

Software Development Kit

Handset HA88

Message Catalogue

Contents

| | | |
|----------|--|----|
| 1 | Introduction | 4 |
| 2 | General Commands | 5 |
| 2.1 | POWER_OFF..... | 5 |
| 2.2 | Response POWER_OFF..... | 5 |
| 2.3 | Reject POWER_OFF..... | 5 |
| 2.4 | POWER_ON..... | 5 |
| 2.5 | Set phone functionality +CFUN..... | 6 |
| 3 | Call Control Commands | 7 |
| 3.1 | 3.1 AT Messages..... | 8 |
| 3.1.1 | 3.1.1 Command Messages..... | 8 |
| 3.1.1.1 | AT_ACCEPT_CALL..... | 8 |
| 3.1.1.2 | AT_DIAL_NUMBER..... | 8 |
| 3.1.1.3 | AT_DIAL_FROM_MEMORY..... | 8 |
| 3.1.1.4 | AT_HANGUP_SINGLE_CALL..... | 8 |
| 3.1.1.5 | AT_HANGUP_ALL_CALLS..... | 9 |
| 3.1.1.6 | AT_SEND_DTMF..... | 9 |
| 3.1.1.7 | AT_SET_MICROMUTE..... | 9 |
| 3.1.1.8 | AT_GET_PHONE_VERSION..... | 9 |
| 3.1.1.9 | AT_ENTER_PIN..... | 10 |
| 3.1.1.10 | AT_CHANGE_PIN..... | 10 |
| 3.1.1.11 | AT_ENTER_PUK..... | 11 |
| 3.1.1.12 | AT_GET_PHONESTATE..... | 11 |
| 3.1.1.13 | AT_GET_SUPPORTED_PHONESTATE..... | 11 |
| 3.1.1.14 | AT_SET_REGISTER_PRESENTATION..... | 12 |
| 3.1.1.15 | AT_GET_CURRENT_NETWORK_OPERATOR..... | 12 |
| 3.1.1.16 | AT_GET_AVAILABLE_NETWORK_OPERATOR..... | 12 |
| 3.1.1.17 | AT_GET_PREFERRED_NETWORK_OPERATOR..... | 12 |
| 3.1.1.18 | AT_SET_NETWORK_OPERATOR..... | 13 |
| 3.1.1.19 | AT_SET_PHONEBOOK_MEMORY..... | 13 |
| 3.1.1.20 | AT_READ_PHONEBOOK..... | 14 |
| 3.1.1.21 | AT_READ_LAST_CALL_LIST..... | 14 |
| 3.1.1.22 | AT_FIND_NAME..... | 14 |
| 3.1.1.23 | AT_GET_COLP_INFO..... | 15 |
| 3.1.1.24 | AT_EDIT_PHONEBOOK_ENTRY..... | 16 |
| 3.1.1.25 | AT_SET_AUTOANSWER_MODE..... | 16 |
| 3.1.1.26 | AT_GET_AUTOANSWER_MODE..... | 17 |
| 3.1.1.27 | AT_GET_SENDDNUMBER_MODE..... | 17 |
| 3.1.1.28 | AT_SET_SENDDNUMBER_MODE..... | 17 |
| 3.1.1.29 | AT_GET_CURRENT_CALLS..... | 17 |
| 3.1.1.30 | AT_READ_SMSC..... | 18 |
| 3.1.1.31 | AT_WRITE_SMSC..... | 18 |
| 3.1.1.32 | AT_LIST_SMS_MESSAGES..... | 18 |
| 3.1.1.33 | AT_READ_SMS_MESSAGE..... | 19 |
| 3.1.1.34 | AT_DELETE_SMS_MESSAGE..... | 19 |
| 3.1.1.35 | AT_WRITE_SMS_MESSAGE..... | 19 |

