRLTE or SVLTE

5.5 Inter-RAT Interoperability Requirements

When working under LTE/TD-SCDMA/GSM (GPRS) mode, single-SIM device shall support:

- Cell Reselection/ Redirection/Handover between TD-LTE and FDD LTE
- Cell Reselection/Redirection between TD-LTE/TD-SCDMA
- Cell Reselection between LTE and GSM, Redirection from LTE to GSM, NC0 Reselection from GSM to LTE

When working under LTE/WCDMA/GSM (GPRS) mode, single-SIM device shall support:

- Cell Reselection/ Redirection/Handover between TD-LTE and FDD LTE
- Cell Reselection/Redirection between FDD LTE and WCDMA
- Cell Reselection between LTE and GSM, Redirection from LTE to GSM, NC0 Reselection from GSM to LTE
- Cell Reselection/Redirection between TD-LTE/WCDMA is optional

When working under LTE/CDMA mode, single-SIM device shall support:

- Cell Reselection/ Redirection/Handover between TD-LTE and FDD LTE
- Cell Reselection between LTE and cdma2000 eHRPD
- Redirection from FDD LTE to cdma2000 eHRPD

5.6 Service Function Requirements

5.6.1 Voice Service Function Requirements

When working under LTE/TD-SCDMA/GSM (GPRS) mode, single-SIM device shall support:

- CSFB from LTE to GSM to provide voice service
- TD-SCDMA/GSM CS voice service

When working under LTE/WCDMA/GSM (GPRS) mode, single-SIM device shall support:

- CSFB from LTE to WCDMA/GSM to provide voice service
- WCDMA/GSM CS voice service

When working under LTE/CDMA mode, single-SIM device shall support:

- SRLTE or SVLTE mode
- cdma2000 1x CS voice services

5.6.2 SMS/MMS Function Requirements

Single-SIM device shall:

- When working under LTE mode, support SMS over SGs to provide SMS service.
- Support TD-SCDMA/WCDMA/cdma2000 1x/GSM CS SMS service
- Support MMS service under LTE/TD-SCDMA/WCDMA/CDMA/GSM network

5.6.3 Data Service Requirements

Single-SIM device shall support to provide PS data service under LTE/TD-SCDMA/WCDMA/CDMA/GSM network.

5.6.4 Supplementary Services Requirements

Single-SIM device shall support to provide supplementary services under TD-SCDMA/WCDMA/cdma2000 1x/GSM network.

5.6.5 Emergency Call Service Requirements

Single-SIM device shall support to provide emergency call service in normal service and limited service state under TD-SCDMA/WCDMA/cdma2000 1x/GSM network.

6 Technical Requirements of LTE/TD-SCDMA/WCDMA/CDMA/GSM (GPRS) Multi-mode Dual-SIM Device

6.1 Overview

The LTE/TD-SCDMA/WCDMA/CDMA/GSM (GPRS) multi-mode dual-SIM device defined in this specification shall support two SIM cards. The primary and secondary SIM shall support the RATs and services as described in Table 6-1 and Table 6-2 respectively.

Table 6-1 RAT requirements for dual-SIM device

	TD-LTE	LTE FDD	TD-SCDMA	GSM	CDMA	WCDMA
Primary	Mandatory	Mandatory	Mandatory	Mandatory	Mandatory	Mandatory
Secondary	Not required	Not required	Not required	Mandatory	Mandatory	Optional

Table 6-2 Services requirements for dual-SIM device

	Voice	SMS	MMS	Data
Primary	Mandatory	Mandatory	Mandatory	Mandatory
Secondary	Mandatory	Mandatory	Mandatory	Optional

If not otherwise stated, the dual-SIM device referred to in this standard is the LTE/TD-SCDMA/WCDMA/CDMA/GSM (GPRS) multi-mode dual-SIM device.

This standard distinguishes between two types of dual-SIM devices: single voice active and dual voice active.

■ For a dual-SIM single active (DSSA) device, when one SIM is in voice active state, another SIM cannot receive the voice paging.
■ For a dual-SIM dual active (DSDA) device, when one SIM is in voice active state, another SIM shall be able to receive the voice paging.

6.2 Card Slot Requirements

The dual-SIM device shall provide two slots, each slot supporting compound USIM card, SIM card, UIM card or USIM+CSIM card. The inserted user cards shall be able to operate properly. The dual-SIM device provides equivalent capabilities on the two slots (support blind insertion).

