

**GSM MOBILE STATION
&
FIXED CELLULAR TERMINAL
GENERIC REQUIREMENTS**

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SECTION I

Generic Requirements of GSM Mobile Stations

**Telecommunication Engineering Centre
(Department of Telecommunication)**

GSM Mobile Stations

(GR/ MSG-01/02. MAR.2004)

1.0 Scope:

This document contains generic requirements for Mobile Station (MS) to be used in India Mobile Personal Communication System (IMPCS), based on GSM technology for Bharat Sanchar Nigam Limited (BSNL) / Mahanagar Telephone Nigam Limited (MTNL). This document covers the requirements of the MS, its feature set, operation time, call management features, external interfaces etc.

2.0 Role of MS:

A mobile station is the end-user interface with the GSM network. The MS is powered using a rechargeable battery. Each MS has a unique identity called IMEI (International Mobile Station Equipment Identity) and transmit this on request from the Public Land Mobile Network (PLMN) as detailed in GSM 02.16 and 03.03. The MS is personalised by inserting the relevant SIM (Subscriber Identity Module) card containing the IMSI (International Mobile Subscriber Identity), which allows the end-user to make use of the services offered in the network

3.0 SIM Compatibility:

MS shall have layout as per GSM-MoU ID1 layout to mount smaller "plug-in-SIM" internally within the MS. The MS shall have an indication of how to obtain correct polarisation of the card. SIM removal shall detach the MS, causing a call in progress to be terminated, and preventing the initiation of further calls (except emergency calls - as per GSM 02.30).

The MS shall support SIM card as per TEC GR NO. GR/ SIM-01/ with amendment-1.

4.0 On/Off switch:

The MS shall be provided with a means of switching its power supply on and off. Switch-off shall be "soft", so that on activation, the MS completes the housekeeping functions such as termination of a current call, detach (where applicable) and storing required data in the SIM (as per GSM 02.17) before actually switching off. This procedure shall also apply on power failure (e.g. switch-off or low battery).

5.0 Features:

The MS shall be user-friendly in its user-interface. MS shall be provided with the following features:

- i. Bands of Operation
- ii. Operation times
- iii. User friendly operation
- iv. Call Management features
- v. Personalisation features

Based upon the features, the MS are classified into three categories, as described below:

5.1 Bands of Operation:

The MS supporting dual band be able to operate on GSM 900, GSM 1800 & GSM 900/1800 networks. When configured, the MS shall automatically changeover between the GSM 900 & GSM 1800 frequency bands. In case of triple band operation, the MS shall be able to operate in 1900 Mhz in addition to the dual band specified above.

Category wise classification is given in Table -1 below:

Table -1

Clause no.	Description	Category - 1	Category - 2	Category - 3
5.1	Bands of Operation:	Dual band	Dual band	Tri-band

5.2 Operation times:

The operation times of any MS are specified as the Talk Time, Standby Time & charging time.

5.2.1 Talk time:

It is defined as the duration for which a fully charged battery will last when the MS is used for making a continuous call. The MS shall have a minimum talk time as given in Table -2, measured at Received Signal Strength (RSS) of lower than -95 dBm from PLMN.

5.2.2 Standby time:

It is defined as the duration for which a fully charged battery will last when the MS is maintained in the standby mode i.e. kept powered on without making/receiving any calls measured at Received Signal Strength (RSS) of lower than -95 dBm from PLMN. The values for standby time for three categories of MS are given in Table-2, below:

5.2.3 Charging time:

It is defined as the time taken to fully charge the rechargeable battery. The charging time shall be as given in the table below:

Category wise values of Talk time, Standby time and charging time are given in the Table -2 below:

Table -2

Clause no.	Description	Category - 1	Category - 2	Category - 3
5.2.1	Talk time	Minimum 1.5 hours	Minimum 2.5 hours	Minimum 2.5 hours
5.2.2	Standby time	Minimum 100 hours	Minimum 150 hours	Minimum 150 hours
5.2.3	Charging time	< 3 hours	< 3 hours	< 3 hours

5.3 User friendly operation:

MS shall have following features contributing towards simple and user-friendly operation. Following features shall be available in all the three categories of MS:

5.3.1 Menu structure:

The MS shall be user-friendly, and the menu interface shall display easy navigation capabilities with a logical and intuitive structure.