| | | |
|----------|---|----|
| 3.1.1.36 | AT_GET_SIM_IMSI..... | 20 |
| 3.1.1.37 | AT_GET_PRODUCT_NUMBER | 20 |
| 3.1.2 | Report Messages..... | 21 |
| 3.1.2.1 | REPORT_COLP_INFO | 21 |
| 3.1.2.2 | REPORT_CLIP_INFO..... | 21 |
| 3.1.2.3 | REPORT_MICROMUTE | 22 |
| 3.1.2.4 | REPORT_PHONE_VERSION..... | 22 |
| 3.1.2.5 | REPORT_PHONESTATE | 23 |
| 3.1.2.6 | REPORT_PHONEBOOK_MEMORY | 23 |
| 3.1.2.7 | REPORT_PHONEBOOK_ENTRIES | 24 |
| 3.1.2.8 | REPORT_LAST_CALL_LIST | 24 |
| 3.1.2.9 | REPORT_NAME..... | 25 |
| 3.1.2.10 | REPORT_AUTOANSWER_MODE | 25 |
| 3.1.2.11 | REPORT_SENDNUMBER_MODE | 26 |
| 3.1.2.12 | REPORT_ERROR..... | 26 |
| 3.1.2.13 | REPORT_SMS_ERROR..... | 27 |
| 3.1.2.14 | REPORT_REGISTER_NETWORK..... | 28 |
| 3.1.2.15 | REPORT_NETWORK_OPERATOR | 29 |
| 3.1.2.16 | REPORT_PREFFERED_NETWORK_OPERATOR..... | 30 |
| 3.1.2.17 | REPORT_NETWORK_FIELDSTRENGTH..... | 30 |
| 3.1.2.18 | REPORT_CURRENT_CALLS..... | 31 |
| 3.1.2.19 | REPORT_SMSC..... | 32 |
| 3.1.2.20 | REPORT_SMS_INDICATOR..... | 33 |
| 3.1.2.21 | REPORT_READ_SMS_MESSAGES..... | 34 |
| 3.1.2.22 | REPORT_LIST_SMS_MESSAGES | 34 |
| 3.1.2.23 | REPORT_CLASS3_SMS_MESSAGES | 35 |
| 3.1.2.24 | REPORT_SIM_IMSI..... | 35 |
| 3.1.2.25 | REPORT_PRODUCT_NUMBER | 35 |
| 3.2 | Data Commands..... | 36 |
| 3.2.1 | Switch from Online to Offline Mode..... | 36 |
| 3.2.2 | Back to Online Mode..... | 36 |
| 4 | References | 37 |

1 Introduction

This document describes the message catalogue (MC) for the communication between a handset device (HA) or another application (for example PDA) and a mobile telephone unit (TPU):

- The client is the display device, which requests information from the server by the means of commands. The TPU must react and answer to all commands from the HA no matter in which order it receives them.
- Every command has exactly one corresponding response apart from the error report REPORT_ERROR.

2 General Commands

This chapter lists the system messages and their parameters implemented by TPU.

2.1 *POWER_OFF*

The power off command is necessary when the TPU can not be connected to the IGNITION ON wire of a car. It is transmitted to signalize a completely power off in XX minutes. So the TPU should be able to store all essential information and parameters before switched off.

This command stops the GSM software stack as well as the hardware layer.

| Parameter | Length [bytes] | Possible elements | Value [hex.] |
|--------------------|-------------------|----------------------|--------------|
| AT+CPOF | 7 | | |
| Sum [bytes] | 7 | | |

2.2 *Response POWER_OFF*

- to response power off:

| Parameter | Length [bytes] | Possible elements | Value [hex.] |
|--------------------|-------------------|----------------------|--------------|
| +CPOF | 5 | | |
| Space | 1 | SPACE | 20 |
| Indicator | 1 | 1 | 31 |
| Sum [bytes] | 7 | | |

2.3 *Reject POWER_OFF*

- to reject power off when the system is in a call. To initiate the power off procedure again the AT+CPOF command is necessary.

| Parameter | Length [bytes] | Possible elements | Value [hex.] |
|--------------------|-------------------|----------------------|--------------|
| +CPOF | 5 | | |
| Space | 1 | SPACE | 20 |
| Indicator | 1 | 0 | 30 |
| Sum [bytes] | 7 | | |

2.4 *POWER_ON*

- to stop the power_off procedure and activate the GSM module again. It will be answered with OK.

| Parameter | Length [bytes] | Possible elements | Value [hex.] |
|--------------------|-------------------|----------------------|--------------|
| AT+CPON | 7 | | |
| Sum [bytes] | 7 | | |

2.5 Set phone functionality +CFUN

This command selects the GSM module's level of functionality. When the application wants to stop the module with a power off, or if the application wants to force the product to execute an IMSI DETACH procedure, then it must send: AT+CFUN=0

This command executes an IMSI DETACH and makes a backup copy of some internal parameters in SIM and in EEPROM. The SIM card cannot then be accessed. Because of not powering off the TPU with AT+CFUN=0 by the application after this command has been sent, a re-start command (AT+CFUN=1) will have to be issued to restart the whole GSM registration process.