The dual-SIM device shall support the following user card combinations for the two slots, as described in Table 6-3:

Table 6-3 Card combinations supported by dual-SIM device

Single SIM	Single SIM mode 1	USIM	
	Single SIM mode 2	SIM	
	Single SIM mode 3	UIM	
	Single SIM mode 4	USIM+CSIM	
Dual-SIM combinations	Dual-SIM combination 1	USIM	SIM
	Dual- SIM combination 2	USIM	USIM
	Dual- SIM combination 3	SIM	SIM
	Dual- SIM combination 4	USIM	UIM
	Dual- SIM combination 5	USIM	USIM+CSIM

| Dual- SIM combination 6 | SIM | UIM |
| Dual- SIM combination 7 | SIM | USIM+CSIM |

6.3 Frequency Band Requirements

Refer to'4G Multi-Mode Multi-Band Device Requirements and Architectures，A GTI White Paper, May, 2016'.

6.4 Operating Mode

Any SIM of the two SIMs can be set as primary SIM according to user's choice:

- When only one card inserted, the dual-SIM device shall operate in single-SIM mode, it should refer the technical requirements of LTE/TD-SCDMA/WCDMA/CDMA/GSM (GPRS) multi-mode single-SIM device in this Chapter 5.
- When two cards are inserted, the device should remind the users by prompted indications on the UI to reset primary SIM and secondary SIM in the following scenarios:
  - Insert two user cards to the dual SIM UE for the first time and boot the device
  - At least one user card is replaced of the two originally inserted cards on the dual SIM device

Refer table 6-4 for dual-SIM combinations and corresponding operating mode of dual-SIM UE after completion of user's choice:

Table 6-4 Dual-SIM UE operating modes

Primary	Secondary	Voice solution of main card
LTE/TD-SCDMA/GSM(GPRS)	GSM(GPRS)	CSFB
LTE/TD-SCDMA/GSM(GPRS)	WCDMA/GSM(GPRS)	CSFB
LTE/TD-SCDMA/GSM(GPRS)	CDMA	CSFB
LTE/WCDMA/GSM(GPRS)	GSM(GPRS)	CSFB
LTE/WCDMA/GSM(GPRS)	WCDMA/GSM(GPRS)	CSFB
LTE/WCDMA/GSM(GPRS)	CDMA	CSFB
LTE/CDMA	GSM(GPRS)	SRLTE or SVLTE
LTE/CDMA	WCDMA/GSM(GPRS)	SRLTE or SVLTE

6.5 Inter-RAT Interoperability Requirements

It's not required for the multi-mode dual-SIM device to support cross-SIM multi-mode interoperability between the RATs for the two SIM cards. However, multi-mode interoperability among the RATs of a single SIM is required and should conform to technical requirements of LTE/TD-SCDMA/WCDMA/CDMA/GSM (GPRS) multi-mode single-SIM device in this Chapter 5.

6.6 Service Function Requirements

6.6.1 Voice Service Function Requirements in dual-SIM mode

6.6.1.1 Call Non-Local Number When Both SIM are in Idle State

The device shall provide the capability for users of selecting the primary or secondary SIM for calling non-local number.

The call connection screen shall display the SIM used for the MO call.

After the user ends the call, the device shall automatically return to the call end UI, and then returns to the dual-SIM dual-standby interface.

6.6.1.2 Incoming Call to One SIM When both SIM are in Idle State

The primary or secondary SIM can both receive their respective incoming calls, and the device shall display the calling party's info and the SIM corresponding to the called number.

Whether the primary or secondary SIM receives a call, the device shall allow the user to reject or answer the call. If the user answers the call, the voice call should be properly setup and performed. If the user does not respond or rejects the call, a missed call should be prompted on the UI. Information about the missed call shall include the number of the calling party as well as the SIM corresponding to the called number. The user can choose to dial back the number of the missed call.

After the user ends the call, the device shall automatically return to the call ending UI, and then to the dual-SIM dual-standby UI.

6.6.1.3 Using One SIM to Call a Non-Local Number When the Other SIM Is Running Data Services

When the data service of one SIM is in active state, the device shall allow the user to use the other SIM to call non-local number.. The voice call should be setup and performed normally, and the original data service should meet the following requirements:

For dual-SIM single active (DSSA) device:

- When the primary SIM is in LTE/TD-SCDMA/GSM (GPRS) single-SIM single-standby single-active mode, if the primary or secondary SIM (applicable only if the secondary SIM supports data service) is using the data service, the user can use the other SIM to call non-local number. The voice call should be properly performed, and the original data service is suspended or uninterrupted.