5.3.2 Keypad and Menu Navigation:

The keys shall be ergonomically placed with backlit illumination as per GSM 2.07 which can give easy access to the frequently used menu functions. The markings on the keys shall be legible. The MS shall be easy to learn and fast to use, without a lot of buttons and fiddling. It shall support the capability of locking

the keypad to prevent accidental dialling. It shall be possible to navigate for different menu option with the use of one key.

5.3.3 Display:

The display in standby mode shall be large enough to have minimum 3 lines of text display. The MS shall have the following key indicators in display or retrievable for all the three categories of MS.

- i) Signal strength (display with minimum 4 bars)
- ii) Name of the Operator
- iii) Time and Date
- iv) Short Message Indicator
- v) Ringer Off Indicator
- vi) Battery charge status indicator
- vii) Key Lock Indicator
- viii) Incoming, Outgoing and Missed Call Indicator

The MS under category 2 & 3 shall be able to provide Data Call Indicator in display or in retrievable mode.

5.3.4 The MS shall have the following indications also.

i) Display of called number

This feature enables the caller to check before call set-up whether the selected number is correct.

ii) Indication of call progress signals

Call progress indicators shall be provided as described in GSM 02.40.

iii) Country/PLMN indication

The MS shall provide country / PLMN indication as described in GSM 02.30

iv) Service Indicator (SI)

Indication regarding adequate signal strength shall be provided to the user based upon the received signal to allow a call to be made. Indication shall also be provided regarding successful registration of MS in the selected PLMN.

v) Country/PLMN selection

The procedures for selection of PLMN shall be in conformity with GSM 02.11 when more than one GSM PLMN is available in a given area.

vi) International access function

The MS shall have a key whose primary or secondary function is marked "+" for a direct, standard method of gaining international access. This is signalled over the air interface and would have the effect of generating the international access code in the network. It may be used directly when setting up a call, or entered into the memory for abbreviated dialling.

vii) Short message indication and acknowledgement

The MS shall provide an indication to the user that a message has been received from the SMS centre and must also send an acknowledgement signal to the PLMN to show that this indication has been activated. The PLMN then returns this acknowledgement to the service centre.

The short message service shall be as described in specification GSM 02.03.

viii) Short message overflow indication

Indication shall be provided to the user of the short message service when an incoming message cannot be received due to insufficient available memory.

5.3.5 Fixed number dialling:

The MS shall support fixed number dialling facility, which makes possible to place a bar on calling any numbers other than those pre-programmed in the SIM by the use of an electronic lock.

Fixed Dialling Numbers stored in the SIM may contain wild characters.

The MS shall be able to prevent any call attempts by the user to numbers that do not exist on the fixed dialling list and shall transmit the actual directory number, and sub address, over the air interface at the user's request.

5.3.6 Barring of outgoing calls:

This MS shall allow blocking of outgoing calls and the barring condition may be activated/deactivated by using a key, key word etc. (Exception: transmission of emergency calls).

The barring may be selective, i.e. applied to individual services (e.g. telephony), individual call types (e.g. long-distance, international calls) or supplementary services. It shall not involve network signalling.

5.3.7 Last Numbers Dialed (LND):

The mobile station shall store up to last '10' Numbers dialled in the SIM and/or the MS. The method of presentation of these numbers to the user for setting up a call is the responsibility of the MS but if these numbers are stored in both the SIM and the MS, those from the SIM shall take precedence. The security for handling this is defined in GSM 02.17.

5.3.8 Language:

The menu interface shall be in simple English language, easy to understand. In addition to English, optionally it shall be possible to switch over to Hindi or any other Indian language.

