



Voice Options Over LTE-CDMA Multimode Device Requirements

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Revision History

Version	Date	Description
0.1	9/10/2012	Incorporated comments from group
0.2	9/18/2012	Updated based on conference call
1.0	10/12/12	Reviewed, Accepted and Released
1.05	03/19/2013	Incorporated the discussion results from the conference call 1. Comments from Erik on basic assumption and requirement 2.3.2.7 2. Modified the reference in requirement 2.3.2.4 3. Removed requirement 2.3.2.14
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2.5	7/8/2014	Change request from China Telecom
2.6	10/2/14	Comments from Qualcomm and Alcatel Lucent
2.7	10/3/14	Editorial update after 10/2/14 conference call
3.0	03/03/15	Removal of CDG and CCF References in favour of MDG and GCF

		Editorial Updates to correct errors Released in MDG Format.
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1. Introduction

1.1 Scope

The target audiences for this document are 3GPP2 operators and device vendors who are developing devices that support legacy 2G and 3G systems (with an emphasis on 3GPP2 standards), as well as 3GPP standards such as LTE air interfaces.

1.2 Reference Documents

Reference documents are referred to throughout this specification. Please use the following sites to find reference documents:

- 3GPP2 reference documents can be found at http://www.3gpp2.org/Public_html/specs/index.cfm.
- 3GPP reference documents can be found at <http://www.3gpp.org/ftp/Specs/html-info/36-series.htm> (March 2009 or later).
- MDG reference documents can be found at <http://www.mobilitydg.org>.
- GCF reference documents can be found at <http://www.globalcertificationforum.org>.

Standards		
Ref#	Document Name	Document Number
1	<i>cdma2000 High Rate Packet Data Air Interface Specification</i>	3GPP2 C.S0024-B v3.0
2	<i>CDMA Device Requirements – CDMA2000 1xEV-DO Revision 0, A, and B</i>	MDG Document 148
3	<i>3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Evolved Universal Terrestrial Radio Access (E-UTRA)Radio Resource Control (RRC);Protocol Specification</i>	3GPP TS 36.331
4	<i>3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio access capabilities</i>	3GPP TS 36.306

Standards		
Ref#	Document Name	Document Number
5	<i>3rd Generation Partnership Project; Technical Specification Group Core Network and Terminals; Non-Access-Stratum (NAS) protocol for Evolved Packet System (EPS); Stage 3</i>	3GPP TS 24.301
6	<i>3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) Procedures in Idle Mode</i>	3GPP TS 36.304
7	<i>Recommended System Selection Requirements for 1X and 1xEV-DO-Capable Terminals</i>	MDG Document 143
8	<i>E-UTRAN – cdma2000 1x Connectivity and Interworking Air Interface Specification</i>	3GPP2 C.S0097-0 v2.0
9	<i>3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) Radio Transmission and Reception</i>	3GPP TS 36.101
10	<i>cdma2000 Application on UICC for Spread Spectrum Systems</i>	C.S0065-B v1.0
11	<i>3rd Generation Partnership Project; Technical Specification Group Core Network and Terminals; Non-Access Stratum (NAS) Functions Related to Mobile Station (MS) in Idle Mode</i>	3GPP TS 22.122
12	<i>Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) Conformance Specification; Radio Transmission and Reception; Part 1: Conformance Testing</i>	TS 36.521-1
13	<i>Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) Conformance Specification; Radio Transmission and Reception; Part 2: Implementation Conformance Statement (ICS)</i>	TS 36.521-2
14	<i>Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) Conformance Specification; Radio Transmission and Reception; Part 3: Radio Resource Management (RRM) Conformance Testing</i>	TS 36.521-3
15	<i>Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Packet Core (EPC); User Equipment (UE) Conformance Specification; Part 1: Protocol Conformance Specification</i>	TS 36.523-1
16	<i>Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Packet Core (EPC); User Equipment (UE) Conformance Specification; Part 2: ICS</i>	TS 36.523-2
17	<i>Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Packet Core (EPC); User Equipment (UE) Conformance Specification; Part 3: Test Suites</i>	TS 36.523-3

Standards		
Ref#	Document Name	Document Number
18	<i>Recommended Minimum Performance Standards for cdma2000 Simultaneous Voice and High Rate Packet Data Mobile Stations</i>	3GPP2 C.S0096 v1.0
19	<i>Recommended Minimum Performance Standards for cdma2000 High Rate Packet Data Access Terminal</i>	3GPP2 C.S0033-B
20	<i>Recommended Minimum Performance Standards for cdma2000 Spread Spectrum Mobile Stations – Release B</i>	C.S0011-A v2.0
21	<i>Signaling Conformance Specification for High Rate Packet Data Air Interface</i>	C.S0038-B v1.0
22	<i>Signaling Conformance Test Specification for cdma2000 Spread Spectrum Systems</i>	C.S0043-0 v1.0
23	<i>Over-the-Air Service Provisioning of Mobile Stations in Spread Spectrum Standards</i>	C.S0016-D v1.0
27	<i>E-UTRAN – cdma2000 HRPD Connectivity and Inter-working Air Interface</i>	3GPP2 C.S0087-0
28	<i>E-UTRAN – eHRPD Connectivity and Interworking: Core Network Aspects</i>	3GPP2 X.S0057-0
29	<i>3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Architectural requirements</i>	TS 23.221
30	<i>3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Circuit Switched Fallback in Evolved Packet System; Stage 2</i>	3GPP TS 23.272
31	<i>Upper Layer (Layer 3) Signaling Standard for cdma2000 Spread Spectrum Systems</i>	3GPP2 S.0005
32	<i>3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception</i>	TS 36.101

1.3 Terms and Definitions

Three categories of requirements are established:

- | | | |
|------|------------------|--|
| (M) | Mandatory | The handset must support that characteristic in order to achieve approval. |
| (HD) | Highly Desirable | It is highly desirable and recommended that the handset supports this characteristic.
This feature may become Mandatory in subsequent versions of the document. |

- (O) Optional Supporting this characteristic will be valued in the commercial promotion of the device.
 It is left up to the manufacturer whether or not the device supports this characteristic.
 The handset may support this characteristic.

