International Telecommunication Union

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

V.254

(09/2010)

SERIES V: DATA COMMUNICATION OVER THE TELEPHONE NETWORK

Control procedures

Asynchronous serial command interface for assistive and multi-functional communication devices

Recommendation ITU-T V.254

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Recommendation ITU-T V.254

Asynchronous serial command interface for assistive and multi-functional communication devices

Summary

Recommendation ITU-T V.254 is applicable to the interconnection of multi-functional communication devices (such as mobile phones) with devices intended to provide assistive capabilities for those communication devices. It defines a range of serial binary commands that comply to the format and general rules of Recommendation ITU-T V.250 via a range of suitable interfaces.

History

Edition	Recommendation	Approval	Study Group
1.0	ITU-T V.254	2010-09-13	16

FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications, information and communication technologies (ICTs). The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

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As of the date of approval of this Recommendation, ITU had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementers are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database at http://www.itu.int/ITU-T/ipr/.

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Asynchronous serial command interface for assistive and multi-functional communication devices

1 Scope

This Recommendation builds upon the current asynchronous DCE control in [ITU-T V.250] to include command protocols that support the interfacing of assistive controlling devices with communication devices over a range of suitable serial binary data interfaces.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

[ITU-T V.250] Recommendation ITU-T V.250 (2003), *Serial asynchronous automatic dialling and control*.

[ETSI TS 127 007] ETSI TS 127 007 V9.4.0 (2010), *Digital cellular telecommunications system (Phase 2+);Universal Mobile Telecommunications System (UMTS); LTE; AT command set for User Equipment (UE)*.

[ISO 639-1] ISO 639-1 (2002), *Codes for the representation of names of languages – Part 1: Alpha-2 code*.

[ISO 639-2] ISO 639-2 (1998), *Codes for the representation of names of languages – Part 2: Alpha-3 code*.

[ISO/IEC 24751-2] ISO/IEC 24751-2 (2008), *Information technology - Individualized adaptability and accessibility in e-learning, education and training – Part 2: "Access for all" personal needs and preferences for digital delivery*.

3 Definitions

3.1 Terms defined elsewhere

None.

3.2 Terms defined in this Recommendation

This Recommendation defines the following terms:

3.2.1 assistive technology device: Device used by a person with disabilities to prevent, compensate, relieve or neutralize any resulting handicap and that has the ability to interface to an ICT device.

NOTE – The term "external device" is used for either a mobile external device or an assistive technology device.

3.2.2 object exchange protocol: Protocol for the exchange of data objects between devices.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

AT Attention

IrDA Infrared Data Association

MMS Multimedia Messaging Service

OBEX Object Exchange

SMS Short Message Service

USB Universal Serial Bus

5 Conventions on error codes

Refer to clause 9.2 of [ETSI TS 127 007] for general information on the use of error codes in assistive devices.

6 Assistive device commands

Some communication devices provide users with a variety of applications (e.g., games, navigation and location tracking, photograph manipulation, currency conversion) either built-in when purchased, or added later. The use of application functionality at a content and information level is beyond the scope of this Recommendation, but all applications should provide input, output and control functionality that is usable by all users.

The following clauses define ITU-T V.250-like commands that allow assistive devices to interact with multi-functional communication devices over a serial binary data interface.

6.1 Calendar

The following sets of commands allow users to be able to use a calendar function on a multi-functional communication device, including reading and writing calendar objects.

6.1.1 Read vCalendar

Execute syntax: **+CCALR=<begin date>, <end date>**

Description: This command causes the reading of vCalendar information within the parameters specified.

The results are the vCalendar objects between the **<begin date>**, and **<end date>**. There can be any number of calendar objects.

Defined values: None.

Result codes: **<vCalendar>,<vCalendar>,<vCalendar>,..,<vCalendar> OK**

+CCALR ERROR: <error code>

Read syntax: Same as the Execute syntax.

Test syntax: **+CCALR=?**

If the functionality is supported, the response is **<begin date>, <end date>**

Implementation: Calendar information is transferred using the vCalendar format.

6.1.2 Write vCalendar

Execute syntax: **+CCALW=<vCalendar>**

Description: The **+CCALW** command writes vCalendar objects.