5.3.9 Call Divert:

The MS shall have support of the following call divert features:

- Call Divert ALL
- Call Divert on Busy
- Call Divert on, No Answering
- Call Divert on if Not Reachable
- Cancel All Divert

It shall be possible for the user to configure the destination, which can be either a voice mail or any other number.

5.4 Call Management Features:

The MS shall have the following call management features:

5.4.1 Recent Calls List:

Shows the phone number of the last dialled, received or missed calls. Display of the time & date of the recent numbers shall be selectable.

5.4.2 Automatic Redial:

The MS shall have capability to make a minimum of 10 re-dial attempts.

5.4.3 Dialling of stored numbers:

The MS shall have the capability to dial the stored numbers in memory locations 2 - 9 by maximum 2 touches.

5.4.4 Any Key Answer:

The MS shall allow the user to receive or reject a call by pressing any key (programmable) while using Headset Kit.

5.4.5 Advice of Charge, Charging & Information:

The MS shall support prepaid services and shall have the facility to check the balance credit on the display, if network provides the message.

5.4.6 Messaging Services:

i) SMS: It shall be possible to allow Mobile Originated (sending) & Mobile Terminated (receiving) text messages upto 160 characters long. The MS shall have the facility to support frequently used short messages.

ii) Multimedia Messaging: It shall be possible to send and receive multimedia messages viz. audio/ video clip, picture & animation for Category-2 & 3 MS in addition to SMS.

5.4.7 Cell Broadcast Services:

Requests the network to send information messages on certain topics to subscribers in a particular 'cell'.

5.4.8 Short Message Service Cell Broadcast Discontinue Reception:

The MS shall have feature, which enables it not to listen during the broadcast of messages if the subscriber is not interested in to save on battery utilisation.

Category wise call management features are shown in Table -3 given below:

Table -3

Clause No.	Description	Category -1	Category -2	Category -3
5.4.1	Recent Calls List	The MS shall be capable of displaying a minimum of 15 calls.	atleast last 10 received calls, last 10 dialled numbers and last 10 missed calls with icons indicating the type of call.	Same as Category -2
5.4.2	Automatic Redial	Yes	Yes	Yes
5.4.3	Dialling of stored numbers	Yes	Yes	Yes
5.4.4	Any Key Answer	Yes	Yes	Yes
5.4.5	Advice of Charge, Charging & Information	Yes	Yes	Yes
5.4.6	Messaging Services	SMS	In addition to SMS, it shall support Multi-Media Messaging (MMS) i.e sending of audio/video clip, animation & picture.	In addition to SMS, it shall support Multi-Media Messaging (MMS) i.e sending of audio/video clip, animation & picture.
5.4.7	Cell Broadcast Services	Applicable	Applicable	Applicable
5.4.8	Short Message Service Cell Broadcast Discontinue Reception	Applicable	Applicable	Applicable

5.5 Personalising features:

The MS shall have the following personalising features

5.5.1 Ringing Tones / Polyphonic Ring Tones

The MS shall have at least 10 ringing tones with different music for Category -1 MS & 16 Polyphonic Ring Tones for Category 2 & 3 MS. It shall be possible to change the ring tone through download.

5.6 Cache Memory: Minimum 4K Bytes shall be available for all the three categories.

• Additional features and Services

5.7 Alternate Line Service:

The MS shall support for Alternate Line Service so as to allow two phone numbers on one SIM card: for e.g.: one for office use and one for home use. The MS shall have Line 1 / Line 2 Indicator for alternate line service.

5.8 Call conferencing:

3 party call conferencing shall be supported.

5.9 Infrared connectivity:

There shall be built in infrared modem in the MS, for wireless connectivity to infrared compatible PC, PDA, and Handheld PC etc or to another infrared compatible MS. Infrared communication shall comply with IrDA 1.0 standards. The synchronisation for IrDA compatible devices shall be as per IrMC 1.1. The speed of data transmission shall be up to at- least 9600 bps

5.10 Data/fax capable:

The MS shall be capable of connecting externally to a PC or laptop using a RS 232 adapter cable, USB, PCMCIA card facilitating to send or receive faxes, emails or to surf the Internet, data/fax feature and the requisite services activated on the SIM card. Data services as defined in the GSM 07 service specifications shall be provided.