1.4 Acronyms and Abbreviations

Table 1. Acronyms and Abbreviations

Acronym / Abbreviation	Description
(e)1xCSFB	Circuit Switch Fall Back to 1x RTT
3GPP	Third Generation Partnership Project
3GPP2	Third Generation Partnership Project 2
AMPS	Advanced Mobile Phone System (Analogue Cellular)
AN	Access Network
APDU	Application Protocol Data Unit
APN	Access Point Network
AT	Access Terminal
BREW	Binary Run-time Environment for Wireless
CAT	Card Application Tool
CCF	CDMA Certification Forum
CDG	CDMA Development Group
CDMA	Code Division Multiple Access
CRX	CDMA Roaming exchange Service
CS	Circuit Switched
CSIM	CDMA Subscriber Identity Module
CTIA	Cellular Telephone Industries Association
DOR0	1x Evolution Data Optimized rev 0

Acronym / Abbreviation	Description
DORA	1x Evolution Data Optimized Rev A
EDGE	Enhanced Data for GSM Evolution
eHRPD	Evolved HRPD
ETSI	European Telecommunications Standards Institute
EvDO (1x-EVDO)	1x Evolution Data Optimized, a.k.a. HRPD
GCF	Global Certification Forum
GHRC	Global Handset Requirement for CDMA
GPRS	General Packet Radio Service
GRX	GPRS Roaming Exchange
GSM	Global System for Mobile communications
GSMA	GSM Association
HD	Highly Desirable
HO	Hand Over (Also Hand Off)
HRPD	High Rate Packet Data, a.k.a. 1x EV-DO
IP	Internet Protocol
IRAT	Inter Radio Access Technology
Java	A computer SW platform
LTE	Long Term Evolution
M	Mandatory
MDG	Mobility Development Group
MCC	Mobile Country Code
MLPL	MMSS Location Priority List
MM	Multi Mode
MMS	Multi Media Services
MMSS	Multi Mode System Selection

Acronym / Abbreviation	Description
MNC	Mobile Network Code
MS	Mobile Station
MSPL	MMSS System Priority List
O	Optional
OTT	Over-The-Top
PLMN	Public Land Mobile Network
PRI	Programmable Requirement Indicator
PRL	Preferred Roaming List
PS	Packet Switched
QoS	Quality of Service
RAN	Radio Access Network
RAT	Radio Access Technology
RUIM	Removable User Identity Module
SAR	Specific Absorption Rate
SIM	Subscriber Identity Module
SMS	Short Message Services
SR-LTE	Single Radio Hybrid 1x LTE
SVDO	Simultaneous Voice and Data Optimized
SVLTE	Simultaneous 1X Voice and LTE Data
TS	Technical Specification
UE	User Equipment
UICC	Universal Integrated Circuit Card
UMTS	Universal Mobile for Telecommunications System
USIM	Universal Subscriber Identity Module
VoHSPA	Voice over Internet Protocol over High Speed Packet Access

Acronym / Abbreviation	Description
VoLTE	Voice over Long Term Evolution
VoRA	Voice over Internet Protocol over Data Optimized Revision A
WAP	Wireless Access Protocol
WCDMA	Wideband CDMA

1.5 Carrier Acceptance

If required by the CDMA 2000 operator, the documentation and equipment that shall be delivered to the Multimode Operator for technical evaluation are detailed below.

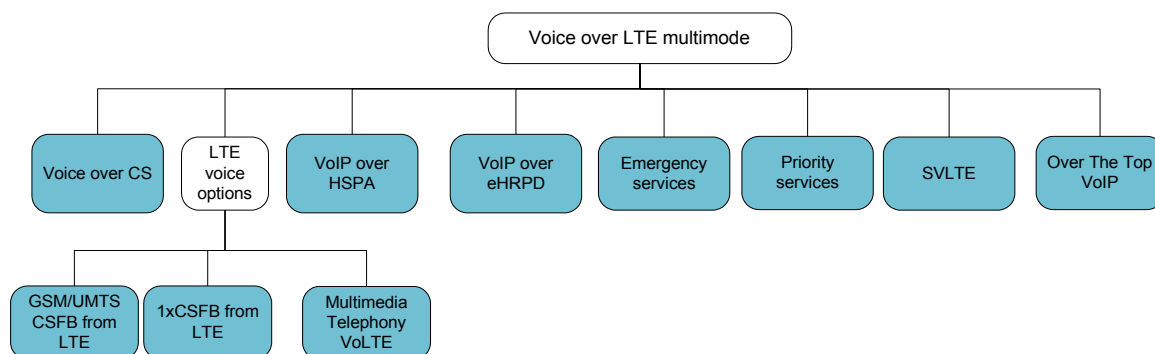
1.5.1 Documentation and Equipment

Req. #	Requirement	Category	Remarks	References
1.5.1	The Multi Mode device shall pass the CDMA certification process defined in GCF testing.	M		GCF Test Plan
1.5.2	The multimode device shall pass the GCF certification requirements.	M	Compliance report detailing GCF completion (LTE shall be included).	
1.5.3	MM device shall pass all the 3GPP2/3GPP interworking requirements as specified by GCF.	M		

2 Voice over LTE Multimode Device

Figure 1 provides the different voice options that are available over a LTE multimode device. It covers the voice support over the circuit-switched domains including 1xRTT, GSM, and UMTS, the voice choices while camping on LTE including the CSFB to a 3GPP2 and 3GPP domains and MMTel VoIP on LTE (VoLTE), VoIP over DoRA (VoRA), VoIP over HSPA (VoHSPA) and the requirements to address emergency and priority calling. It also lists the over-the-top (OTT) VoIP solutions. The voice choices required needs to be determined by the operators and device/network vendors allowing for effective in-home and global roaming scenarios.

Figure 1 Voice Options for LTE Multi-mode Device



This section currently addresses the SVLTE and 1xCSFB choices that are currently predominantly deployed on the market.

Note the requirement for VoLTE itself is addressed by 3GPP GSMA IR.92 and should be used as reference for implementation.

The different inter-RAT mobility support will be addressed in a future revision of this document. This includes VoLTE to VoRA/VoHSPA transitions and SR-VCC procedures.

2.1 SVLTE and SVDO

The following two subsections cover requirements for devices that support Simultaneous 1X Voice and LTE Data (SVLTE) and Simultaneous 1X Voice and DO Data (SVDO). The last

subsection covers the modifications of MMSS to support dual transceiver devices.

2.1.1 SVLTE

The class of devices that support simultaneous receive and transmit in both LTE and 1xRTT is called SVLTE. These devices interact with 1xRTT and LTE networks like two devices and there is no protocol level coordination. From 1xRTT network perspective, SVLTE device is like any other 1xRTT device. Similarly, SVLTE device is like any other LTE device from the perspective of LTE network.

