



Technical Document

**LLD SPECIFICATION. NOTIFICATION OF
CCM FOR INDIVIDUAL CALLS %CCCM.**

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Notes:

1. Initial version

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1 Introduction

The New proprietary AT%CCCM command and unsolicited result code relate to Advice of Charge supplementary service that enables subscriber to get information about the cost of individual calls.

2 Interface changes

%CCCM parameter command syntax

Command	Possible response(s)
%CCCM=[<n>]	OK
%CCCM?	%CCCM: <n> OK
%CCCM=?	%CCCM: (list of supported <n>s) OK

Description

This refers to Advice of Charge supplementary service (3GPP TS 22.024 [26] and 3GPP TS 22.086 [27]) that enables subscriber to get information about the cost of individual calls. With <n>=1, the execute command enables an unsolicited event reporting the CCM information. The unsolicited result code %CCCM: < LineID>,<ccm> is sent when the CCM value for the call identified by <LineID> changes. Deactivation of the unsolicited event reporting is made with the same command with <n>=0.

Defined values

<n> (parameter sets/shows the result code presentation status in the MT/TA):

0 disable

1 enable

<LineID> identifies ALS Line ID

- 1 Speech Mode
- 2 Auxiliary Speech Mode

<ccm> string type; three bytes of the current call meter value in hexadecimal format (e.g. "00001E" indicates decimal value 30); value is in home units and bytes are similarly coded as ACMmax value in the SIM card or in the active application in the UICC (GSM or USIM)

3 Proposed Low Level Design.

3.1 Interface Changes

The %CCCM command will be defined as described above.

3.2 ATI Modifications.

3.2.1 New Functions:

-setatPercentCCCM() will handle the %CCCM set command.
-queatPlusCCCM () will handle the %CCCM query command

3.2.2 Affected Global variables:

ati_cmd.c:

The ATI array "cmds" will be updated with the new functions as follow:

setatPercentCCCM()

queatPlusCCCM ()

For the test command echo the following string will be added to the ATI array "cmds" to be handled via test_gen.

"%s: (0, 1)"

aci_cmh.h:

Addition of the ID AT_CMD_P_CCCM will be necessary to type T_ACI_AT_CMD for call to the functions above.

<n> Sets/shows the result code presentation status in the MT/TA.

Percent_CCCM_stat will be added to type T_ATI_USER_OUTPUT_CFG for the global variable ati_user_output_cfg[CMD_SRC_MAX] for set/query functionality of the %CCCM command.

3.2.3 Description of the changes:

Ati_cc.c:

%CCCM Set and Query functions will do the following:

setatPercentCCCM() will call GenAtCR_C(cl, srcId, AT_CMD_P_CCCM).

queatPercentCCCM() will display the current settings for the parameter <n>.

GenAtCR_C () will be modified to include case for AT_CMD_P_CCCM where ati_user_output_cfg[] will be updated as shown below for the AT command parameter <n>.

```
case( AT_CMD_P_CCCM ):  
    ati_user_output_cfg[srcId].Percent_CCCM_stat = x;
```

3.3 CMH Modications

3.3.1 New Callback:

A Callback is required for when the presentation of the Advice of Charge supplementary service at the TE is enabled, result code will be as below:

%CCCM: <cid>,<pcccm>.

Here Advice of charge information is given for a particular call identified by <cid>. The results code is sent when a change is identified in the Advice of charge for a call.

As with all other unsolicited messaged we make use of the RAT_ macro to display the result code.

aci_cmh.h

RAT_P_CCCM will be added to type RAT_ID.

Additionally the prototype will be added as below:

```
EXTERN void rAT_PercentCCCM ( SHORT cid,  
                             ULONG *pcccm );
```

The rAT_PercentCCCM function definition will be implemented either in mfw_cm.c (like rAT_PlusCCCM) or in a dummy functions module. All it needs to do is return.

Ati_ret.c

Here a new ATI function rCI_PercentCCCM as below will be implemented which corresponds to the rAT_PercentCCCM function. The setting of ati_user_output_cfg[srcId].CCCM_stat will be used to generate the +CDIP: result code (comparable to rCI_PlusCLIP).

```
GLOBAL void rAT_PercentCCCM ( SHORT cid,  
                             ULONG *pcccm );
```

Cmh_f.c:

New element for %CCCM will be added to the array RATJumpTbl
CB_VC(PercentCCCM), /* RAT_P_CCCM */

Aoc.c:

The existing function `aoc_send_ccm()` already searches for connected calls via function `qAT_CallActive`.

