

WCDMA USSD User Guide

UMTS/HSPA Module Series

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About the Document

History

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1 Introduction

This document describes the recommended working procedure about USSD (Unstructured Supplementary Service Data) function and how to decode the USSD text.

1.1. Scope of Document

Quectel USSD function is applicable to the following modules:

- UC20 module
- UC15 module
- UG95 module

2 Overview of USSD

USSD is an operator customized service and usually used to query telephone bill, weather or other information. Different operators support different USSD request strings.

For example, there are two kinds of USSD for MO and MT call, one is MS (Mobile Station) initiated and the other is NW (Network) initiated. Most of them are mobile station initiated. When a USSD request is initiated successfully, a connection will be established between MS and NW. USSD data is transmitted when MS or NW releases data.

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3 USSD AT Command

AT+CUSD Unstructured Supplementary Service Data

Test Command AT+CUSD=?	Response +CUSD: (list of supported <mode> s) OK
Read Command AT+CUSD?	Response +CUSD: <mode> OK
Write Command AT+CUSD=<mode>[,<reqstr>[,<dc>]]]	Response OK ERROR If error is related to ME functionality: +CME ERROR: <err>
Related URC	+CUSD: <status>[,<rspstr>[,<dc>]]
Maximum Response Time	120s, determined by network.
Reference 3GPP TS 27.007	

Parameter

<mode>	Integer type, sets/shows the result code presentation status to the TE 0 Disable the result code presentation to the TE 1 Enable the result code presentation to the TE 2 Cancel session (not applicable to read command response)
<reqstr>	Unstructured Supplementary Service Data (USSD) to be sent to the network. If this parameter is not given, network is not interrogated.
<rspstr>	Unstructured Supplementary Service Data (USSD) received from the network.
<dc>	Integer type, 3GPP TS 23.038 Cell Broadcast Data Coding Scheme (default 15)
<status>	USSD response from the network or the network initiated operation 0 No further user action required (network initiated USSD notification, or no further information needed after mobile initiated operation) 1 Further user action required (network initiated USSD request, or further

-
- | | |
|---|--|
| | information needed after mobile initiated operation) |
| 2 | USSD terminated by network |
| 3 | Other local client has responded |
| 4 | Operation not supported |
| 5 | Network time out |
-

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4 Recommended USSD Working Procedure

The following figure shows the recommended USSD working procedure. When executing command "AT+CUSD=1,<reqstr>,15", if you do not receive URC "+CUSD" after 20 seconds, please send the AT+CUSD=2 to cancel the USSD session and report an error to UI.

For WCDMA series modules, it is recommended to execute AT+QCFG="ussd/cause",1 before using the USSD function, thus URC "+CUSD" will be reported when an error occurs.