- When the primary SIM is in LTE/WCDMA/GSM (GPRS) single-SIM single-standby single-active mode, if the primary or secondary SIM (applicable only if the secondary SIM supports data service) is using the data service, the user can use the other SIM to call non-local number. The voice call should be properly performed, and the original data service is suspended or uninterrupted.

- When the primary SIM is in LTE/CDMA single-SIM dual-standby single-active mode, if the primary or secondary SIM (applicable only if the secondary SIM supports data service) is using the data service, the user can use the other SIM to call non-local number. The voice call should be properly performed, and the original data service is suspended or uninterrupted.

For dual-SIM dual-active (DSDA) device:

- When the primary SIM is in LTE/TD-SCDMA/GSM (GPRS) single-SIM single-standby single-active mode, if the primary or secondary SIM (applicable only if the secondary SIM supports data service) is using the data service, the user can use the other SIM to call a non-local number. The voice call should be properly performed, and the original data service is uninterrupted.

- When the primary SIM is in LTE/WCDMA/GSM (GPRS) single-SIM single-standby single-active mode, if the primary or secondary SIM (applicable only if the secondary SIM supports data service) is using the data service, the user can use the other SIM to call a non-local number. The voice call should be properly performed, and the original data service is uninterrupted.

- When the primary SIM is in LTE/CDMA single-SIM dual-standby dual-active mode:

  - When the primary SIM is using LTE data service, the user can use the secondary SIM to call another UE. The voice call is normal, and the original data service is suspended or uninterrupted.

  - If the primary or secondary SIM (applicable only if the secondary SIM supports data service) is using non-LTE data service, the user can use the other SIM to call another UE. The voice call is normal, and the original data service is uninterrupted.

6.6.1.4 One SIM Receiving a Call When the Other SIM is Running Data Service

If one SIM is in data active state, when the other SIM receives an incoming call, the device shall display the information about calling party and indicate the intended SIM.

When the data service of one SIM is running, the device shall allow the subscriber to answer or reject the incoming call of the other SIM. If the user does not respond or rejects the incoming call of the other SIM, the UI displays a missed call and the original data service is uninterrupted. Information about the missed call shall include the number of the calling party as well as the SIM corresponding to the called number. The user can choose to dial back the number of the missed call. If the user chooses to answer a call to the other SIM, the device shall conduct the voice call normally and the original data services shall be in the following state:

For dual-SIM single active (DSSA) device:

- When the primary SIM is in LTE/TD-SCDMA/GSM (GPRS) single-SIM single-standby single-active mode, if the primary or secondary SIM (applicable only if the secondary SIM supports data service) is using the data service, the user can use the other SIM to call non-local number.. The voice call should be properly performed, and the original data service is suspended or uninterrupted.

- When the primary SIM is in LTE/WCDMA/GSM (GPRS) single-SIM single-standby single-active mode, if the primary or secondary SIM (applicable only if the secondary SIM supports data service) is using the data service, the user can use the other SIM to call non-local number.. The voice call should be properly performed, and the original data service is suspended or uninterrupted.

- When the primary SIM is in LTE/CDMA single-SIM dual-standby single-active mode, if the primary or secondary SIM (applicable only if the secondary SIM supports data service) is using the data service, the user can use the other SIM to call non-local number.. The voice call should be properly performed, and the original data service is suspended or uninterrupted.

For dual-SIM dual-active (DSDA) device:

- When the primary SIM is in LTE/TD-SCDMA/GSM (GPRS) single-SIM single-standby single-active mode, if the primary or secondary SIM (applicable only if the secondary SIM supports data service) is using the data service, the user can use the other SIM to call a non-local number. The voice call should be properly performed, and the original data service is uninterrupted.

- When the primary SIM is in LTE/WCDMA/GSM (GPRS) single-SIM single-standby single-active mode, if the primary or secondary SIM (applicable only if the secondary SIM supports data service) is using the data service, the user can use the other SIM to call a non-local number. The voice call should be properly performed, and the original data service is uninterrupted.

- When the primary SIM is in LTE/CDMA single-SIM dual-standby dual-active mode:

■ If the primary SIM is using LTE data service, the user can use the secondary SIM to call another UE. The voice call should be properly performed, and the original data service is suspended or uninterrupted.