The function `qAT_CallActive(&cld)` function will be modified to return the call ID `<cld>` of the active call. The `<cld>` is necessary to find the `srcId` for the originating caller.

The %ALS setting is then queried with the following function:

```
cmhCC_get_active_als_mode( srcId, &mode );
```

Returned value `<mode>` has the following structure and will be used for `<LineID>` when sending the unsolicited results code:

```
typedef enum          /* %ALS parameter <mod> bit_field*/
{
    ALS_MOD_NOTPRESENT = 0,
    ALS_MOD_SPEECH     = 1,
    ALS_MOD_AUX_SPEECH = 2
} T_ACI_ALS_MOD;
```

Sending Unsolicited Results Code:

```
R_AT( RAT_P_CCCM, idx )( < LineID>, <ccm> );
```

The function `aoc_send_ccm()` is already being called from various locations to yield initial AOC info and AOC incremental updates for connected call(s).

3.4 BAT

For BAT the equivalent is:

BAT_RES_UNSPERCENT_CCCM T_BAT_res_uns_percent_cccm;

typedef struct

```
{
    U16      cid;          /* Call identification number */
    U32      pcccm;        /* Current Call Meter for call with <cid> */
} T_BAT_res_uns_percent_cccm;
```

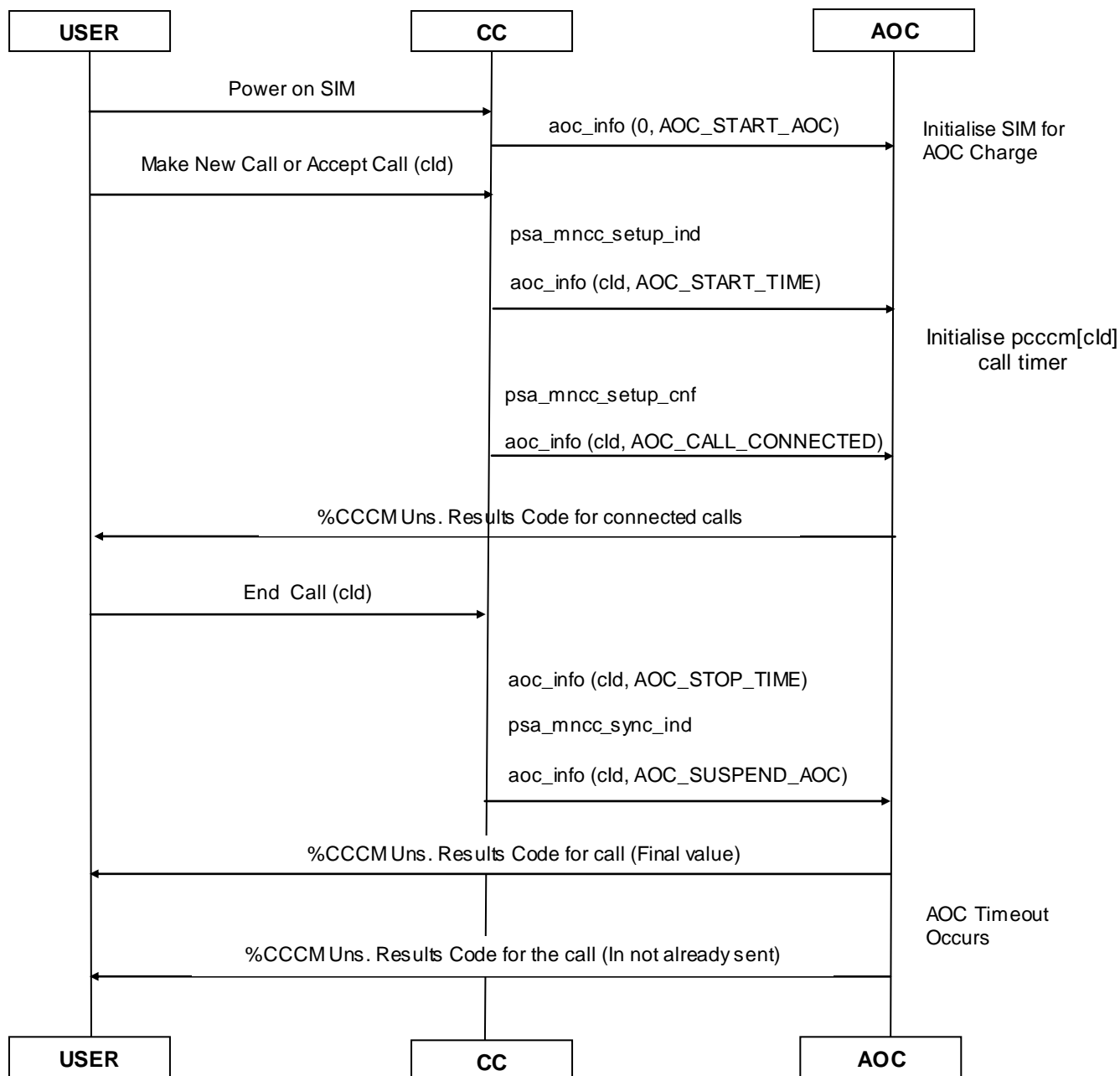
There will be no application control over the generation of this unsolicited result code (i.e. no need to enable and disable with a BAT_CMD_SET_PERCENT_CCCM equivalent to AT%CCCM=[<n>] as it is always enabled with BAT).