The AT+CFUN=1 command restarts the entire GSM stack and GSM functionality: a complete software reset is performed. All parameters are reset to their previous values if AT&W was not used.

| Parameter | Length [bytes] | Possible elements | Value [hex.] |
|---------------------|-------------------|----------------------|--------------|
| AT+CFUN= | 8 | | |
| functionality_level | 1 | 0, 1 | |
| Sum [bytes] | 9 | | |

The following functionality levels are available:

| functionality_level | Value | Description | Code [hex] |
|---------------------|-------|--|---------------|
| POWER_OFF | 0 | Set minimum functionality, IMSI detach procedure | 30 |
| RESTART | 1 | Set the full functionality mode with a complete software reset | 31 |

3 Call Control Commands

Semantics

- (1) The HA will use AT Commands to control the TPU.
- (2) Every Command from the HA has to be acknowledged by the TPU by using the GSM standardised response.
- (3) The TPU will use indications to send actual states to the monitoring HA.
- (4) It is not allowed to send a new Command when the previous is not acknowledged.

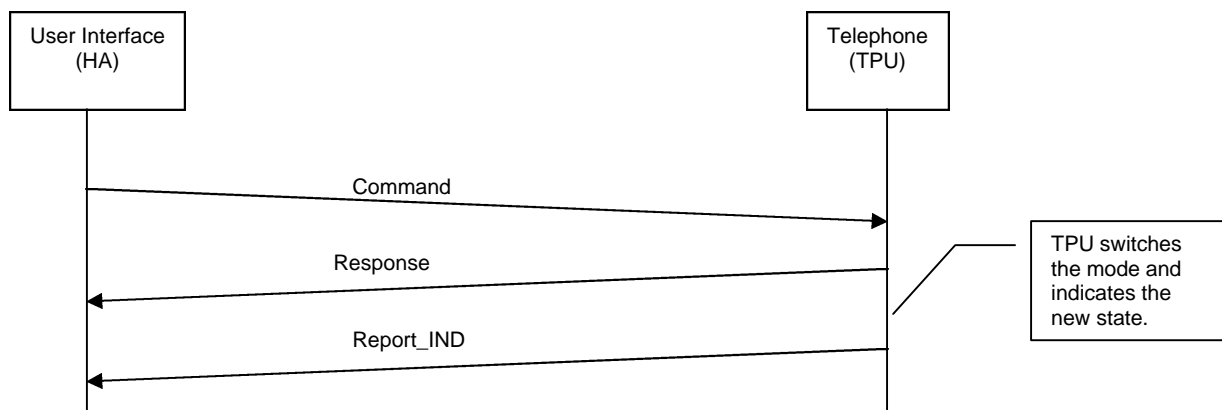


Figure 1: The HA sends a command to the TPU. TPU acknowledges it and indicates the new state.

3.1 3.1 AT Messages

3.1.1 3.1.1 Command Messages

3.1.1.1 AT_ACCEPT_CALL

- to answer an incoming call.

| Parameter | Length [bytes] | Possible elements | Value [hex.] |
|--------------------|-------------------|----------------------|--------------|
| ATA | 3 | | |
| Sum [bytes] | 3 | | |

3.1.1.2 AT_DIAL_NUMBER

- to originate an outgoing call to the specified phone number.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|--------------------|-------------------|-------------------------|--------------------|
| ATD | 3 | | |
| data_number[] | 0..32 | '+', 'p', 'w', '0'..'9' | 2B, 70, 77, 30..39 |
| Sum [bytes] | 3..36 | | |

Number of chars: USA max. 32, GSM max. 30

3.1.1.3 AT_DIAL_FROM_MEMORY

- to originate an outgoing call with a phone number from location data_index. It is manufacturer specific which memory storage of TPU , SIM and phone is used. It is recommended to use command Select Phonebook Memory with AT_SET_PHONEBOOK_MEMORY before.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|--------------------|-------------------|----------------------|--------------|
| ATD> | 4 | | |
| data_index | 1..4 | '0'..'9' | 30..39 |
| Sum [bytes] | 5..9 | | |