■ If the primary or secondary SIM (applicable only if the secondary SIM supports data service) is using non-LTE data service, the user can use the other SIM to call another UE. The voice call should be properly performed, and the original data service is uninterrupted.

6.6.1.5 Both SIM Receiving Calls When They Are Both in Idle

This function aims at the dual-SIM dual-active device only.

● When there are incoming calls to both SIM, the device shall be able to display information about both calling parties and indicate the SIM for which the calls are intended.

● When there are incoming calls for both SIM simultaneously, the user can select to answer the call to either SIM. When the call to one of the SIM is answered, there should be prompt of a missing call corresponding to the call that is not responded. Information about the missed call shall include the number of the calling party as well as the SIM corresponding to the called number.

● In dual-SIM mode, after the user hangs up, the device should automatically return to the call-ending screen and then to the dual-SIM standby screen. The missed call display information should include the caller number and the SIM corresponding to the number the caller dialled. Besides, the user can dial back to the number of the missed call.

6.6.1.6 Voice Service of One SIM Ongoing, Incoming Call to another SIM

This function aims at the dual-SIM dual-active device only.

● When one SIM receives an incoming call while the other SIM is performing the voice service, the device shall generate the voice and text prompts, keeping the original call, and shall display calling party information, including the SIM corresponding to the called number.

● If voice service of one SIM is ongoing when the other receives a call, the user should be allowed to select to answer the incoming call. If the user chooses to answer the call, the device should properly switch to the call to the other SIM and the user can maintain or stop the original call. If the user selects to reject or ignore the new call, the original call should be continued. For the call ignored by the user, there should be a prompt for the missed call on the screen. The prompt should contain the number of the calling party as well as the SIM corresponding to the number of the called party. After the voice service ends, the user can dial back to the number of the missed call.

6.6.2 SMS Function in dual-SIM mode

6.6.2.1 Sending an SMS When Both SIM are in Idle State

When both SIM are idle, the device shall allow the user to send SMS through the primary or secondary SIM.

In dual-SIM mode, an SMS should be successfully sent, regardless of whether the SMS is sent by the primary or secondary SIM. After the SMS is successfully sent, the device should automatically return to the dual-SIM mode.

6.6.2.2 Receiving an SMS When Dual SIM are in Idle State

When both SIM are idle, the SMS can be received properly, regardless of whether the SMS is sent to the primary or secondary SIM.

The device shall clearly indicate an unread SMS on the standby UI.

The received SMS contains the number of the sender and clearly indicates the intended SIM, and display the SMS content correctly.

The user shall be able to reply to the received SMS.

6.6.2.3 Voice Service of One SIM Ongoing, Sending SMS through the Other SIM

This function aims at the dual-SIM dual-active device only. In dual-SIM mode, when one SIM is running the voice service, the other SIM can successfully send SMS without affecting the ongoing call.

6.6.2.4 Voice Service of One SIM Ongoing, Receiving SMS through the Other SIM

This function aims at the dual-SIM dual-active device only.

- In dual-SIM mode, when one SIM is running the voice service, the other SIM shall successfully receive and reply to an SMS without affecting the ongoing call.

- In dual-SIM mode, when one SIM is performing the voice service, the other SIM should clearly indicate an unread SMS on the UI.

- The received SMS shall contain the sender's number and indicate the SIM for which the SMS is intended. The SMS content should be correct.

6.6.2.5 Sending SMS through One SIM When the Other SIM is Running Data Service

In dual-SIM mode, when one SIM performs data services in active state, the user can choose the other SIM for sending SMS. The SMS should be successfully sent while the original data services are kept or suspended.

6.6.2.6 Receiving SMS through One SIM When the Other SIM is Running Data Service

In dual-SIM mode, when one SIM performs data services in active state, the other SIM should be able to successfully receive SMS. The MMS can be normally read while the original data services are kept or suspended.

The unread SMS should be clearly indicated on the UI.

The received SMS contains the sender's number and indicates the SIM that receives this SMS. The SMS content should be correct.

6.6.3 MMS Function in Dual-SIM mode

6.6.3.1 Sending an MMS When Both SIM are in Idle State

When both SIM are idle, the device shall allow the user to send MMS through the primary or secondary SIM.

In dual-SIM mode, an MMS should be successfully sent, regardless of whether the message is sent by the primary or secondary SIM. After the MMS is successfully sent, the UE should automatically return to the dual-SIM mode.

6.6.3.2 Receiving an MMS When Both SIM are in Idle State

When both SIM are idle, MMS can be normally received, regardless of whether the MMS is intended for the primary or secondary SIM.