Req. #	Requirement	Category	Remarks	References
2.1.1.1	The SVLTE device shall support two independently tunable transceivers. One transceiver is used for transmit and receive of 1xRTT signal and the other transceiver is used for transmit and receive of LTE signal.	M		
2.1.1.2	The LTE transceiver shall support two receivers and one transmitter.	M		
2.1.1.3	The 1X transceiver shall support one receiver and one transmitter.	M		
2.1.1.4	The SVLTE device shall support a mechanism for controlling LTE maximum transmit power as a function of 1X transmit power.	M	This requirement is needed for meeting SAR requirement when both transmitters are on.	
2.1.1.5	If SVLTE UE receives UECapabilityEnquiry message with ue-CapabilityRequest includes 'eutra', the SVLTE UE shall exclude cdma2000-1xRTT parameters in UE-EUTRA-Capability information element. This configuration implies that this device does not support LTE \leftrightarrow 1XRTT interworking.	M	Since SVLTE devices look like two different devices to network, interworking is not required. For example, the following functionalities: cell-reselection, 1xCSFB, and re-direction are not required.	[3], [4]

Req. #	Requirement	Category	Remarks	References
2.1.1.6	If SVLTE UE that supports EVDO receives UECapabilityEnquiry message with ue-CapabilityRequest includes 'eutra', the SVLTE UE shall include cdma2000-HRPD parameters in UE-EUTRA-Capability information element. This configuration implies that this device supports LTE \leftrightarrow eHRPD interworking.	M	This requirement is needed for IP mobility between LTE and eHRPD.	[3], [4]
2.1.1.7	If the SVLTE device supports EVDO, the UE shall populate tx-ConfigHRPD and rx-ConfigHRPD fields in UE-EUTRA-Capability information element as follows: ■ tx-ConfigHRPD = "Single" ■ rx-ConfigHRPD = "Single"	M	This means that the device supports LTE or EVDO but not both at the same time.	[3], [4]
2.1.1.8	The SVLTE UE shall allow provisioning of a timer attribute for delaying transfer of data service to 1X so that the UE has enough time to search for acquisition of an EV-DO or LTE system. This timer starts when LTE system loss is declared and stops if an EV-DO or LTE system is acquired. If this timer expires and there is no LTE or EV-DO service, the AT shall select 1X system for data services.	M	The default value of this parameter is 15 sec.	

Req. #	Requirement	Category	Remarks	References
2.1.1.9	If the SVLTE device loses the LTE system while dormant over the LTE and the 1X system is still acquired, the AT shall delay data service transfer from the LTE to 1X by the minimum of a configurable attribute (1XDataServiceTransferTimer) or the time it takes to acquire EV-DO or LTE system. This delay is required to give enough time for system determination to acquire an alternative EV-DO or LTE system when LTE service is lost before moving data service to 1X.	M	Once the data service is transferred, there has to be another data call attempt or retry to establish data call over 1X.	
2.1.1.10	If the SVLTE device loses the LTE system while on an active LTE call (LTE call goes dormant) and the 1X system is still acquired, the AT shall delay the data service transfer from LTE to 1X by the minimum of a configurable attribute (1XDataServiceTransferTimer) or the time it takes to acquire EV-DO or LTE system. This delay is required to give enough time for system determination to acquire an alternative EV-DO or LTE system when LTE service is lost.	M		

Req. #	Requirement	Category	Remarks	References
2.1.1.11	If the SVLTE UE is on an active 1X data call and it acquires a full LTE service on its other receiver, the UE may obtain acknowledgement from the user before triggering a hand up from 1X to LTE. This operation will tear down the 1X data call and attach to the LTE system	O	Full LTE service means successful attach to LTE network.	[5]
2.1.1.12	If the SVLTE device is dormant on the 1X system and it acquires a full LTE service on its other receiver, the AT shall trigger hand up from the 1X to the LTE by forcing tearing down of 1X data call and attaching to the LTE system.	M	Full LTE service means successful attach to LTE network.	[5]
2.1.1.13	The SVLTE UE shall meet Specific Absorption Rate (SAR) limit while transmitting simultaneously.	M	The US limit is 1.6 mW/g. This requirement is region specific.	
2.1.1.14	The AT shall make an emergency call on 1X system.	M		[7]
2.1.1.15	The SVLTE UE shall suspend LTE and the EV-DO modem during an emergency call and emergency callback state. The AT shall enable LTE and EV-DO operation once it exits the emergency callback state.	M		
2.1.1.16	The SVLTE device shall comply with [11], [12], [13], [14], [15], [16], and [17] during an LTE only call.			[11], [12], [13], [14], [15], [16], and [17].
2.1.1.17	The SVLTE device shall comply with [9] when operating in an LTE-only call.			[9]

Req. #	Requirement	Category	Remarks	References
2.1.1.18	The SVLTE device shall comply with requirements in [20] when operating in 1X-only mode.			[20]
2.1.1.19	The SVLTE device shall maintain 1xRTT performance during simultaneous operation at expense of reducing LTE maximum transmit power level.		Depending on band and channel combinations, there may be IM products that impact 1x or LTE sensitivity during simultaneous transmit. This may require LTE transmit power backoff to minimize the impact to 1X sensitivity.	
2.1.1.20	The SVLTE device shall support SMS over 1X.	M		
2.1.1.21	The SVLTE device should support SMS over IMS when it has full LTE service.	HD	This requires IMS network support.	

2.1.2 SVDO

This section covers the requirements for devices that support Simultaneous 1x Voice and DO Data (SVDO).

Req. #	Requirement	Category	Remarks	References
2.1.2.1	The SVDO device shall support two independently tunable transceivers. One transceiver is used for transmit and receive of 1xRTT signal and the other transceiver is used for transmit and receive of EVDO signal.	M		
2.1.2.2	The EVDO transceiver shall support two receivers and one transmitter.	M		[2]
2.1.2.3	The 1X transceiver shall support one receiver and one transmitter.	M		

Req. #	Requirement	Category	Remarks	References
2.1.2.4	The SVDO device shall support a mechanism for controlling EVDO maximum transmit power as a function of 1X transmit power.	M	This requirement is needed for meeting SAR requirement when both transmitters are on.	
2.1.2.5	When the UE is on a 1X traffic channel and there is contention for mobile Tx power (PA headroom), the 1X traffic channel shall have higher priority than both DO access channel and traffic channel; i.e. the DO access channel and traffic channel shall use the excess power (PA headroom). If this contention results in DO traffic channel drop due to ForwardTrafficValid monitoring supervision and DO power is backed off due to above priority, the UE shall log ConnectionFailureReason = 0x1 (connection failure due to tune-away to cdma2000® 1X air-interface). This failure shall be reported in a ConnectionFailureReport message if ConnectionFailureReportingEnabled is set to 0x1.	M		[1]
2.1.2.6	The UE shall set the SimultaneousCommonChannelTransmit attribute of Multimode Capability Discovery Protocol to 0x0B. The UE supports multiple independently tunable transmitters that can be used simultaneously on the cdma2000 high rate packet data and the cdma2000 1X common channels. The transmitters can be tuned to separate channel numbers in the band classes supported by the device .	M		[1]