Defined values: **<vCalendar>**: vCalendar exchange format.

Result codes: **+CCALW: OK**

+CCALW: ERROR: <error code>

Read syntax: None.

Test syntax: **+CCALW=?**

Implementation: Calendar information is transferred using the vCalendar format.

6.2 Modify display parameters

The following command set supports the reading and modification of a display appearance. This includes character and background colour, and the font size.

6.2.1 Read or write current font colour

Execute syntax: **+CFCLR=<R>,<G>,<B>**

Description: The **+CFCLR** command sets font/text colours of a visual display.

Defined values: **<R>**: The value of the red colour component, in the range 0..255
<G>: The value of the green colour component, in the range 0..255
<B>: The value of the blue colour component, in the range 0..255

Result codes: **+CFCLR: OK**

+CFCLR ERROR: <error code>

Read syntax: **+CFCLR?**

The receiving device shall transmit one or two strings of information text to the assistive device, consisting of:

+CFCLR:<R>,<G>,<B>

Test syntax: **+CFCLR=?**

Response consists of three integers in the range 0..255 representing the <R>, <G>, <B> colour components

6.2.2 Read and modify font size

Execute syntax: **+CFSZ=<font size>**

Description: The **+CFSZ** command allows an assistive device to read and modify the font size of characters used on display of a multi-functional communication device.

Defined values: **<font size>** is the preferred font size in pixels. The maximum value of **<font size>** depends of the capability of the device.

Result codes: **+CFSZ: OK**

+CFSZ ERROR: <error code>

Read syntax: **+CFSZ?**

The response to this query is the current font size of the text being displayed on the communication device.

+CFSZ: <font size>

where **<font size>** is from 1 - Max **<font size>**.

Test syntax: **+CFSZ=?**

6.2.3 Read or modify background colour

Execute syntax: **+CBKG=<R>,<G>,<B>**

Description: The **+CBKG** command sets the background colours of the display of a multi-functional communication device.

Defined values: **<R>**: The value of the colour red, in the range 0..255
<G>: The value of the colour green, in the range 0..255
<B>: The value of the colour blue, in the range 0..255

Result codes: **+CBKG: OK**

+CBKG ERROR: <error code>

Read syntax: **+CBKG?**

The response to this query is the current background colour set of the display of the communication device:

+CBKG=<R>,<G>,<B>

Test syntax: **+CBKG=?**

6.3 Cursor control

Mobility-impaired users may need alternative pointing devices to control the on-screen cursor/pointer. The user shall be able to make a click on a specific coordinate X, Y. The clicks can be various numbers such as single click or double click. Clicks can be done with various buttons, so the buttons being used for the click may also be defined.

6.3.1 Pointing device click

Execute syntax: **+CCLIK=<X>,<Y>,<numberOfClicks>,<buttonNumber>**

Description: This command provides the option to click on a specific coordinate X, Y with alternative pointing devices. The clicks can be various numbers such as for single click or double click.

Defined values: **<X>**: Integer representing the coordinate in the x-direction.

<Y>: Integer representing the coordinate in the y-direction.

<numberOfClicks>: Number of clicks.

<buttonNumber> Defines what button is used for the click.

Result codes: **+CCLIK: OK**

+CCLIK ERROR: <error code>

Read syntax: **+CCLIK?**

The response to this command is **<OK>**

Test syntax: **+CCLIK=?**

The response to this command is the following string:

Max <X>, Max <Y>, Max <NumberOfClicks>, Max <buttonNumber>

6.3.2 Pointing device move

Execute syntax: **+CMOV=<X>,<Y>**

Description: This command allows the user to be able to move the cursor to a specific coordinate X, Y. This command can be used several times in order to show the motion.

Defined values: **<X>**: Integer representing the coordinate in the x-direction.

<Y>: Integer representing the coordinate in the y-direction.

Result codes: **+CMOV: OK**

+CMOV ERROR: <error code>

Read syntax: **+CMOV?**

OK

Test syntax: **+CMOV=?**

The response to this command is the following string:

Max <X>, Max <Y>

6.3.3 Pointing device drag

Execute syntax: **+CDRG=<X>,<Y>, <status>**

Description: The user shall be able to drag something with the cursor to a specific coordinate X, Y. This command can be used several times in order to show the motion.