The device UI shall clearly indicate an unread MMS.

The received MMS shall contain the sender's number and indicate the SIM for which the MMS is intended. The content is correct.

The user shall be capable of replying to the received MMS.

6.6.3.3 Voice Service of One SIM Ongoing, Sending MMS through the Other SIM

This function aims at the dual-SIM dual-active device only.

- In dual-SIM mode, when one SIM is running the voice service, the other SIM can successfully send MMS without affecting the ongoing call.

6.6.3.4 Voice Service of One SIM Ongoing, Receiving MMS through the Other SIM

This function aims at the dual-SIM dual-active device only.

- In dual-SIM mode, when one SIM is running the voice service, the other SIM shall successfully receive and reply to an MMS without affecting the ongoing call.

- In dual-SIM mode, when one SIM is performing the voice service, the other SIM should clearly indicate an unread MMS on the UI.

- In dual-SIM mode, the received MMS shall contain the sender's number and indicate the SIM for which the MMS is intended. The MMS content should be correct.

6.6.3.5 Sending MMS through One SIM When the Other SIM is Running Data Service

In dual-SIM mode, when one SIM performs data services in active state, the user can choose the other SIM for sending MMS. The MMS should be successfully sent while the original data services are kept or suspended.

6.6.3.6 Receiving MMS through One SIM When the Other SIM is Running Data Service

In dual-SIM mode, when one SIM performs data services in active state, the other SIM, unless otherwise stated, should be able to successfully receive MMS. The MMS can be normally read while the original data services are kept or suspended.

The un-viewed MMS shall be explicitly prompted on the UI.

The received MMS shall contain the sender's number and indicate the SIM for which the MMS is intended. The content is correct.

6.6.4 Data Service Function in Dual-SIM mode

6.6.4.1 Initiating Data Service When Both SIM Are in Idle State

In dual-SIM mode, the user is allowed to select the primary SIM or the secondary SIM (applicable only if the secondary SIM supports data service) to initiate data services.

In dual-SIM mode, no matter the primary SIM or secondary SIM (applicable only if the secondary SIM supports data service) initiates the data service, the data service should be normally set up and the device should automatically return to the dual-SIM mode after the data service ends.

6.6.4.2 Receiving Data Service When Both SIM Are in Idle State

In dual-SIM mode, the user is allowed to select the primary SIM or the secondary SIM (applicable only if the secondary SIM supports data service) to receive data services.

In dual-SIM mode, no matter the primary SIM or secondary SIM (applicable only if the secondary SIM supports data service) receives the data service, the data service should be normally set up and the device should automatically return to the dual-SIM mode after the data service ends.

6.6.4.3 Voice Service of One SIM Ongoing, Initiating Data Service through the Other SIM

In dual-SIM mode, when one SIM is running the voice service and the other SIM initiates data service, the original call shall not be affected and the status of the device is as follows:

For Dual-SIM Single Active (DSSA) device:

- If the primary SIM is in LTE/TD-SCDMA/GSM (GPRS) single-SIM single-standby single-active mode: When the primary or secondary SIM is running the voice service, the data service on the other SIM is not required.

- If the primary SIM is in LTE/WCDMA/GSM (GPRS) single-SIM single-standby single-active mode: When the primary or secondary SIM is running the voice service, the data service on the other SIM is not required.

- If the primary SIM is in LTE/CDMA single-SIM dual-standby single-active mode: When the primary or secondary SIM is running the voice service, the data service on the other SIM is not required.

For Dual-SIM Dual Active (DSDA) device:

- If the primary SIM is in LTE/TD-SCDMA/GSM (GPRS) single-SIM single-standby single-active mode and the secondary SIM is running the voice service, the primary SIM shall normally run data services. While the primary SIM is running the voice service, if the secondary SIM is capable of data services, the secondary SIM shall normally run data services.

- If the primary SIM is in LTE/WCDMA/GSM (GPRS) single-SIM single-standby single-active mode and the secondary SIM is running the voice service, the primary SIM shall normally run data services. While the primary SIM is running the voice service, if the secondary SIM is capable of data services, the secondary SIM shall normally run data services.

- If the primary SIM is in LTE/CDMA single-SIM dual-standby dual-active mode:

  - When the secondary SIM is running voice services, the LTE data service on the other SIM is not required.