The speed of data transmission shall be up to at- least 9600 bps.

5.11 Call Transfer:

The MS shall have the facility, which allows the user to transfer an active call to another number and disconnect itself.

5.12 Vibrator:

The MS shall have Vibrator to alert on an incoming call when the user has turned off the ringing tone and shall have indicator to show that the MS is in vibrator mode.

5.13 Closed User Group:

MS shall support CUG function, which limits calls to within a group pre-defined by the operator.

5.14 WAP services:

The MS shall be able to support the Wireless Application Protocol services. The Category -1 MS shall be compliant to the WAP 1.2 whereas Category -2 &3 MS shall comply with WAP 2.0 or higher version with support for both SMS & CSD (Circuit Switched Data) as bearers. The WAP enabled mobile handset shall have the following features:

5.14.1 Display Height and Width:

The display shall have following characteristics:

- i) Rows of text - minimum 5 line (4 + header)
- ii) Pixels - minimum 96 x 54

5.14.2 Image Display:

It shall be possible to have the complete image display by scrolling.

5.14.3 Profile Setting:

The handset shall support various profile setting like ringing tones types, volume, call alert types etc. as per different user's environments.

5.15 Support for GPRS:

General Packet Radio Service (GPRS) enabled Mobile Station shall have capabilities defined in Class A with minimum of 1 channel for data transmission in the uplink(for sending the data) / 4 channels in downlink (for browsing & downloading the data).

5.16 Coloured Screen Display:

The MS shall support colour display on the screen as defined for category -2 & 3 MS in the Table - 4.

5.17 Digital Camera:

The MS under category - 2 & 3 shall have in built digital camera having resolution of 352 X 288 pixels. In addition to the brightness control, it shall have the feature of picture Zoom Up. It shall be possible to store minimum of 10 full size colour pictures.

5.18 Voice Dialling:

The MS shall have capability of voice dialling.

5.19 Phonebook:

The capacity of phonebook shall be sufficient to store entries of names and numbers as defined for each category in the Table - 4 given below. In addition to names & numbers, it shall be possible to store minimum three other fields viz. E-mail Id etc. for category -2 & 3 MS.

5.20 Support for Bluetooth:

The MS shall support Bluetooth technology as per IEEE 802.11a standard for wireless connection to Personal Computer (PC), PDA (Personal Digital Assistant) etc. The MS shall support Bluetooth accessories like wireless headset and PC.

5.21 Support for Games:

The MS under category -1 & 2 shall have provision for playing in built games. MS under category -3 shall support playing & downloading of games & applications based on JAVA. It shall also be possible to customise the games.

5.22 Personal Information Manager:

The MS shall be capable to provide the following functions of personal organiser:

- Calendar
- To do list
- Calculator
- Alarm etc.

5.23 Support for Location based services:

MS under category -2 & 3 shall support location based services provided by PLMN.

5.24 Screen Saver:

MS under category -2 & 3 shall be able to display and download screen saver.

5.25 Wall Paper:

MS under category -2 &3 shall the feature for wall paper.

Category wise additional features & services as described above are classified in the Table -4 given below:

Table -4

Clause No.	Description	Category -1	Category -2	Category -3
5.7	Alternate Line Service	No	Yes	Yes
5.8	Call conferencing	No	Yes	Yes
5.9	Infrared connectivity	Not Applicable	Applicable	Applicable
5.10	Data/fax capable	No	Yes	Yes
5.11	Call Transfer	Not Applicable	Applicable	Applicable
5.12	Vibrator	Applicable	Applicable	Applicable
5.13	Closed User Group	Not Applicable	Applicable	Applicable
5.14	WAP Services	WAP 1.2	WAP 2.0	WAP 2.0
5.15	GPRS	Not Applicable	Applicable	Applicable
5.16	Coloured Screen Display	Not Applicable	65K colour display in MS shall have picture resolution of minimum 128 X128 pixels.	65K colour display in MS shall have picture resolution of minimum 128 X128 pixels.
5.17	Digital Camera	Not Applicable	In built digital camera.	In built digital camera.
5.18	Voice Dialling	No	No	Yes (optional)
5.19	Phonebook	50	200	500
5.20	Support for Bluetooth	No	yes	Yes
5.21	Support for Games	Inbuilt	Inbuilt	Inbuilt as well support for downloading.
5.22	Personal Information Manager	No	No	Yes
5.23	Support for Location based services	No	Yes	Yes
5.24	Screen Saver	No	Yes	Yes
5.25	Wall Paper	No	Yes	Yes