Req. #	Requirement	Category	Remarks	References
2.1.2.7	The UE shall set the SimultaneousDedicatedChannelTransmit attribute of Multimode Capability Discovery Protocol to 0x0B. The UE supports multiple independently tunable transmitters that can be used simultaneously on the cdma2000 high rate packet data and the cdma2000 1X dedicated channels. The transmitters can be tuned to separate CDMA channels.	M		[1]
2.1.2.8	The UE shall set the SimultaneousCommonChannelReceive attribute of Multimode Capability Discovery Protocol to 0x1. The UE supports multiple independently tunable receivers that can be used to simultaneously receive the cdma2000 high rate packet data Control Channel and one or more common channels defined by the cdma2000 1X air interface. The UE is defined to have independently tunable receivers if each receiver can be tuned to a separate CDMA channel.	M		[1]

Req. #	Requirement	Category	Remarks	References
2.1.2.9	The UE shall set the SimultaneousDedicatedChannelReceive attribute of Multimode Capability Discovery Protocol to 0x1. The AT supports multiple independently tunable receivers that can be used to simultaneously receive the cdma2000 high rate packet data Traffic Channel and one or more dedicated channels defined by the cdma2000 1X air interface. The UE is defined to have independently tunable receivers if each receiver can be tuned to a separate CDMA channel.	M		[1]
2.1.2.10	The AT shall set the Receiver Diversity attribute of Multimode Capability Discovery Protocol to 0x1 if it supports EV-DO mobile Rx diversity.	M		[1]
2.1.2.11	If the SVDO device loses the EVDO system while dormant over the EVDO system and the 1X system is still acquired, the UE shall delay data service transfer from the EVDO to 1X by a minimum of configurable attribute (1XDataServiceTransferTimer) or the time it takes to acquire EV-DO or LTE system. This delay is required to give enough time for system determination to acquire an alternative EV-DO or LTE system when EVDO service is lost before moving data service to 1X.	M	Once the data service is transferred, there has to be another data call attempt or retry to establish data call over 1X. This requirement assumes that SVDO device also supports SVLTE.	

Req. #	Requirement	Category	Remarks	References
2.1.2.12	If the SVDO device loses the EVDO system while on an active EVDO call (EVDO call goes dormant) and the 1X system is still acquired, the UE shall delay the data service transfer from EVDO to 1X by a minimum of configurable attribute (1XDataServiceTransferTimer) or the time it takes to acquire EV-DO or LTE system. This delay is required to give enough time for system determination to acquire an alternative EV-DO or LTE system when EVDO service is lost.	M	This requirement assumes that SVDO device also supports SVLTE.	
2.1.2.13	If the SVDO device is on an active 1X data call and it acquires an EV-DO system on its other receiver, the UE shall start a configurable timer (1XtoEVDOHandupDelayTimer). If the EV-DO system is lost prior to expiration of the timer, the AT shall cancel the timer. If the 1XtoEVDOHandupDelayTimer expires, the AT shall trigger hand-up from 1X to EV-DO by tearing down the 1X data call and attaching to the EV-DO system	M	The EVDO acquisition means acquiring pilot and successfully updating overhead information.	

Req. #	Requirement	Category	Remarks	References
2.1.2.14	If the SVDO device is dormant on a 1X system and it acquires an EV-DO system on its other receiver, the UE shall start a configurable time (1XtoEVDOHandupDelayTimer). If the EVDO system is lost prior to expiration of the timer, the UE shall cancel the timer. If the 1XtoEVDOHandupDelayTimer expires, the UE shall trigger hand-up from 1X to EV-DO by attaching to the EV-DO system.	M	The EVDO acquisition means acquiring pilot and successfully updating overhead information	
2.1.2.15	The SVDO UE shall allow provisioning of an attribute (1XtoEVDOHandupDelayTimer) to allow for stable acquisition of an EV-DO system prior to initiating hand-up from 1X to EV-DO by forcing the 1X call to dormancy and initiating an EV-DO attach procedure.	M	The default value of this parameter is 15 sec	
2.1.2.16	The UE shall allow provisioning of an attribute (1XDataServiceTransferTimer) to allow for acquisition of an LTE or EV-DO system. This timer starts when EV-DO system loss is declared and stops if LTE or EV-DO system is acquired. If this timer expires and there is no LTE or EV-DO service, the AT shall select the 1X system for data services.		The default value of this parameter is 15 sec	
2.1.2.17	The SVDO UE shall meet Specific Absorption Rate (SAR) limit while transmitting simultaneously.	M	The US limit is 1.6 mW/g. This requirement is region specific.	
2.1.2.18	The UE shall make an emergency call on 1X system.	M		[7]

Req. #	Requirement	Category	Remarks	References
2.1.2.19	The UE shall suspend the EV-DO modem during an emergency call and emergency callback state. The UE shall enable EV-DO operation once it exits the emergency callback state.	M		
2.1.2.20	The SVDO-capable device shall comply with SVDO performance requirements in [18].	M		[18]
2.1.2.21	The SVDO-capable device shall comply with 1X performance requirements in [20] and [22] while operating in 1X only mode of operation.	M		[20], [22]
2.1.2.22	The SV-DO-capable device shall comply with EV-DO performance requirements in [19] and [21] while operating in EVDO only mode of operation.	M		[19], [21]
2.1.2.23	The SVDO device shall maintain 1xRTT performance during simultaneous operation at expense of reducing EVDO maximum transmit power level.		Depending on band and channel combinations, there may be IM products that impact 1x or EVDO sensitivity during simultaneous transmit. This may require EVDO transmit power backoff to minimize the impact to 1X sensitivity.	
2.1.2.24	The SVDO device shall support SMS over 1X.	M		
2.1.2.25	The SVDO device should support SMS over IMS when it has full eHRPD service.	HD	This requires IMS network support.	

2.1.3 MMSS Requirements

This section covers MMSS modification required for SVLTE/SVDO capable devices. These changes are required to allow for dual radio operation.