  - While the secondary SIM is running the voice service, the primary SIM shall normally run non-LTE data services. While the primary SIM is running the voice service, if the secondary SIM is capable of data services, the secondary SIM shall normally run non-LTE data services.

6.7 Requirements for Human-Machine Interface

6.7.1 IMEI

Since the device can simultaneously camp on two networks of different RATs, LTE/TD-SCDMA/WCDMA/GSM corresponds to the IMEI, and CDMA corresponds to the MEID.

The device shall have two IMEIs that are globally unique. The length shall be 15 digits in decimal base. The MEID requires 14 hexadecimal character identifications. The 15th hexadecimal bit is the checking bit and is not transmitted through the air interface. The device supports IMEI/MEID checking and displays the complete IMEI/MEID after the user enters "*#06#".

The IMEI/MEID cannot be modified through device or software.

The correct and complete IMEI/MEID information should be filled out in the corresponding area.

6.7.2 Menu Requirements

The menu of the device shall include the menu for selecting the primary or secondary SIM.

When two SIM are inserted, the device should remind the users by prompted indications on the UI to reset primary SIM and secondary SIM in the following scenarios:

- Insert two user cards to the dual SIM device for the first time and boot the device

● At least one user card is replaced of the two originally inserted cards on the dual SIM device

6.7.3 Display Requirements

When two SIM are inserted into the device and the device is in standby mode, the network identifiers and signal strength of both SIMs should be displayed. Besides, operator information of the two SIM should be displayed with the network identifier on the lock-screen.

6.7.4 MO Number Selection

The device should provide the MO number selection function. The device should provide the MO number selection using one of the following methods:

● There are two voice dial keys on the interface of the device to differentiate two caller numbers.

● There is one voice dial key on the interface of the device. After the user clicks the key, a dialog box is displayed for the user to select the caller number.

6.7.5 MT Number Display

The UI interface of the device should correctly display the MT numbers or abbreviated numbers, so that the user can confirm whether the number being called or is going to be called is correct.

6.7.6 Call Progress Indication

The device shall provide prompts in the forms of tone, prompt, visible symbol or figure based on the signalling returned by the network. The user can understand call status so as to verify that the call is successfully established.

6.7.7 Country/PLMN indication

The device should display the PLMN of the registered network or the corresponding operator's logo for both SIMs so that the user can check whether the UE is in the area with network coverage or in roaming status.

6.7.8 Roaming indication

The device should indicate that it is in roaming status with graphics or words while roaming in other operator's network.

6.7.9 Connection RAT type Indication

The type of connected network should be displayed when the device roams in or is switched among 2G, 3G and LTE networks.

6.7.10 Battery capacity indication and alarm

The device should be able to indicate battery capacity and charging status. There will be a warning tone if the capacity is not enough.

6.7.11 Storage Function of Telephone Directory

The device should support telephone directory storage and management. The device should be able to store the directory in VCARD format. The user is allowed to store the directory into the device or user card.

The number and contact person auto-match function is supported in the following scenarios no matter where the directory is saved: A SMS is received. The device initiates a call. The device receives a call.

The maximum number of directory items supported by the device should meet relevant requirements of 3GPP: it is recommended that the device can read and display at least 500 records, including name, number, addition number and email.

The device and USIM/SIM can copy the telephone directory from each other, and the user is allowed to copy the directory (or part of the directory; for example, copy part of number saved in the device onto the USIM/SIM). The user is allowed to copy (n and m are natural numbers and m>n. m and n are less than the number of source list items) from the device to the user SIM (or from the SIM to the device):

- Item n
- Item n - item n+ m
- All

The device can read and display at least 500 records saved in the USIM, including name, number, addition number and email. Those records can be edited and stored.

The device must support the EFPBR file in the USIM. It should be able to read the directory management file (EF PBR) on the USIM to acquire the link relations between each directory.

6.7.12 Call Time Indication

The device is able to correctly display the call duration time during the call. Once the call is terminated, the device shall display the total call duration, which stretches from the moment when the call is picked up to the moment when the call is terminated.

6.7.13 Prompt Tone Requirements

The device that is in a call will give prompts over tone or vibration while receiving a call or SMS.

The prompt tone shall meet the following requirements:

- Frequency: 450Hz±10%

- On-off duration: 0.4s on, 4s off.

- Sound pressure: 60dB (A) ±10dB

7 Network Selection

7.1 Network Selection upon Boot-up

The device should select the appropriate network to camp on based on the type of the inserted card (composite USIM or SIM) and pre-set network selection mode.