3.1.1.4 AT_HANGUP_SINGLE_CALL

- to hang up or reject a single call. The command can only be used for a single call.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|--------------------|-------------------|----------------------|--------------|
| ATH | 3 | | |
| Sum [bytes] | 3 | | |

3.1.1.5 AT_HANGUP_ALL_CALLS

- to cause the phone to hang up all calls (active and hold). This command can also be used for a single call.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|--------------------|-------------------|----------------------|--------------|
| AT+CHUP | 7 | | |
| Sum [bytes] | 7 | | |

3.1.1.6 AT_SEND_DTMF

- to transmit a DTMF-tone. It operates only in voice-mode. The duration of the tone should be specified in the specification for the TPU and implemented there. The TPU will send an OK-State report after executing the DTMF-tone.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|--------------------|-------------------|-------------------------|--------------------|
| AT+VTS= | 7 | | |
| data_dtmf | 1 | '+', 'p', 'w', '0'..'9' | 2B, 70, 77, 30..39 |
| Sum [bytes] | 8 | | |

3.1.1.7 AT_SET_MICROMUTE

- to control the microphone during a call. The TPU reports the new state.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|--------------------|-------------------|----------------------|--------------|
| AT+CMUT= | 8 | | |
| micromute_mode | 1 | see table below | |
| Sum [bytes] | 9 | | |

The following settings for microphone mute are available:

| micromute_mode | Value | Description | Code [hex] |
|----------------|-------|---------------------|---------------|
| MICROMUTE_OFF | 0 | activate microphone | 30 |
| MICROMUTE_ON | 1 | mute microphone | 31 |

3.1.1.8 AT_GET_PHONE_VERSION

- to get the GSM software version / date / time, the software version / date / time of TPU and the hardware version of TPU.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|--------------------|-------------------|----------------------|--------------|
| AT+CGMR | 7 | | |
| Sum [bytes] | 7 | | |

3.1.1.9 AT_ENTER_PIN

- to send a password (SIM PIN or LockCode) to the telephone unit. If the user application tries to make an outgoing call before the SIM PIN code has been confirmed, then the TPU will refuse the "ATD" command with a "+CME ERROR:11" (SIM PIN required).

The application is responsible for checking the PIN after each reset or power on - if the PIN was enabled. If no PIN request is pending or the password was wrong, no action is taken towards the phone and an error message, +CME ERROR, is returned. With correct PIN dialled the phone will send the report message REPORT_OK.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|--------------------|-------------------|----------------------|--------------|
| AT+CPIN= | 8 | | |
| quotes | 1 | " | 22 |
| data_pincode[] | 3..8 | '0'..'9' | 30..39 |
| quotes | 1 | " | 22 |
| Sum [bytes] | 13..18 | | |

(Maximal number of characters for the code: USA 3 or 4, GSM 4..8)

To ascertain which code must be entered (or not), the following query command can be used:
AT+CPIN?

The possible responses are:

+CPIN: READY - SIM is not pending for any password

+CPIN: SIM PUK - PUK is required

+CME ERROR: <err> SIM failure (13) absent (10) etc...

Please note that in this case the mobile equipment does not end its response with the OK string.

The response +CME ERROR : 13 (SIM failure) is returned after 10 unsuccessful PUK attempts. The SIM card is then out of order and must be replaced by a new one.

3.1.1.10 AT_CHANGE_PIN

- to change a password.

If the password was wrong, no action is taken towards the phone and an error message, +CME ERROR, is returned. In the other case the phone will send the OK report.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|--------------------|-------------------|----------------------|--------------|
| AT+CPWD= | 8 | | |
| Quotes | 1 | " | 22 |
| data_group[] | 2 | See table below | |
| Quotes | 1 | " | 22 |
| Comma | 1 | , | 2C |
| Quotes | 1 | " | 22 |
| data_oldcode[] | 3..8 | '0'..'9' | 30..39 |
| Quotes | 1 | " | 22 |
| Comma | 1 | , | 2C |
| Quotes | 1 | " | 22 |
| data_newcode[] | 3..8 | '0'..'9' | 30..39 |
| Quotes | 1 | " | 22 |
| Sum [bytes] | 27..31 | | |