Req. #	Requirement	Category	Remarks	References
2.1.3.1	The SVLTE device shall use 1X/GSM/UMTS records in MMSS provisioning tables and respective priorities for acquiring 1X/GSM/UMTS service on one transceiver (voice transceiver) and use LTE and EV-DO records in MMSS provisioning tables plus their respective priorities to acquire LTE or EV-DO systems on the second transceiver (data transceiver).	M	The notion of voice transceiver and data transceiver is used for short reference. It does not mean that voice transceiver does not support PS service.	
2.1.3.2	The AT shall comply with system selection requirements for LTE per [11], [5], and [6].	M		
2.1.3.3	When operating in SV-DO mode, the AT shall maintain association between the acquired 1X system on one transceiver and the acquired EV-DO system on the other transceiver per collocation association in PRL as defined in [7].	M		
2.1.3.4	<p>The device shall camp on {1X only, GSM only, UMTS only, HRPD only, LTE only, LTE+1X, HRPD+1X} systems based on the system availability and priorities required by the MMSS tables.</p> <p>1. Relative priority is needed between:</p> <ul style="list-style-type: none"> a. 1xRTT and LTE systems b. 1xRTT and GSM/UMTS systems c. LTE and HRPD systems <p>2. The voice transceiver provides the found 1X system to the data transceiver</p> <ul style="list-style-type: none"> a. The transceiver uses this information to determine if LTE and HRPD systems are available in the region based on the MMSS tables. b. If the voice transceiver reports a found 1X system, then the data transceiver allows for LTE camping only when the relative priority of the LTE system is equal-to or greater-than the 1X priority. c. If the voice transceiver 	M	<p>For example, the device shall select and camp on 1xRTT and LTE independently, i.e. 1X only, HRPD only, LTE only, 1X+LTE, or 1X+HRPD depending on the network availability.</p> <ul style="list-style-type: none"> a. If 1X network is available, the device shall camp on 1xRTT network. b. If both HRPD and LTE network are available, the device shall select one. If LTE relative priority is higher than both 1xRTT and HRPD, then the device shall camp on LTE network. Otherwise, the device shall camp on 1xRTT/ HRPD network. 	

Req. #	Requirement	Category	Remarks	References
	<p>reports a found 1X system, the UE shall attach only to HRPD systems associated with the found 1X system except the cases listed in CDG Document 143.</p> <p>3. If the voice transceiver found GSM/UMTS full service, i.e., CS service attached:</p> <p>a. The data transceiver shall shut down.</p> <p>4. When no 1X system is found:</p> <p>a. When the voice transceiver is OoS and the LTE/HRPD is acquired, the data transceiver shall throttle the GSM/UMTS scans in order to not preempt LTE/HRPD operation too often.</p> <p>i. GSM/UMTS should be scanned only once every $T_{\text{GSMUMTSScansWithCVM00S}}$ minutes (default value is set to 6 mins) if LTE or HRPD is in Idle state.</p> <p>ii. If LTE or HRPD is on traffic, GSM/UMTS scan shall be stopped until LTE or HRPD connection closes.</p> <p>b. Each time the voice transceiver hands over control to data transceiver, it shall allow the data transceiver to run one full scan of LTE/HRPD systems before taking over control for GSM/UMTS scans.</p> <p>c. When the data transceiver and voice transceiver are both OoS, the throttling of the GSM/UMTS scans should not be applied. Instead, the UE shall perform alternate searches on the data transceiver and the voice transceiver until one transceiver acquires service taking into account OoS timelines. Then, throttling mechanism shall be followed.</p>			
2.1.3.5	Device power up for the first	M		

Req. #	Requirement	Category	Remarks	References
	<p>time</p> <p>1.The device shall scan for available systems from the voice transceiver for 1xRTT systems and GSM/UMTS systems sequentially. The order of the 1X, GSM, UMTS scans are determined by the ToT table. The voice transceiver completes MMSS-based scans for 1X, GSM, and UMTS systems and camps on the most preferred system available taking the following constraint into account.</p> <p>a. Note that the LTE/HRPD scans may be run by the data transceiver when 1xRTT scans are run by the voice transceiver. When GSM/UMTS scans are initiated by the voice transceiver, it is assumed that the data transceiver cannot search as simultaneous LTE with GSM/UMTS is not supported. When the LTE/HRPD scans find an LTE/HRPD system, the UE shall wait to hear from the voice transceiver on the found system or having declared OoS before camping on the found system.</p> <p>2.Once the voice transceiver has completed its scans and found a system to camp on, transceiverare activated based on Req. # 6.1.7 step 2 or Req. # 6.1.7 step 3. If no systems are found by the voice transceiver, the UE hands over control to the data transceiver to find available LTE/HRPD systems.</p> <p>a. Each time the voice transceiver hands over control to the data transceiver, it shall allow the data transceiver to run one full scan of LTE/HRPD systems before taking over control for GSM/UMTS scans.</p>			
2.1.3.6	<p>Device subsequent powerup</p> <p>1.The MRU for the voice transceiver and the data</p>	M		

Req. #	Requirement	Category	Remarks	References
	<p>transceiver shall be managed independently.</p> <p>2. The voice transceiver system selection shall be executed first before the data transceiver similar to Req. # 6.1.7</p>			
2.1.3.7	<p>Better system reselection</p> <p>1. The VOICE TRANSCEIVER shall run MMSS BSR procedures looking for more preferred 1X/GSM/UMTS systems. When the 1X system that the UE is camping on changes, the new 1X system information is provided to the DATA TRANSCEIVER.</p> <p>2. The VOICE TRANSCEIVER shall run HPPLMN scan per 3GPP procedures looking for more preferred 3GPP GSM/UMTS systems.</p> <p>3. The DATA TRANSCEIVER shall run BSR procedures looking for more preferred system across LTE and HRPD systems per the MMSS procedures.</p> <p>4.If the DATA TRANSCEIVER is camped on an HRPD system, THE DATA TRANSCEIVER shall run HRPD BSR based on PRL.</p> <p>a. If 1X system is acquired in VOICE TRANSCEIVER, it will try to move to a better HRPD within the same association tag.</p> <p>b. If no system is acquired in THE VOICE TRANSCEIVER, it will try to move to a better HRPD system in the same GEO.</p> <p>5.When a 1X system is acquired and a more preferred GSM/UMTS is defined in the MMSS tables:</p> <p>a. GSM/UMTS scans will be run per the BSR procedures. THE DATA TRANSCEIVER operation will be preempted, including Connected mode operation when GSM/UMTS scans need to be run. So, GSM/UMTS scans shall not start when LTE/HRPD are in the</p>	M		