The device shall provide the following network selection modes upon power-on:

- If the user selects the "automatic" network selection mode, the device shall select a network based on the network selection priority information (EFPLMNwAcT or EFOPLMNwACT) stored in the composite USIM. If the USIM does not have such information, the device shall correctly select the 4G, 3G, or 2G network based on the access priority. The access priority of the device shall be implemented according to 3GPP standards.

- If the user selects the "manual" network selection mode, then the device shall display the list of all networks that the device captures and perform registration based on the user's choice.

7.2 Operator Network Selection in Standby Mode

In standby mode, the device shall support switching between all types of networks using cell reselection or manual network selection mode. If the service is restricted or the device is in OOS state after the user sets the device to manual network selection mode, it is recommended that the device prompt the unavailability of the network selected by the user and checks whether the user wishes to switch to automatic network selection mode so that the user can camp on an available network as soon as possible and run services.

The device shall provide a shortcut key or menu selection method to trigger RAT selection. The specific network mode selection shall meet the following requirements:

- The device shall display the network mode selection list for the user to re-select a network, and the list shall be correct in both the contents and sequence.

- If the user selects the network currently serving the device, the UE shall go back to the standby state and network search should not performed again.

- When the user does not select the current network in use, the UI shall display a notification, indicating that the device is now searching for a new network. After capturing a new network, the device shall perform RAU or LAU according to 3GPP protocols. After the RAU or LAU is completed, the signal strengths and the correct operator logos shall be immediately displayed.

- If the device fails when searching for the network selected by the user, it shall re-display the list of networks available.

8   Performance Requirements

The performance requirements for a device operating in LTE/WCDMA/GSM (GPRS) mode shall conform to YD/T 2685 "Technical Requirements for the LTE/WCDMA/GSM (GPRS) Multi-Mode Single-Standby Device".

The performance requirements for a dual SIM device operating in LTE/CDMA mode shall conform to YD/T 2687 "Technical Requirements and Test Methods for LTE/CDMA Multi-Mode Device Equipment (Single-Slot)".

8.1 Performance requirements in LTE mode

For requirements (except performance requirements specified in this standard) for power level, frequency category, normal temperature RF KPIs and RRM consistency of device in LTE mode, refer to the General Technical Specifications for TD-LTE Device of China Mobile and 3GPP TS 36.133.

8.2 Performance requirements in TD-SCDMA mode

For requirements (except performance requirements specified in this standard) for power level, frequency category and normal temperature RF KPIs of device in TD-SCDMA mode, refer to the YD/T 1367 Technical Requirements for Device Equipment of 2GHz TD-SCDMA Digital Cellular Mobile Communications Network and General Technical Requirements for TD-SCDMA Device Equipment of China Mobile (R7).

8.3 Performance requirements in GSM mode

For requirements (except performance requirements specified in this standard) for power level, frequency category, normal temperature RF KPIs and protocol consistency of device in GSM mode, refer to the YD/T 1214 Technical requirement of 900/1800MHz TDMA Digital Cellular Mobile Telecommunication Network General Packet Radio Service (GPRS) Equipment: Mobile Stations and General Technical Specification for EDGE Device Equipment of China Mobile.

8.4 Requirements for device receiving sensitivity

8.4.1 Requirements for conducted receiving sensitivity

The conducted receiving sensitivity requirements for devices in LTE, TD-SCDMA/TD-HSPA, and GSM/GPRS/EDGE modes are listed in Tables 8-1, 8-2, 8-3, and 8-4.

For requirements for related interfaces working on CDMA2000 networks, refer to "Technical Requirements for GSM/CDMA2000 1x Dual-mode Digital Mobile Stations", "Technical Requirements for 800 MHz CDMA2000 1x Digital Cellular Mobile Communications Network Devices: Mobile Stations", and 3GPP2 specifications.