6.0 Support_of_encryption A5/1 and A5/2:

Provision shall be made for support of up to 7 different algorithms, and the support of no encryption. It is mandatory for A5/1, A5/2 and non-encrypted mode to be implemented on mobile stations. Other algorithms are optional.

7.0 Voice Codecs:

The MS shall support Adaptive Multi Rate (AMR) codecs with 8+6 codecs configuration.

8.0 External Devices connecting to the MS:

The following minimum external devices shall be provided for all the three categories of MS and the MS shall have provision to connect these devices.

8.1 Charger:

The MS shall be provided with a charger with compatible port of MS for charging the rechargeable battery. The MS shall also be compatible with a desktop charger stand. The charger shall be able to withstand wide power fluctuations with a operating voltage range 100 – 240V AC (50 Hz $\pm$ 2HZ). The charger plug shall be compatible with 5A 3PIN ISI approved sockets.

8.2 Headset kit:

The MS shall have headset kit, which allows the user to have a hands-free conversation. One end of the headset kit connects to the MS and the other end has a microphone & a speaker.

8.3 Car-kit:

The MS under Category -2 & 3 shall have provision to attach to a car-kit fitted in the car.

8.4 Battery Type:

Lithium Ion Battery for all the three categories shall be provided.

9.0 MS Sensitivity:

MS sensitivity shall be better than –102 dbm.

10.0 MS Weight:

MS weight with battery shall not exceed 100 grams for category- 1 & 2 and 150 grams for category - 3.

11.0 Power Class:

As per GSM Recommendation 02.06, maximum power of MS shall not exceed 2Watts for 900 MHz and 1 watt for 1800 MHz.

12.0 Environmental requirements:

Mobile handset shall comply with requirements for Category B2 equipment as per QM-333 document of Quality Assurance Wing of BSNL.

13.0 The common requirements for WAP enabled terminals pertaining to micro browser; authentication and security etc. shall be as per GR No. G/WAP-01/01.JUN 2000.

SECTION II

GSM BASED FIXED CELLULAR TERMINALS

11. GENERAL:

This section describes the generic requirements for GSM based Fixed Cellular Terminal (FCT). Based upon the design, whether separate modules for radio & handset or integrated solution, FCT can have the following two types of configuration:

- a) GSM radio terminal to which conventional fixed telephony equipment can be connected to access the GSM network. These units are adaptable and can be installed in any place within a building, or wherever the fixed telephone connection is eventually needed.
- b) An integrated module to access the GSM network using 'ID-1' SIM card, which is capable of being deployed as GSM PCO.

1.0 DESIGN

The FCT shall be simple in design to be easily fitted at a convenient place. FCT shall have interfaces for telephone, G3 FAX machine, Personal Computer.

The FCT shall not have any keypad and the functions of the device shall be operated with the help of a telephone, connected to it.

There shall be visual indications (LEDs) for

- i) Network Connection Status
- ii) Power Status (on/off)
- iii) Battery function

1.1 Wall installation base:

FCT shall include necessary installation material for wall mounting including telephone cable to connect the terminal to the telephone.

2.0 FIXED NETWORK SUPPORTED SERVICES

2.1 It shall support DTMF dialling.

2.2 It shall be possible to connect up to three telephones in parallel with atleast 50 meters cable length between the phone and the FCT to enable great versatility in interior installation of the equipment.