Defined values: **<X>** is an integer representing the coordinate in the x-direction. The value range is 0..Max, where Max depends on the device capability.

<Y> is an integer representing the coordinate in the y-direction, with a value in the range 0..Max.

<status> is an integer value that represents the status of the drag operation:

- **0** Start Drag
- **1** Move Drag
- **2** Release Drag
- **9** No Drag (Cancelling of the drag operation, e.g., by pressing ESC)

Result codes: **+CDRG: OK**

+CDRG ERROR: <error code>

Read syntax: **+CDRG?**

OK

Test syntax: **+CDRG=?**

The response to this command is the following string:

Max <X>, Max <Y>, <status>

Example: The following illustrates an example sequence of commands (in the order listed below):

AT+CDRG=27, 39, 0 (27 is X coordinate, 39 is Y coordinate and 0 is Start Drag)

AT+CDRG=30, 42, 1

AT+CDRG=35, 47, 1

AT+CDRG=40, 52, 1

AT+CDRG=45, 57, 1

AT+CDRG=50, 62, 2 (50 is X coordinate, 62 is Y coordinate and 2 is Release Drag)

6.4 Menu

The purpose of the functionality for this set of commands is to the means to customize and provide menus that suit user needs.

NOTE – Several menus could have the same name, therefore it is necessary that menus have a unique numeric identifier.

6.4.1 Notification of menu changes

Execute syntax: **+CMEN=<n>**

Description: Set command controls the presentation of an unsolicited result code

+CMEN: <menu id>, <menu name>, <highlighted item>, <item 1>, <item 2>,..,<item N>

Each time there is a change in the menu on the mobile, the unsolicited result code is transmitted to the external device.

<menu id>: Integer defining the unique identifier of the menu.

<menu name>: Text string.

<highlighted item>: Integer indicating which of the menu items is highlighted. The menu items are numbered from 1 to N. The value 0 indicates that no item is highlighted.

<item> consists of the following:

<item> = <menu item name> ,<menu item type>,<menu item value>

<menu item name>:	text string	
<menu item type>:	0	normal item (in plain text)
	1	radio button
	2	checkbox
<menu item value>:	0	not ticked
	1	ticked

NOTE 1 – The **<menu item value>** is only relevant when the **<menu item type>** is a radio button or checkbox.

NOTE 2 – Menus can be displayed as a list of items or as a set of icons on the multi-functional communication device. However, the logical representation will remain as defined in the present clauses.

Examples:

1) "Main menu", "Phone book", "text", "", "Messaging", "text", "", etc.

2) "Ask to save", "On", "radio", "unselected", "Off", "radio", "selected"

Defined values: **<n>**: 0 Turn off menu notification.
1 Turn on menu notification.

Result codes: **+CMEN:<menu id>, <menu name>, <highlighted item>, <item 1>, <item 2>,..,<item N>**

+CMEN ERROR: <err>

Read syntax: **+CMEN?**

Table 1 provides the +CMEN syntax.

Test syntax: **+CMEN=?**

Table 1 – +CMEN parameter command syntax

+CMEN command with sub-command	**Command**	**Possible response(s)**
Execute command:	+CMEN=<n>	+CMEN: OK +CMEN ERROR: <err>
Unsolicited result code:	N/A	+CMEN :<menu id>, <menu name>, <highlighted item>, <item 1>, <item 2>,<item N>
Read command	+CMEN?	+CMEN=<n>
Test command	+CMEN=?	

6.4.2 Navigating on the external device

Execute syntax: **+CNMEN=<menu id>,<operation>**

Description: The external device provides the communication device with the user interactions when navigating in menus.

Defined values: **<menu id>**: Integer defining the unique identifier of the menu.

<operation>: 0 back to previous menu (if any)
1 highlight next menu item
2 highlight previous menu item
3 Select/change status of current menu item (e.g., select current menu item or tick checkbox or radio button if not ticked)

Result codes: **+CNMEN: OK**

+CNMEN ERROR: <error code>

Read syntax: None.

Test syntax: **+CNMEN=?**

6.5 Screen

For persons with vision impairments, it would be very useful if a copy of the screen could be shown in a larger size on the external device. It would also be useful if the contents of the screen as well as the screen dump could be rotated.