Table 8-1 Conducted receiving sensitivity of an LTE UE

Network mode	Operating Band	Conducted Receiving Sensitivity (dBm) (3GPP)				
		20 MHz	10MHz	15MHz	5MHz	3MHz
TD-LTE	Band 40	-94	-97	-95.2	-100	-
	Band 38	-94	-97	-95.2	-100	-
	Band 39	-94	-97	-95.2	-100	-
	Band 41	-92	-95	-93.2	-98	-
LTE FDD	Band 7	-92	-95	-93.2	-98	-
	Band 1	-94	-97	-95.2	-100	-
	Band 3	-91	-94	-92.2	-97	-98.7
	Band 17	-	-94	-	-97	-
	Band 4	-94	-97	-95.2	-100	-101.7
	Band 20	-90	-94	-91.2	-97	-

Table 8-2 Conducted Receiving Sensitivity of TD-SCDMA/TD-HSPA Band34/39 UE

Network mode	Operating Band	Conducted Receiving Sensitivity
TD-SCDMA/TD-HSPA	Band 34	-108
	Band 39	-108
	Band 40	-108

Table 8-3 Conducted Receiving Sensitivity of GSM/GPRS/EDGE UE

Network mode	Operating Band	Conducted Receiving Sensitivity
GSM/GPRS/EDGE	Band 8	-102
	Band 3	-100
	Band 2	-100
	Band 5	-102

Table 8-4 Conducted Receiving Sensitivity of WCDMA/HSPA Band1 UE

Network mode	Operating Band	Conducted Receiving Sensitivity
WCDMA/HSPA	Band 1	-106.7

Table 8-5 Conducted Receiving Sensitivity of WCDMA/HSPA Band 5/2 UE

Network mode	Operating Band	Conducted Receiving Sensitivity
WCDMA/HSPA	Band 2/5	-104.7

8.4.2 TIS Requirements

For TIS counter requirements of the device in the LTE, TD-SCDMA/TD-HSPA, WCDMA/HSPA, and GSM/GPRS/EDGE modes, see Table 8-6 and 8-14.

For TIS specifications under the CDMA mode of the device, see related requirements in YD/T 1484 Spatial RF Emission Power and Receiver Performance Measurement Methods of the Wireless Device Part 3: CDMA2000 Wireless Device.

For LTE TIS test methods, see 3GPP TR 37.902 for more details.

Table 8-6 TIS of the LTE UE

Test Configuration	Average TIS	Maximum TIS
Free space	-88 dBm (recommended)	-87 dBm (recommended)

Table 8-7 TIS of TD-SCDMA/TD-HSPA Band34/39 UE

Test Configuration	Average TIS (Enterprise Standard)	Maximum TIS (Enterprise	Average TIS (3GPP/Industry Standard)	Maximum TIS (3GPP/Industry Standard)
Only human head model	-104dBm	-103dBm	-101dBm	-100dBm

Table 8-8 TIS of the GSM 900MHz UE

Test Configuration	Average TIS (Enterprise Standard/Industry Standard/3GPP)	Maximum TIS (Enterprise Standard/Industry Standard/3GPP)
Only human head model	-97dBm	-94dBm

Table 8-9 TIS of the GSM 1800 MHz UE

Test Configuration	Average TIS (Enterprise Standard/Industry Standard/3GPP)	Maximum TIS (Enterprise Standard/Industry Standard/3GPP)
Only human head model	-99.5dBm	-96.5dBm

Table 8-10 TIS of the GSM 850 MHz UE

Test Configuration	Average TIS (3GPP)	Maximum TIS (3GPP)
Only human head model	-98dBm	-95dBm

Table 8-11 TIS of the GSM 1900 MHz UE

Test Configuration	Average TIS (3GPP)	Maximum TIS (3GPP)
Only human head model	-98.5dBm	-95.5dBm

Table 8-12 TIS of the WCDMA Band 1 UE

Test Configuration	Average TIS (3GPP)	Maximum TIS (3GPP)
Only human head model	-101dBm	-98dBm

Table 7-13 TIS of the WCDMA Band 2 UE

Test Configuration	Average TIS (3GPP)	Maximum TIS (3GPP)
Only human head model	-99dBm	-96dBm

Table 7-14 TIS of the WCDMA Band 5 UE

Test Configuration	Average TIS (3GPP)	Maximum TIS (3GPP)

9 Device-Card Interface Requirements

For requirements on the interface between the device and the USIM+CSIM interface, see YD/T 1762.1, YD/T 2085, YD/T 2524, YD/T 2525, and YD/T 2581.

Requirements on the interface between the device and the SIM: see YD/T 2630.

For requirements on the interface between the device and the USIM, see YD/T 1683.

For the requirements on the interface between the device and the USIM, refer to YD/T 1762.1, YD/T 1762.2 and YD/T 1762.3.

10 Enhanced Features

10.1 VoLTE

Single SIM device or Primary SIM of Dual-SIM device is recommended to support VoLTE to provide HD voice experience for users.

11 Revision History

Table 10-1 Revision history