Req. #	Requirement	Category	Remarks	References
	<p>Connected state.</p> <p>b. Each time the VOICE TRANSCEIVER hands over control to the DATA TRANSCEIVER, it shall allow the DATA TRANSCEIVER to run one full scan of LTE/HRPD systems before taking over control for GSM/UMTS scans.</p>			
2.1.3.8	<p>Device OoS behavior</p> <p>1. The VOICE TRANSCEIVER and DATA TRANSCEIVER shall follow the OoS procedures of the individual modems.</p> <p>2.If a 1xRTT system is acquired in THE VOICE TRANSCEIVER, the knowledge of the acquired system may be used to improve the OoS scan list in the DATA TRANSCEIVER.</p> <p>3. The VOICE TRANSCEIVER shall coordinate with the DATA TRANSCEIVER for GSM/UMTS search to avoid overlapping OoS search, LTE/HRPD traffic state, and limit impact to LTE/HRPD Idle state. The throttling timeline for GSM/UMTS shall follow $T_{\text{GSMUMTSScansWithCVM OOS}}$ timer when LTE/HRPD is acquired and in the Idle state.</p> <p>4. If the DATA TRANSCEIVER is OoS, the VOICE TRANSCEIVER shall allow the DATA TRANSCEIVER to run one full scan of LTE/HRPD systems before taking over control for GSM/UMTS.</p>	M		
2.1.3.9	<p>Voice call silent redial</p> <p>1.The VOICE TRANSCEIVER shall follow the silent redial procedures as specified by [7] while camped on a 1xRTT system.</p>	M	Silent redial across 1xRTT and GSM/UMTS systems is not supported.	
2.1.3.10	<p>Packet call silent redial</p> <p>1.The packet call silent redial when in (e)HRPD for DATA TRANSCEIVER will follow the procedures specified for eHRPD devices.</p> <p>2.The UE shall not transition across the DATA</p>	M		

Req. #	Requirement	Category	Remarks	References
	TRANSCEIVER and GSM/UMTS for packet call silent redial functionality.			
2.1.3.11	After redirection from LTE to (e)HRPD or Cell-Reselection from LTE to (e)HRPD, the association tag will be ignored if the 1X system acquired in the VOICE TRANSCEIVER and new DO are not associated. Follow [7] procedures to move to an associated HRPD system.	M		
2.1.3.12	The AT shall make GSM/UMTS service indication available within the VOICE TRANSCEIVER and DATA TRANSCEIVER so that data preference can be managed.	M		

2.2 (e)1xCSFB Requirements

Req. #	Requirement	Category	Remarks	References
2.2.1	(e)1xCSFB capable UE shall support receiving the <i>CSFBParam1xRTT</i> IE in SIB-8 to detect if LTE network supports 1xCSFB.	M		[3][30]
2.2.2	UE shall support OMA-DM variables and Domain selection procedures defined in [29] [5].	M	This is required to standardize the behavior when UE encounters a LTE network that does not send <i>CSFB-Param-1XRTT</i> (does not support 1xCSFB). It is expected that a handset will be set to voice-centric. In which case, the UE that only supports (e)1xCSFB as LTE voice option will leave a LTE network that does not support 1xCSFB and avoid it for an implementation dependent time	[29][5]

Req. #	Requirement	Category	Remarks	References
2.2.3	If the LTE network supports (e)1xCSFB, then UE should not need to monitor CDMA while in LTE idle mode	M	This is to take maximum advantage of the LTE sleep mode	
2.2.4	UE shall display no 1x signal	M	Since UE is not actively monitoring CDMA, displaying 1x signal strength only adds confusion to user	
2.2.5	(e)1xCSFB capable UE shall follow the requirements as defined in [8].	M		[8]
2.2.6	A UE capable of e1xCSFB shall set <i>e-CSFB-1xRTT=TRUE</i> in the UE capability message	M		[3][4]
2.2.7	A UE capable of e1xCSFB shall set the FGI bits 16, 24 in the UE capability message sent to the LTE network	M	Needed to indicate support for 1x measurements	[3][4]
2.2.8	(e)1xCSFB capable UE shall support sending a 1x RGM over the S102 tunnel to update 1x registration state.	M		[8], [30]
2.2.9	The network shall support the CDMA2000 parameters as defined in Annex A of C.S0097-0	M		[8]
2.2.10	The UE shall retrieve the MobilityParametersCDMA2000 by sending CSFBParametersRequestCDMA2000 message to the eNB before sending the 1x registration message sent over the tunnel.	M		[3]

Req. #	Requirement	Category	Remarks	References
2.2.11	The UE shall use the parameters in the <i>CSFBParam1xRTT</i> in SIB-8 and <i>MobilityParametersCDMA2000</i> parameters to perform 1x registration based on the following triggers 1) Power-up registration 2) Parameter registration 3) Power-down registration 4) Zone-based registration 5) Timer-based registration	M		[8], [30] [31]
2.2.12	(e)1xCSFB capable UE shall perform an ac-BarringReg check before sending a 1xRGM over the S102 tunnel.	M	PSIST failure mapped to hard failure	[8], [3]
2.2.13	The UE shall use the GCSNAL2Ack received in response to the 1xRGM sent over the S102 tunnel to represent a successful registration	M		
2.2.14	If the 1x registration over the S102 tunnel fails, the UE shall be able to classify the failures into two categories 1) Short-term failures 2) Long-Term failures,	M		
2.2.15	If a long-term failure occurs during 1x registration over the S102 tunnel, the UE shall use the provisioned OMA-DM variables and Domain selection procedures in [29] [5] to determine if it can camp on LTE without voice service.	M		[5] [29]

Req. #	Requirement	Category	Remarks	References
2.2.16	<p>If a short-term failure occurs, the UE should update a failure count.</p> <p>1) If failure count > N_max_retry, the UE should upgrade the failure to long-term failure and behave like 6.2.1.5</p> <p>2. If failure count <= N_max_retry, the UE should retry the S102 registration procedure.</p>	O	Silent redial	
2.2.17	If a (e)1XCSFB UE is powered down while on LTE and the last received CSFBParam1xRTT or MobilityParametersCDMA2000 has enabled power-down registration, the UE shall first perform the 1x power down registration before performing LTE detach if powerDownReg parameter is enabled in CSFBParam1xRTT.	M	Power-down registration may be disabled in CSFBParam1xRTT or MobilityParametersCDMA2000	
2.2.18	If the user originates a voice call, the UE shall perform a ac-Barring0to9 or ac-BarringN check to determine if the call can be originated over the S102 tunnel as a (e)1xCSFB call.	M		[8]
2.2.19	If the ac-Barring check succeeds, the (e)1xCSFB capable UE shall trigger a ESR procedure over the LTE air-interface with cause-code = MO 1xCSFB	M	PSIST failure mapped to hard failure for silent redial algorithm	[8], [3] [30]
2.2.20	The UE shall handle ac-Barring check failure during MO call through silent redial	M		