This functionality is useful in a range of situations, such as watching MMS or when navigating in menus (in case the external device cannot deal with the AT command for menus).

6.5.1 Send screen dump

Execute syntax: **+CDMP= <Number of octets>, <file>**

Description: The "send screen dump" functionality sends the screen dump from the communication device to the external device, which can then be presented in a bigger size. This functionality shall send still pictures, but these could be updated according to the needs of each situation. The external device may chose to update the screen (using +CDMP=) in intervals or according to the user's interactions.

The assistive device needs to get information on how many octets it will receive from the mobile device so that it knows when to stop receiving input. The mobile device provides information on the number of octets it will send and sends it in **<Number of octets>**. The file received shall be in a standardized picture format, such as JPEG, GIF, BMP, PNG.

Defined values: **<Number of octets>**: An integer in the range 0..N, where N is the size in octets of the picture/screen dump.

<file>: A delimited character string.

Result codes: **+CDMP: <Number of octets>,<file>**

+CDMP ERROR: <error code>

Read syntax: None.

Test syntax: **+CDMP=?**

6.6 Speech-to-text

The ability of a mobile phone to convert speech-to-text would enable persons who are visually impaired or blind to easily enter text.

6.6.1 Enables speech-to-text

Execute syntax: **+CSTT=<state>**

Description: The **+CSTT** command enables speech-to-text.

Defined values: **<state>**: 0 Speech-to-text off
1 Speech-to-text on

Result codes: **+CSTT: OK**

+CSTT ERROR: <error code>

Read syntax: **+CSTT?**

+CSTT: <state>

Test syntax: **+CSTT=?**

6.7 Text telephony

Users who are hard of hearing or deaf have traditionally used text telephony for communicating by typing text. Text telephony on an external device would provide users who are hard of hearing or deaf with a familiar and convenient way to communicate, especially when video telephony for some reason is not an option.

6.7.1 Sending text

Execute syntax: **+CSTXT=<destination>, <string>**

Description: An application will simulate the text telephony service from an assistive device. It will receive text character by character or, alternatively, a string of characters using the command **+CRTXT**. The user can communicate with one or more other parties.

Defined values: **<destination>**: Contact identifier of the receiving party.

<string>: The hexadecimal string representation of UTF-8. An example is seen in Table 2, where the word "Hello" is represented with the UTF-8 hexadecimal string "48656C6C6F".

Result codes: **+CSTXT: OK**

+CSTXT ERROR: <error code>

Unsolicited result code:

+CSTXT=<type>

Read syntax: None.

Test syntax: **+CSTXT=?**

Table 2 – Hexadecimal string representation of the word "Hello"

Letters	H	e	l	l	o
Hexadecimal representation	48	65	6C	6C	6F

6.7.2 Receiving text

Execute syntax: **+CRTXT=<state>**

Description: An application will simulate the text telephony service from an assistive device. It will receive text character by character or, alternatively, a string of characters using the command +CRTXT. The user can communicate with one or more other parties.

Defined values: **<state>**: State for text reception:
0 Turn off receiving text
1 Turn on receiving text

Result codes: **+CRTXT: OK**

+CRTXT ERROR: <error code>

Unsolicited result code:

+CRTXT=<source>, <string>

<source>: Contact identifier of the originating party.

<string>: The hexadecimal representation of the UTF-8 string.

Read syntax: **+CRTXT?**

Response is:

+CRTXT: <state>

Test syntax: **+CRTXT=?**

6.7.3 Setting preference for real-time text

Execute syntax: **+CRTXT=<state>**

Description: This is an indication to the network of whether the real-time text medium shall be set up or not (if it is available).

Defined values: **<state>**: Preference for real-time text:
1 On
0 Off

Result codes: **+CRTXT: OK**

+CRTXT ERROR: <error code>

Read syntax: None.

Test syntax: None.

6.8 Text-to-speech

Users shall be given the option to enable text-to-speech (TTS) on their communication device. For users with visual impairments, text-to-speech is a useful functionality. Settings for speech rate, spelling speed and number read-out (options for how numbers larger than four digits will be read) and language option will be available.