The following state of data_group[] is possible:

| data_group | Description | Code [hex] |
|------------|---------------------|------------|
| CODE_SC | Change the PIN code | 53 43 |

3.1.1.11 AT_ENTER_PUK

- to send the SIM PUK, PH-SIM PIN, etc. to the telephone unit. It is necessary when the SIM is locked, because of entered the wrong PIN triple. Within these codes a new PIN (<b_data_newpin>) has to be send to replace the old PIN in the SIM. If no PUK request is pending or the password was wrong, no action is taken towards the phone and an error message, +CME ERROR, is returned to HA. The TPU will report the new status.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|--------------------|-------------------|----------------------|--------------|
| AT+CPIN= | 8 | | |
| Quotes | 1 | " | 22 |
| data_puk[] | 10 | '0'..'9' | 30..39 |
| Quotes | 1 | " | 22 |
| Comma | 1 | , | 2C |
| Quotes | 1 | " | 22 |
| data_newpin[] | 4..8 | '0'..'9' | 30..39 |
| Quotes | 1 | " | 22 |
| Sum [bytes] | 27..31 | | |

3.1.1.12 AT_GET_PHONESTATE

- to ask for the current GSM module activity status.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|--------------------|-------------------|----------------------|--------------|
| AT+CPAS | 7 | | |
| Sum [bytes] | 7 | | |

3.1.1.13 AT_GET_SUPPORTED_PHONESTATE

- to ask for the supported values.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|--------------------|-------------------|----------------------|--------------|
| AT+CPAS=? | 9 | | |
| Sum [bytes] | 9 | | |

3.1.1.14 AT_SET_REGISTER_PRESENTATION

- to control the presentation of an unsolicited result code. With <data_state> = 1 the TPU will send a REPORT_REGISTER_NETWORK when there is a change in the TPU network registration.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|--------------------|-------------------|----------------------|--------------|
| AT+CREG= | 8 | see table below | |
| register_mode | 1 | | |
| Sum [bytes] | 9 | | |

The following setting for the presentation of an unsolicited result code is possible:

| register_mode | Value | Description | Code [hex] |
|----------------------|-------|--|------------|
| REGISTER_ENABLE_PRES | 1 | enable network register unsolicited result code | 31 |

3.1.1.15 AT_GET_CURRENT_NETWORK_OPERATOR

- to get the current network operator (PLMN). The TPU should transfer the name in numeric size.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|--------------------|-------------------|----------------------|--------------|
| AT+COPS? | 8 | | |
| Sum [bytes] | 8 | | |

3.1.1.16 AT_GET_AVAILABLE_NETWORK_OPERATOR

- to get all the available PLMN. The TPU should transfer the names in numeric size.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|--------------------|-------------------|----------------------|--------------|
| AT+COPS=? | 9 | | |
| Sum [bytes] | 9 | | |

3.1.1.17 AT_GET_PREFERRED_NETWORK_OPERATOR

- to get the preferred network operator list. The TEL has to transfer the names in numeric size.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|--------------------|-------------------|----------------------|--------------|
| AT+CPOL? | 8 | | |
| Sum [bytes] | 8 | | |

3.1.1.18 AT_SET_NETWORK_OPERATOR

- to change the current network operator. The user chooses between the available network operators and the preferred list.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|--------------------|-------------------|----------------------|--------------|
| AT+COPS= | 8 | | |
| register_mode | 1 | see table below | |
| comma | 1 | , | 2C |
| format | 1 | numeric size | 32 |
| comma | 1 | , | 2C |
| quotes | 1 | " | 22 |
| Operator_code[] | 5 | '0'..'9' | 30..39 |
| quotes | 1 | " | 22 |
| Sum [bytes] | 19 | | |

The following state of register_mode is possible:

| register_mode | Description | Code [hex] |
|---------------|--|------------|
| MANUAL | set the network operator manual | 31 |
| AUTOMATIC | set the network operator automatically | 30 |

Rule:

If the parameter register_mode is set to automatic, all other parameters are not necessary.