If there is more than one connected call then more BAT results code instances T_BAT_res_uns_percent_cccm will be sent to match the number of connected calls.

3.4.1 BAT Testing

The BAT_RES_UNSPERCENT_CCCM results code will occur whenever there is a change in the Advice of Charge for a call.

3.5 Individual Call Timer Notification - %CCCM



Abbreviations:

AOC Advance of Charge
CC Call Control
cld Call Id

4 Simulation Tests

The following simulation test cases will be added:

-Testcase 1 - %CCCM Test Command

%CCCM=?
%CCCM: (0, 1)

-Testcase 2 - %CCCM Disable, Enable and Query Command

%CCCM=0 /* This will disable AOC unsolicited results code for this command */
OK,+CME ERROR

%CCCM? /* Query when Disabled */
%CCCM: 0

%CCCM=1 /* This will Enable AOC unsolicited results code for this command */
OK,+CME ERROR

%CCCM? /* Query when Enabled */
%CCCM: 1

Call Session ...

No %CCCM Unsolicited results code is received

-Testcase 3 - Disable %CCCM, +CAOC Enabled (1 Connected Call)

%CCCM=0 /* This will Disable %CCCM unsolicited results code */
OK,+CME ERROR

Call Session ... giving rise to change in Advice of Charge (1 Connected Call).

Time Delay in call ...20 seconds

No %CCCM Unsolicited results code is received

AT+CAOC=0 /* Query CCM value */

+CAOC: 000014 /* CCM value for all calls */

-Testcase 4 - Enable %CCCM, Query CCM value (1 Connected Call)

%CCCM=1 /* This will Enable %CCCM unsolicited results code */
OK,+CME ERROR

Setup Call Session ... giving rise to change in Advice of Charge (1 Connected Call).

Time Delay in call ...25s

%CCCM: 0, 00000A /* Format is %CCCM: <Call Id1>, <PCCCM> for the Call */

5s Delay....

%CCCM: 0, 00000C

5s Delay....

%CCCM: 0, 00000E

More delays...

%CCCM: 0, 000014

Terminate Call...

AT+CAOC=0 /* Query CCM value */

+CAOC: 000014 /* CCM value for call */

-Testcase 5 - Enable %CCCM, Query CCM value (2 Connected Calls)

%CCCM=1 /* This will enable %CCCM unsolicited results code */
OK,+CME ERROR

Set up the 1st Call Session ... giving rise to change in Advice of Charge.

Time Delay in call ...25 Seconds

%CCCM: 0, 00000A /* Format is %CCCM: <Call Id1>, <PCCCM> for the Call */

5s Delay....

%CCCM: 0, 00000C

5s Delay....

%CCCM: 0, 00000E

Set up the 2nd Call Session ... giving rise to change in Advice of Charge. (2 Connected Calls)

More delays...

%CCCM: 0, 000012 /* For the 1st Call */
%CCCM: 1, 000002 /* For the 2nd Call */

10s Delay

%CCCM: 0, 000016
%CCCM: 1, 000006

Terminate All Calls...

AT+CAOC=0 /* Query CCM value */

+CAOC: 00001E /* CCM value for call, which is the total of individual call timers above */

/* N.B. This total CCM value 0x1E above is 2 units more than the total of the %CCCM value for the 2 calls. This discrepancy is due to delays caused when setting up calls during which the %CCCM timers are not incremented. */

Similar functionality will be tested in the target.

5 List of References

- [1] 3GPP TS 27.007 v3.13.0
- [2] 3GPP TS 22.024
- [3] 3GPP TS 22.086