Req. #	Requirement	Category	Remarks	References
2.2.21	A e1xCSFB capable UE shall support receiving both <i>RRC-Connection Release(Redirection)</i> or <i>HOFromEUTRAPrepRequest</i> in response to the ESR	M		
2.2.22	If the UE receives a RRC-Connection Release with Redirection information, it shall tune to the 1x channel and band specified in the message. It shall go through 1x overhead updating & access procedure to send the ORM.	M		[31]
2.2.23	If a failure happens during the MO call flow before the UE receives a redirection message, UHDM or ECAM, the UE shall perform silent redial if the time since the call origination < 30s.	M	CDG 143 requirement	[7]
2.2.24	If the UE receives a GCSNA message with 1xGPM by setting Service Option other than 76, it shall send a ESR with cause code = MT 1xCSFB call to initiate MT 1xCSFB call	M		[30]
2.2.25	If a failure happens after sending ESR but before receiving redirection, UHDM or ECAM during MT 1xCSFB call, the UE shall remain on the LTE system and wait for repage.	M		
2.2.26	After a MO/MT 1xCSFB call ends, the UE shall attempt to re-acquire the LTE network it was previously camped. If LTE is re-acquired, it shall send TAU to resume suspended LTE context.	M	This is proposed to avoid performing 1x registration during every e1xCSFB call.	

Req. #	Requirement	Category	Remarks	References
2.2.27	(e)1xCSFB capable UE camped on LTE and has successfully performed S102 registration shall initiate a emergency call as a MO 1xCSFB call .	M		
2.2.28	UE can use either e1xCSFB or 1x to make emergency call based on operator configuration	M		
2.2.29	(e)1xCSFB capable UE shall support a NV parameter callbackmode, which specifies if the UE shall attempt to remain on 1x for callback or return to LTE after E911 call that originated when UE was camped on LTE.	M		
2.2.30	The UE shall follow 36.133 section 5.4.2.1.2 Interruption Time	M		
2.2.31	The UE should be capable of supporting tunneled traffic channel SMS or SO76 as defined in C.S0097-0 2.0	HD	Actual implementation should be based on operator network configuration to support Circuit Switched SMS over S102 interface or Packet Switched over IMS. The UE should be able to support either, depending on the network configuration	

Req. #	Requirement	Category	Remarks	References
2.2.32	The UE should be capable of supporting SMS over IP (IMS) as defined in [IR.92 or X.S0048 v1.0]	HD	Actual implementation should be based on operator network configurations to support Circuit Switched SMS over S102 interface or Packet Switched over IMS. The UE should be able to support either, depending on the network configuration. For networks supporting IMS based SMS, this becomes a mandatory item	
2.2.33	If UE remains on 1x after the 1xCSFB call, UE shall follow ATIM, if available. If UE enters 1x/DO hybrid mode after the 1xCSFB call, in addition the UE shall follow the OtherRATNeighborList message, if available. If neither ATIM nor OtherRATNeighborList are available, UE shall attempt to return to LTE through system selection procedures.	M		
2.2.34	e1xCSFB capable UE shall support the calling party number as delivered by the Alert with Information Message through S102	M		
2.2.35	e1xCSFB capable UE shall support 1x measurement while in LTE.	M		
2.2.36	e1xCSFB capable UE shall use RAND generated by eNB for 1x authentication, when AUTH is set to '1'.	M		

2.3 Single Radio Hybrid 1x LTE

2.3.1 Basic Assumption

This operation refers to a mobile with LTE and 1x capability. Here are the basic assumptions for the requirements that follow:

- a) The UE can transmit only on LTE or 1x, but not both at the same time.
- b) The UE uses a single transceiver and is time shared between LTE and 1x during idle monitoring procedures. The UE may also use a subset of the LTE path to monitor 1x.
- c) There is no need for S-102 based 1xCSFB in SR-LTE mode. There is no support for S-102 based 1xCSFB on the eNB. But 1xCSFB and SR-LTE functionality can co-exist in the same UE.
- d) The UE and network exchange capabilities for SR-LTE operation.
- e) Monitoring 1x control channel has priority over LTE.
- f) VoLTE is not supported.

2.3.2 Requirements

Requirement #	2.3.2.1
Description	After power up or exit from airplane mode, based on MMSS Tables, UE shall acquire LTE service as preferred Service Network. If UE or eNB does not support LTE voice services, then UE shall operate in SR-LTE mode. In SR-LTE mode, UE shall acquire and perform registration on the 1x system .
Category	M
Remarks	<p>If DO is configured as higher priority than LTE, then UE will select DO Network and operates in legacy DO/1x Hybrid mode. For LTE & 1x Hybrid Operation, it requires LTE as higher priority system than DO & 1x.</p> <p>The UE is expected to have LTE system as higher priority data service than DO. If UE fails to acquire LTE then UE will fall back to native 1x/DO Hybrid mode. If LTE is available then UE can use 1x to provide voice service (i.e LTE-1x Hybrid Tune Away Mode). With LTE as higher priority Network, UE is not expected to acquire DO/1x Service in presence of LTE Coverage Availability.</p>
Reference	
Related Requirement	

1
2

Requirement #	2.3.2.2
Description	The UE shall support inter-frequency and intra-frequency idle handoff for 1x and inter-frequency and intra-frequency cell reselection for LTE systems independently.
Category	M
Remarks	
Reference	
Related Requirement	

3

Requirement #	2.3.2.3
Description	<p>When the UE is on LTE connected mode and 1x system is lost, the UE shall periodically attempt to re-acquire a CDMA1x system in such a way that a CDMA1x system is acquired as soon as possible without seriously impacting LTE connection performance.</p> <p>When the UE is idle on LTE and 1x system is lost, the UE shall periodically attempt to re-acquire a 1x system as soon as possible.</p> <p>When 1x coverage becomes unavailable while the UE is on LTE connected mode, the UE shall continue to provide LTE service.</p> <p>When 1x coverage becomes unavailable while a UE is idle on LTE, the UE shall continue to provide LTE service.</p> <p>When a 1x system is re-acquired, the UE shall operate in hybrid 1x and LTE mode.</p>
Category	M
Remarks	The acquisition time shall be dependent on 1x rescan and sleep mode timers
Reference	
Related Requirement	