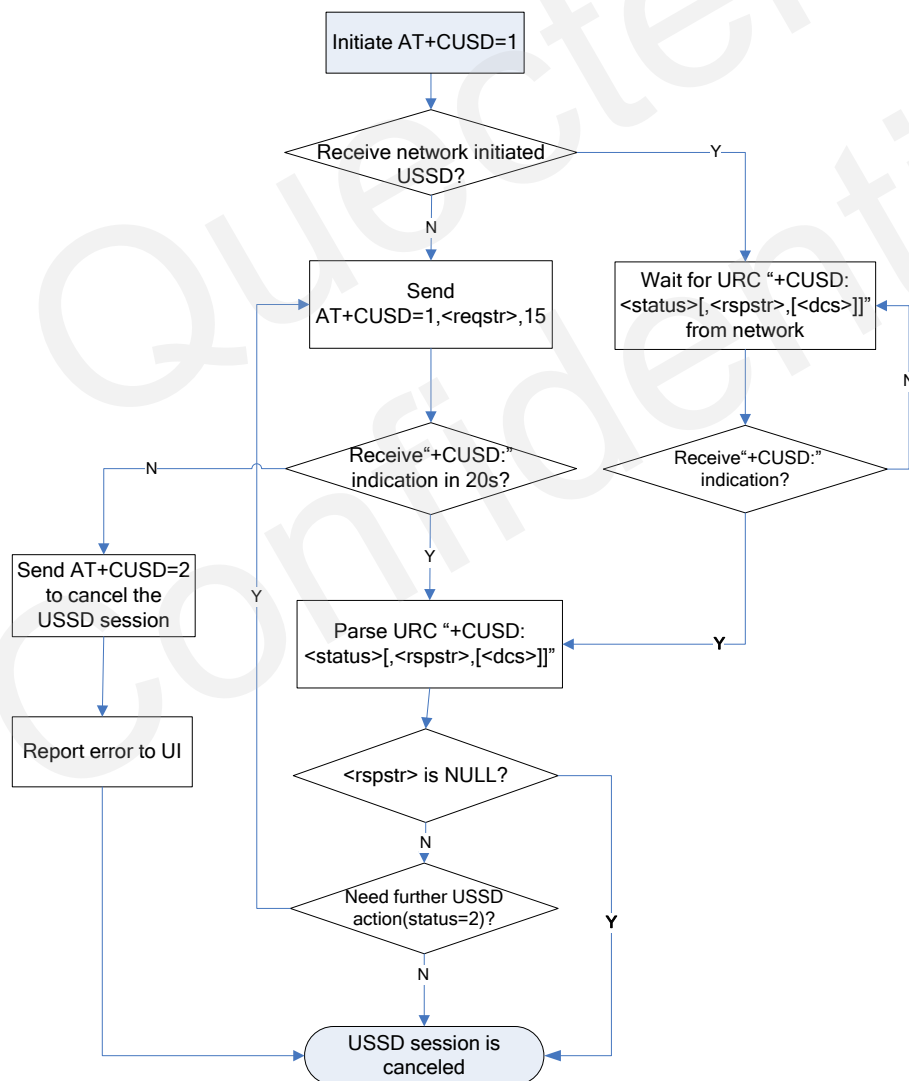


Figure 1: Recommended USSD Working Procedure

Example 1: MS initiates USSD without further user action required

AT+CSCS="IRA"

OK

AT+QCFG="ussd/textescape",1

OK

AT+CUUSD=1

OK

AT+CUUSD=1,"*777*3#",15

OK

+CUUSD: 0,"AT&T Free Msg: Data is unlimited. 1st 2GB @ speeds up to 3G. Speed then reduced to 128 Kbps max. until plan renews.",15

AT+CUUSD=2

OK

Example 2: MS initiates USSD with further user action required

AT+CSCS="IRA"

OK

AT+QCFG="ussd/textescape",1

OK

AT+CUUSD=1

OK

AT+CUUSD=1,"*777*3#",15

OK

+CUUSD: 1,"Select from following\0A1.My Delights\0A2.My Balance\0A3.Last 3 Activities\0A5.VAS and Services.\0A6.Data Plan\0A7.Bonus Card\0A0.For More",15

AT+CUUSD=1,"2"

OK

+CUUSD: 1,"Balance for 7506016119 is Rs. 0.08. Account Exp Date 28/11/2014 23:59.\0APress # for main menu",15

AT+CUUSD=1,"#"

OK

+CUUSD: 1,"Select from following\0A1.My Delights\0A2.My Balance\0A3.Last 3 Activities\0A5.VAS and Services.\0A6.Data Plan\0A7.Bonus Card\0A0.For More",15

AT+CUUSD=2

OK

Example 3: NW initiates USSD Request

```
AT+CSCS="UCS2"  
OK  
AT+QCFG="ussd/textescape",1  
OK  
AT+CUSD=1  
OK  
  
RING  
  
RING  
AT+QHUP=17  
OK  
  
+CUSD:  
1,"900962E97ED96765753500310038003700350036003900310033003500370032768456DE590D8BE  
D3002000D000A003100204E0D65B94FBF00289ED88BA40029000D000A003200205F004F1A4E2D0  
00D000A003300204E0A8BFE4E2D000D000A",72  
AT+CUSD=1,"0001",15  
OK  
AT+CUSD=2  
OK
```

5 How to Parse URC "+CUSD: <status>[,<rspstr>,[<dcsc>]]"

" +CUSD" is a URC message, some of the USSD messages include the <CR><LF> characters under the condition of AT+CSCS="GSM" or "IRA". This makes it difficult to get the whole USSD URC message.

There are two methods to deal with this case. The first one is to execute the command AT+CSCS="UCS2" to enable the UNICODE coding, so that the USSD URC messages which have <CR><LF> will print string as "000D000A". The second is to use the character escape function, which will escape the <CR><LF> and other control characters. The following part mainly introduces the latter method.

5.1. The Function of Character Escape in AT+CSCS="GSM" or "IRA"

Usually, "+CUSD" is regarded as the beginning of URC, and <CR><LF> as the end of URC. And between "+CUSD" and <CR><LF>, the first quotation mark is regarded as the beginning of <rspstr>, and the last one as the end of <rspstr>. But if AT+CSCS="GSM" or "IRA", and <rspstr> content contains <CR><LF> or quotation mark, this method will parse the URC incorrectly. Besides, 0x00 is character @ in GSM character set, however, it is usually regarded as the end of string in spite of AT+CSCS="GSM".

We provide command AT+QCFG="ussd/textescape",1 to avoid this situation. After setting this command, <CR>, <LF>, quotation mark and 0x00 in <rspstr> content will be escaped.

When AT+CSCS="GSM" or AT+CSCS="IRA", in USSD text outputting:

0x5C (show in hex, character Ö in GSM, character \ in IRA) will be escaped into 0x5C3543 ("\\5C").
0x0D (show in hex, character <CR> in GSM and IRA) will be escaped into 0x5C3044 ("\\0D").
0x0A (show in hex, character <LF> in GSM and IRA) will be escaped into 0x5C3041 ("\\0A").
0x22 (show in hex, character " in GSM and IRA) will be escaped into 0x5C3232 ("\\22").
0x00 (show in hex, character @ in GSM) will be escaped into 0x5C3030 ("\\00").