In order to specify the natural language that is used by the text-to-speech (TTS) functionality, the parameter language is used. It is used as specified in [ISO 639-1] and [ISO 639-2]. The language codes are based upon the concept of a set of basic languages together with variants based upon the country in which they are used (e.g., French used in France is coded as "fr-FR", and when used in Canada is coded as "fr-CA").

6.8.1 Configure text-to-speech service

Execute syntax: **+CTTS=<state> <speech rate> <spelling speed> <number option> <language>**

Description: The +CTTS command indicates to the network if the text-to-speech service shall be set up or not (if it is available).

Defined values: **<state>**: 0 Text-to-speech off
1 Text-to-speech on

<speech rate>: 0 to N, where N is the number of words per minute. Larger N values indicate increasing speed. Speech rate specifies the speed at which a synthetic voice reads selected text; see [ISO/IEC 24751-2], *reading rate*.

<spelling speed>: 0 to N, where N is the number of characters per minute. A larger N value indicates higher speed.

<number option>: 0 Single digits. Numbers longer than four digits can be read as single digits.

1 Double digits. Numbers longer than four digits can be read as double digits.

2 Whole numbers. Numbers longer than four digits can be read as whole numbers.

<language>: Name of language, as specified in [ISO 639-1] or [ISO 639-2]. This parameter is used to specify the natural language that is used by the text-to-speech (TTS) functionality, as specified in the ISO 639 series. The language codes are based upon the concept of a set of basic languages together with variants based upon the country in which they are used (e.g., French used in France is coded as "fr-FR", and when used in Canada is coded as "fr-CA").

Result codes: **+CTTS: OK**

+CTTS ERROR: <error code>

Read syntax: **+CTTS?**

Response is:

+CTTS: <state>

Test syntax: **+CTTS=?**

6.9 Time-out

The following commands allow for the control of time-outs.

6.9.1 Change time-out

Execute syntax: **+CTOUT=<n>**

Description: The **+CTOUT** command multiplies all time factors by the factor n.

Defined values: **<n>**: multiply all time factors by the factor n.

Result codes: **+CTOUT OK**

+CTOUT ERROR: <err>

Read syntax: **+CTOUT?**

Response is:

+CTOUT: <n>, where **n** is the current time factor value.

Test syntax: **+CTOUT=?**

6.10 Volume

Media players (e.g., FM radio) on communication devices are increasingly popular and people with disabilities also desire to use that functionality. Users shall be able to change the volume of media played on the communication device.

6.10.1 Change volume

Execute syntax: **+CMVLM=<volume>**

Description: The **+CMVLM** command controls volume of media (e.g., FM radio).

Defined values: **<volume>**: Integer type value with manufacturer specific range (smallest value represents the lowest sound level).

Result codes: **+CMVLM: OK**

+CMVLM ERROR: <error codes>

Read syntax: **+CMVLM?**

Response is the current volume.

Test syntax: **+CMVLM=?**

Response is the list of supported volume values.

Appendix I

Mobile device functionality and their commands

(This appendix does not form an integral part of this Recommendation)

Table I.1 lists functionalities of typical mobile devices and the related standardized ITU-T V.250 commands. For some functions, standardized ITU-T V.250 commands are missing.