2.3 FCT shall have echo cancellation for excellent quality of conversation.

3.0 TONES:

The following tones shall be provided by FCT with cadences and frequency programmable as per S/ASF-01.

- Dial tone
- Busy tone
- Ring back tone for testing

- Call waiting tone
- Alarm status tones

The following tones shall be distinguishable from other tones.

- Reminder tone
- Voice mail message tone

FCT shall be transparent to network generated tones.

4.0 GSM NETWORK SUPPORTED SERVICES

FCT shall facilitate the following network based services.

4.1 Call line identification presentation (CLIP)

It shall be possible to have calling line identification in external calling line display equipment based on DTMF signalling.

4.2 Voice Mail Alert

If there is a message in the user's voice mail, the unit will generate a special tone advising the user to dial the voice mail number in order to hear the message.

4.3 Pre-paid Subscriptions

The FCT shall support Pre-paid subscriptions and recharging shall be possible via conventional phones connected to the unit.

4.4 Short Message Service (SMS):

It shall be possible to connect a PC to the fixed cellular equipment so that a short message program can be used. The maximum length of an individual short message shall be 160 characters.

4.5 Automatic Area Code insertion

The units shall support Automatic Area Code insertion. This function automatically adds the local area code to calls within the same SDCA so that users do not have to bother dialling area codes in places where they are not required.

Additionally, The following network based services shall also be supported.

- 4.6 Call hold**
- 4.7 Call waiting**
- 4.8. Call forward**
- 4.9 Three party conferencing**
- 4.10 Call transfer**
- 4.11 Call barring**
- 4.12. Alternate line services**
- 4.13 Abbreviated dialling**

4.14 The FCT shall support for the following features

- a) PIN entry
- b) SIM Lock
- c) Lock to Network
- d) Lock to cell

4.15 Emergency Call:

FCT shall support dialling of emergency number even if the SIM is not inserted in.

5.0 SUPPORT FOR FAX, DATA & General Packet Radio Service (GPRS)

5.1 Fax Interface

- a) FCT shall support G3 faxes upto atleast 9.6 kbps
- b) It shall have capability to support data reader's services such as credit card readers.

5.2 Data Interface

Data interface shall have the following characteristics:

- i) Connector RS232C, serial 9 pin female with cable
- ii) It shall support the data speeds up to atleast 9.6 kbps.

5.3 GPRS Interface

FCT shall support GPRS as per TEC GR no. GR/GPR-01.

6.0 Advice of Charge

FCT shall be transparent to Advice of Charge (AoC) received from the GSM system. It shall be possible to connect Pay phone to the GSM FCT.

7.0 Antennae

FCT shall have built in antenna with the following characteristics.

Band : 900 Mhz and 1800 Mhz.
Gain : $\geq 2\text{dBi}$.

It shall also be possible to connect external patch antenna with a gain of $\geq 7\text{ dB}$.

8.0 Power supply

8.1 A.C. Power Supply: 160 V- 270 V, 50 +/- 2 Hz

8.2 Power Consumption: To be specified by the supplier.

8.3 Back up battery:

- a) The FCT shall be provided with a sealed type battery and capable of providing 2 hrs talk time and 16 hrs idle mode (idle mode means the time when there is no call during the period of 16 hrs and RS is on). It shall be possible to charge the battery with DC voltage derived from 230 V, 50 Hz AC nominal supply (160-270 V, 48-52 Hz AC) to 90% capacity with a charging time not exceeding 10 hrs. Exact battery voltage and capacity is to be provided.

b) FCT shall be capable to work solar panel with battery charger. The capacity is as follows

- i) Solar panel with battery charger- 12 V , minimum 12 W
- ii) Sealed battery - minimum 12 AH

8.4 FCT shall have facility to connect 12 V for enabling it to work in cars, coaches, ambulances etc.

8.5 Operation and maintenance KIT:

An operation and maintenance KIT with a program running under Windows which enables to carry out configurations, SW and HW version readings, test start-ups, alarm presentation and erasing, etc shall be provided.