Example 4: Character Escape of 0x00 (shown in hex, character @ in GSM)

AT+QCFG="ussd/textescape",0

OK

AT+CSCS="IRA"

OK

AT+CUSD=1,"*777*3#",15

OK

+CUSD: 0,"AT&T Free Msg: Data is unlimited. 1st 2GB @ speeds up to 3G. Speed then reduced to 128 Kbps max. until plan renews.",15 //@ is 0x40 in IRA alphabet. Usually 0x40 can be displayed.

AT+CSCS="GSM"

OK

AT+CUSD=1,"*777*3#",15

OK

+CUSD: 0,"AT&T Free Msg: Data is unlimited. 1st 2GB [null] speeds up to 3G. Speed then reduced to 128 Kbps max. until plan renews.",15 //@ is 0x00 in GSM alphabet. Usually 0x00 cannot be displayed.

AT+QCFG="ussd/textescape",1

OK

AT+CUSD=1,"*777*3#",15

OK

+CUSD: 0,"AT&T Free Msg: Data is unlimited. 1st 2GB \00 speeds up to 3G. Speed then reduced to 128 Kbps max. until plan renews.",15 //Now 0x00 is escaped into "\00"

Example 5: Character Escape of 0x0A (<LF>)

AT+CSCS="IRA"

OK

AT+QCFG="ussd/textescape",0

OK

AT+CUSD=1,"*111#",15

OK

+CUSD: 1,"Select from following

1.My Delights

2.My Balance

3.Last 3 Activities

5.VAS and Services.

6.Data Plan

7.Bonus Card

0.For More",15

AT+QCFG="ussd/textescape",1

OK

AT+CUSD=1,"*777*3#",15

OK

+CUSD: 1,"Select from following\0A1.My Delights\0A2.My Balance\0A3.Last 3 Activities\0A5.VAS and Services.\0A6.Data Plan\0A7.Bonus Card\0A0.For More",15

Table 1: The Output Conversions Table (DCS=GSM 7 bit and AT+CSCS="GSM")

	0	1	2	3	4	5	6	7
0	5C3030 ("\00")	10	20	30	40	50	60	70
1	01	11	21	31	41	51	61	71
2	02	12	5C3232 ("\22")	32	42	52	62	72
3	03	13	23	33	43	53	63	73
4	04	14	24	34	44	54	64	74
5	05	15	25	35	45	55	65	75
6	06	16	26	36	46	56	66	76
7	07	17	27	37	47	57	67	77
8	08	18	28	38	48	58	68	78
9	09	19	29	39	49	59	69	79
A	5C3041 ("\0A")		2A	3A	4A	5A	6A	7A
B	0B		2B	3B	4B	5B	6B	7B
C	0C	1C	2C	3C	4C	5C3543 ("\5C")	6C	7C
D	5C3044 ("\0D")	1A	2D	3D	4D	5D	6D	7D
E	0E	1E	2E	3E	4E	5E	6E	7E
F	0F	1F	2F	3F	4F	5F	6F	7F

Table 2: GSM Extended Characters (1)

	0	1	2	3	4	5	6	7
0					1B40			
1								
2								
3								
4		1B14						
5								
6								
7								
8			1B28					
9			1B29					
A								
B								
C				1B3C				
D				1B3D				
E				1B3E				
F			1B2F					

Table 3: The Output Conversions Table (DCS=GSM 7 bit and AT+CSCS="IRA")

	0	1	2	3	4	5	6	7
0	40	20	20	30	A1	50	BF	70
1	A3	5F	21	31	41	51	61	71
2	24	20	5C3232 ("22")	32	42	52	62	72
3	A5	20	23	33	43	53	63	73
4	E8	20	A4	34	44	54	64	74

5	E9	20	25	35	45	55	65	75
6	F9	20	26	36	46	56	66	76
7	EC	20	27	37	47	57	67	77
8	F2	20	28	38	48	58	68	78
9	C7	20	29	39	49	59	69	79
A	5C3041 ("\0A")		2A	3A	4A	5A	6A	7A
B	D8		2B	3B	4B	C4	6B	E4
C	F8	C6	2C	3C	4C	D6	6C	F6
D	5C3044 ("\0D")	E6	2D	3D	4D	D1	6D	F1
E	C5	DF	2E	3E	4E	DC	6E	FC
F	E5	C9	2F	3F	4F	A7	6F	E0

Table 4: GSM Extended Characters (2)

0	1	2	3	4	5	6	7
0				7C			
1							
2							
3							
4	5E						
5							
6							
7							
8		7B					
9		7D					
A							

B	
C	5B
D	7E
E	5D
F	5C3543 ("\5C")

5.2. Note for AT+CSCS="UCS2"

When using the AT+CSCS="UCS2", if the USSD message is an ASCII one, you need to translate the whole USSD URC message from UNICODE to ASCII.

When AT+CSCS="UCS2", all of text content should be input or output by UCS2 coding. The related AT commands or URCs are +CUSD, +CLCC, +CNUM, +CPBF, +CPBR, +CPBW, +CMGR, +CSCA, +CMGL, +CMGS, +CMGW, +QCMGS and +QCMGW.

When AT+CSCS="UCS2" and the USSD's DCS is GSM 7 bit, the max length of USSD text content is 832 bytes. The whole URC can reach to 846 bytes.