Table I.1 – Functionalities of typical mobile devices and related AT commands

Function name	Description	Standardized AT commands
Account management	Tools for managing the use of the mobile devices and the costs of service and application access and use	"+CNUM", "+CAOC", "+CACM", "+CAMM", "+CPUC", "+CCWE"
Address/Phone Book	Manage and display address book entries, including speed dial configurations, and synchronization with external address books	"D", "+CPBS", "+CPBR", "+CPBF", "+CPBW"
Answer Phone/ Voice Mail	Manage the storage and retrieval of answer phone messages	"+CRLP", "+CSTA", "D", "+CHUP", "+CBST", "+CR", "+CEER", "+CSNS", "+CSVM"
Applications	Downloading, installation and use of applications	Not available
Calculator	Enter data on the keypad and perform basic arithmetic functions for display on the screen	Not available
Calendar	Manage and display calendar entries, and synchronization with other external calendars (mostly controlled by OBEX)	"+CSDF"
Camera	Take, store, manage and distribute photos and video clips taken with the on-board camera	Not available
Clock	Manage the display and configuration of the clock, including alarm functions	"+CSTF", "+CCLK", "+CALA", "+CALD", "+CAPD", "+CTZU", "+CTZR"
Device configuration	Low level device management, including memory usage, battery usage, key assignment, etc.	"+CPBS", "+CSIL", "+CPAS", "+CFUN", "+CPIN", "+CBC", "+CSQ", "+CMEC", "+CKPD", "+CDIS", "+CIND", "+CMER", "+CSIM", "+CRSM", "+CSCC", "+CPWC", "+CLAN", "+CLAE", "+CSGT", "+CRMC", "+CRMP", "+CMAR", "+CLAC", "+CPROT", "+CGLA", "+CRLA", "+CCHO", "+CCHC", "+CEAP", "+CERP", "+CUAD", "+CMEE", "+CME ERROR"
Device Connection	Control and configuration of device connection interfaces, including Bluetooth and USB	Not available

Table I.1 – Functionalities of typical mobile devices and related AT commands

Function name	Description	Standardized AT commands
E-Mail	Read, compose, edit and store e-mail messages	Not available
Games	Installation and playing of games, including hi-score and collaboration management	Not available
Location	GPS and MBS location functions, showing location on a map, and sending location via other services (e.g., e-mail or SMS)	Not available
Messages	Manage the creation, editing, sending and storage of messages	"+CRC", "+CIND"
Music Player	Manage the loading, storage and replay of music files	Not available
Network Configuration	Manage the selection of, and connection to a mobile network, including identification, closed user groups and multiparty calls. Includes Wireless LAN connection as well as GSM, GPRS, etc.	"+WS46", "+CREG", "+COPS", "+CLCK", "+CPWD", "+CLIR", "+COLP", "+CDIP", "+CCUG", "+CCFC", "+CCWA", "+CHLD", "+CTFR", "+CTFR", "+CSSN", "+CLCC", "+CPOL", "+CPLS", "+COPN", "+CAEMLPP", "+CPPS", "+CFCS", "+CAAP", "+CUUS1", "+CSQ", "+CIND", "+CGDCONT", "+CGDSCONT", "+CGTFT", "+CGQREQ", "+CGQMIN", "+CGEQREQ", "+CGEQMIN", "+CGEQNEG", "+CGATT", "+CGACT", "+CGCMOD", "+CGDATA", "+CGCLOSP" (Obsolete), "+CGPADDR", "+CGAUTO", "+CGANS", "+CGCLASS" (GPRS only), "+CGCLPAD" (GPRS only), "+CGEREP", "+CGREG", "+CGSMS"
Personalization	Control of the personalization functions of the devices, including volume settings, rings styles and display themes	"+CNUM", "+CALM", "+CRSL", "+CVIB", "+CLVL", "+CMUT"
Radio	Tune and listen to radio programs (FM or Internet)	Not available.
Video Phone Call	Place, receive and participate in video calls, including call control and administration (caller ID etc., call forwarding, etc.)	"+CSTA", "D", "+CHUP", "+CBST", "+CR", "+CEER", "+CRC", "+CSNS", "V.250", "+CIND"
Voice Control	Configuration and use of the voice control of the phone functions	"+CIND"
Voice Phone Call	Place, receive and participate in voice calls, including call control and administration (caller ID etc., call forwarding, etc.)	"+CSTA", "D", "+CHUP", "+CBST", "+CR", "+CEER", "+CRC", "+CSNS", "+CVHU", "V.250", "+CIND", "+CAJOIN", "+CAREJ", "+CAHLD", "+CAPTT", "+CAULEV", "+CALCC", "+CACSP", "+CANCHEV", "+COTDI", "+CGCS", "+CBCS"

Table I.1 – Functionalities of typical mobile devices and related AT commands

Function name	Description	Standardized AT commands
Web Browsing	Access web based information, including the management of bookmarks. Includes the inputting of data into forms	"+CRLP", "+CSTA", "D", "+CHUP", "+CBST", "+CR", "+CEER", "+CSNS"

Bibliography

The following are non-normative references that contain information supporting this Recommendation.

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Printed in Switzerland
Geneva, 2011