9.0 Technical Parameters

9.1 Air Interface:

GSM 900

Frequencies	TX 890-915 MHz, RX 935-960 MHz
Maximum RF power	2 W, class4
Number of channels	124 x 8 (TDMA)
Duplex Separation	45 MHz
Channel Separation	200 kHz
Modulation	GMSK
Vocoders	13kb/s Full Rate (FR), Enhanced Full Rate (EFR)

9.2 LINE INTERFACE

Connector a/b	RJ-11
Line impedance default	600 ohm
Maximum number of POTS in parallel	3
Programmable parameters	Line levels Ringing signal Hang-up/answer detection times Register recall

9.3 SIM Interface:

The FCT shall support SIM card as per TEC GR "GSM Subscriber Identity Module" no. GR/SIM-01. with Amendment no.1.

Normative references

- [1] GSM 01.04 (ETR 100): "Digital cellular telecommunication system (Phase 2); Abbreviations and acronyms".
- [2] GSM 02.03 (ETS 300 502): "Digital cellular telecommunication system) Phase 2; Teleservices supported by a GSM Public Land Mobile Network (PLMN)".
- [3] GSM 02.04 (ETS 300 503): "Digital cellular telecommunication system (Phase 2); General on supplementary services".
- [4] GSM 02.11 (ETS 300 507): "Digital cellular telecommunication system (Phase 2); Service accessibility".
- [5] GSM 02.16 (ETS 300 508): "Digital cellular telecommunication system (Phase 2); International Mobile Station Equipment Identities (IMEI)".
- [6] GSM 02.17 (ETS 300 509): "Digital cellular telecommunication system (Phase 2); subscriber identity modules functional characteristics".
- [7] GSM 02.30 (ETS 300 511): "Digital cellular telecommunication system (Phase 2); Man-Machine Interface (MMI) of the Mobile Station (MS)".
- [8] GSM 02.40 (ETS 300 512): "Digital cellular telecommunication system (Phase 2); Procedures for call progress indications".
- [9] GSM 02.90 (ETS 300 625): "Digital cellular telecommunication system (Phase 2); Stage 1 description of Unstructured Supplementary Service Data (UUSD)".
- [10] GSM 03.03 (ETS 300 523): "Digital cellular telecommunication system (Phase 2); Numbering, addressing and identification".
- [11] GSM 03.14 (ETS 300 532): "Digital cellular telecommunication system (Phase 2); Support of Dual Tone Multi-Frequency signalling (DTMF) via the GSM system".
- [12] GSM 04.08 (ETS 300 557): "Digital cellular telecommunication system (Phase 2); Mobile radio interface layer 3 specification".
- [13] GSM 11.10 (ETS 300 607): "Digital cellular telecommunication system (Phase 2); Mobile Station (MS) conformity specification".
- [14] GSM 11.11 (ETS 300 608): "Digital cellular telecommunication system (Phase 2); Specification of the Subscriber Identity Module-Mobile Equipment (SIM-ME) interface".
- [15] QM-333: Quality manual on environment conditions from Quality Assurance wing of DTS.

LIST OF ABBREVIATIONS

CSD	Circuit Switched Data
CUG	Close User Group
DCE	Data Communication Equipment
DTE	Data Terminal Equipment
ETSI	European Telecommunications Standards Institute
GPRS	General Packet Radio Service
GSM	Global System For Mobile Communication
IMEI	International Mobile Equipment Identity
IMPCS	India Mobile Personal Communication System
IMSI	International Mobile Subscriber Identity
IRDA	Infra Red Data Association
ISI	Indian Standards Institute
IrMC	Infra red Mobile Communication
LND	Last Number Dialed
MS	Mobile Station
PC	Personal Computer
PDA	Personal Digital Assistant
PLMN	Public Land Mobile Network
SIM	Subscriber Identity Module
SMS	Short Message Service
USSD	Unstructured Supplementary Service Data
WAP	Wireless Application Protocol

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