4

Requirement #	2.3.2.4
Description	When the UE is out of LTE coverage, it should work in 1x/DO Hybrid Mode rather than 1x only mode, and the data session should proceed onto

	eHRPD/HRPD or 1X mode according to its internal system selection algorithm.(data continuity is not required) While idling on 1x or 1x/DO hybrid mode, the UE shall periodically attempt to acquire the LTE system with minimum impacts on 1X paging channel performance as possible. When LTE system is reacquired, the UE shall operate in SR-LTE mode.
Category	M
Remarks	Here it is assumed that LTE is higher priority than DO in MMSS Tables
Reference	
Related Requirement	

1

Requirement #	2.3.2.5
Description	The sensitivity and dynamic range of the UE's receiver for 1x and LTE shall meet the requirements specified in chapter 3 [20] and chapter 7 of [32] The receiver performance of the UE shall meet the requirements specified in chapter 3 [20] and Chapter 7 of [32].
Category	M
Remarks	
Reference	
Related Requirement	

2

Requirement #	2.3.2.6
Description	The UE shall monitor both 1x and LTE control channels to receive their corresponding pages.
Category	M
Remarks	
Reference	
Related Requirement	

3

Requirement #	2.3.2.7
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Description	The UE shall give the highest priority to 1x service requests while on LTE connected mode.
Category	M
Remarks	
Reference	
Related Requirement	

1
2
3

Requirement #	2.3.2.8
Description	<p>When the UE and network suspend and resume the LTE session, they shall use the procedures in 3GPP TS 23.272 section B.3.</p> <p>UE shall only execute the ESR procedure during 1x MO/MT Voice Calls if the csfb-SupportForDualRxUEs-r9 in SIB8 set to TRUE</p> <p>ESR procedure is only needed for MO/MT 1x voice call in RRC idle and connected states. There is no ESR procedure required for other 1x service options.</p> <p>When the UE is in Idle State and MT/MO 1x voice call is coming, UE should transit from Idle to Connected state then start the ESR procedure.</p>
Category	M
Remarks	
Reference	
Related Requirement	

4

Requirement #	2.3.2.9
Description	The UE may delay 1x access other than voice access during LTE active connection.
Category	M
Remarks	
Reference	
Related Requirement	

Requirement #	2.3.2.10
Description	<p>The UE shall fallback to the CDMA 1x CS domain for emergency 1x calls. All emergency calls shall be redirected to CDMA 1x access by the UE in order to fulfill the Emergency Callback requirements. The UE shall leave LTE without notifying the network. (In Emergency Callback Mode, you cannot send and receive messages or use the internet.)</p> <p>After the emergency call session has ended, the UE shall enter Emergency Callback Mode as required by the respective country.</p>
Category	M
Remarks	For example, in the USA this mode enables the E911 operator to call UE back or determine your approximate location. Depending on the service provider, Emergency Callback Mode is active for five minutes or is canceled when make a non-emergency call. The UE then reattaches to the LTE network. The UE also exits Emergency Callback Mode at any time a non-emergency call is initiated.
Reference	
Related Requirement	
Requirement #	2.3.2.11
Description	UE shall configure a guard timer for limiting maximum time allowed to stay in LTE system. This timer starts after UE sends Extended Service Request message. Once the timer expires, UE should leave LTE and initiate/receive 1x voice call in 1x system.
Category	M
Remarks	The recommended value for the guard timer is 500ms
Reference	
Related Requirement	

Requirement #	2.3.2.12
Description	UEs should send/receive SMS based on either LTE/IMS or 1x TCH SMS
Category	M
Remarks	
Reference	
Related Requirement	

1

Requirement #	2.3.2.13
Description	UEs shall use ESR procedure for 1x MO/MT Voice Calls. UE shall perform all other 1x signaling procedures (ex: 1x MO/MT SMS, E911 Emergency Calls, registration, SSD Update, authentication etc.) without use of LTE ESR Procedure.
Category	M
Remarks	
Reference	
Related Requirement	

2

3

Requirement #	2.3.2.14
Description	UEs that are also capable of CSFB should be able to dynamically switching between 1XCSFB mode & Hybrid Tune Away modes based on LTE network support for 1x CSFB Service
Category	M
Remarks	UE determines 1x CSFB capability of LTE Network based on SIB 8, and CSFBParam1xRTT IE configuration.
Reference	
Related Requirement	

1

2

Requirement #	2.3.2.15
Description	For UEs that are also capable of CSFB , when switching from 1XCSFB to SR-LTE mode , it shall execute the TAU procedure to indicate a change of UE capability to LTE Network (Capability_Change_Flag to LTE Network)
Category	M
Remarks	
Reference	
Related Requirement	

3

Requirement #	2.3.2.16
Description	For UEs that are also capable of CSFB , when switching from 1x CSFB to SR-LTE mode, it shall execute the TAU procedure, and report rx-Config1XRTT = Dual & No support for 1XCSFB mode.
Category	M
Remarks	
Reference	
Related Requirement	

4

5

Requirement #	2.3.2.17
Description	Based on availability of 1x CSFB Service (SIB 8, CSFBParam1xRTT IE) availability, CSFB capable UE shall be able to switch from SR-LTE mode to 1x CSFB mode
Category	M
Remarks	
Reference	
Related Requirement	

6

1

Requirement #	2.3.2.18
Description	SR-LTE UEs shall support a hysteresis timer while switching from SRLTE to 1XCSFB mode in order to avoid unwanted rapid switching of mode.
Category	M
Remarks	Typical value for hysteresis timer is about 5-10 minutes
Reference	
Related Requirement	

2

3

Requirement #	2.3.2.19
Description	UE shall not transition into SR-LTE mode unless the LTE PLMN ID it camped on is populated in the PLMN ID white list configured in the UE database
Category	M
Remarks	PLMN ID white List can be configured in UE Database. This will help operators to control SR-LTE Operation based on PLMN IDs
Reference	
Related Requirement	

4

5

Requirement #	2.3.2.20
Description	Upon 1x MO/MT Voice Call Termination in SR-LTE mode, UE shall acquire LTE based on MRU or MMSS Database. UE shall use TAU procedure to activate suspended LTE EPS Non-GBR Bearers.
Category	M
Remarks	
Reference	
Related Requirement	

6

1

Requirement #	2.3.2.21
Description	UEs does not support simultaneous 1x Voice and LTE data session
Category	M
Remarks	
Reference	
Related Requirement	

2

3

Requirement #	2.3.2.22
Description	For UEs that are also capable of CSFB, when a S102 based 1xCSFB registration failure occurs, UE shall not black list the LTE PLMN-ID and shall be able to switch its mode to SR-LTE.
Category	M
Remarks	
Reference	
Related Requirement	

4