3.1.1.19 AT_SET_PHONEBOOK_MEMORY

- to select phonebook memory storage. If <data_storage> is equal to "FF" it will ask for the current selected phonebook. If setting fails in a TPU error, REPORT_ERROR is returned. Refer the table of available error messages.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|--------------------|-------------------|----------------------|--------------|
| AT+CPBS= | 8 | | |
| quotes | 1 | " | 22 |
| data_storage[] | 2 | see table below | |
| quotes | 1 | " | 22 |
| Sum [bytes] | 12 | | |

The following phone book memory storages are possible:

| B_data_storage | Description | Code [hex] |
|----------------|---|------------|
| STORAGE_MC | TPU missed (unanswered received) calls list | 4D 43 |
| STORAGE_RC | TPU received (answered) calls list | 52 43 |
| STORAGE_ON | Own numbers | 4F 4E |

After reading an entry the phonebook selection will be fall back to the SIM phonebook. For reading the list of last calls there is another command (AT+CDCR).

3.1.1.20 AT_READ_PHONEBOOK

- to return phonebook entries in location number range <data_first_index> .. <data_last_index> from the current phonebook memory, selected with AT_SET_PHONEBOOK_MEMORY. If <data_last_index> is left out, only location <data_first_index> is returned.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|---------------------|-------------------|----------------------|--------------|
| AT+CPBR= | 8 | | |
| data_first_index[] | 1..4 | '0'..'9' | 30..39 |
| comma | 1 | , | 2C |
| data_last_index[] | 1..4 | '0'..'9' | 30..39 |
| Sum [bytes] | 11..17 | | |

3.1.1.21 AT_READ_LAST_CALL_LIST

- to return the last calls list entries in location number range <data_first_index> .. <data_last_index> of the current SIM card. If <data_last_index> is left out, only location <data_first_index> is returned.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|---------------------|-------------------|----------------------|--------------|
| AT+CDCR= | 8 | | |
| data_first_index[] | 1..4 | '0'..'9' | 30..39 |
| comma | 1 | , | 2C |
| data_last_index[] | 1..4 | '0'..'9' | 30..39 |
| Sum [bytes] | 11..17 | | |

3.1.1.22 AT_FIND_NAME

- to return phonebook entry (from the current used phonebook) which alphanumeric field starts with string <data_searchstring>. Entry fields returned are location number [<index>] from the TPU, stored phone number [<number>] and text [<text>] associated with the number. If listing fails in a TPU error, REPORT_ERROR is returned. Refer the table of available error messages.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|-----------------------|-------------------|----------------------|--------------|
| AT+CPBF= | 8 | | |
| quotes | 1 | " | 22 |
| data_searchstring[] | 1..3 | 'A'..'Z' | 41..5A |
| quotes | 1 | " | 22 |
| comma | 1 | , | 2C |
| upper_lower_case_mode | 1 | see table below | |
| Sum [bytes] | 13..15 | | |

The following settings for upper / lower case are available:

| upper_lower_case_mode | Value | Description | Code [hex] |
|-----------------------|-------|----------------------------------|---------------|
| UPPER_LOWER_CASE_OFF | 0 | Size of letter doesn't matter | 30 |
| UPPER_LOWER_CASE_ON | 1 | consider capital / small letters | 31 |

The default value is "Size of letter doesn't matter".

3.1.1.23 AT_GET_COLP_INFO

- to return a phonebook entry how's belong to the phone number or to the name searched. The parameter search_mode defines the kind of the search (search for name or for number). By using search name, the difference to the message AT_FIND_NAME is only the length of the search string (with this function you can search for the completely name). If there is no match, the parameter data[] of the report is empty.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|----------------------|-------------------|----------------------|--------------|
| AT+COLP= | 8 | | |
| search_mode | 1 | see table below | |
| comma | 1 | , | 2C |
| quotes | 1 | " | 22 |
| data_searchstring[] | 1..32 | all characters | 20...FE |
| quotes | 1 | " | 22 |
| Sum [bytes] | 13..44 | | |

The following settings for search_mode case are available:

| search_mode | Value | Discription | Code [hex] |
|----------------|-------|---------------------------|---------------|
| NAME_TO_NUMBER | 0 | Find a name to the number | 30 |
| NUMBER_TO_NAME | 1 | Find a number to the name | 31 |

3.1.1.24 AT_EDIT_PHONEBOOK_ENTRY

- to enter a new, to edit or to delete an existing entry in the current phonebook selected with AT_SET_PHONEBOOK_MEMORY.

To enter a new entry, the parameter <data_index> has to be omitted.

To edit an existing entry, <data_index> specifies the storage number for replace.

To delete an existing entry, only the parameter <data_index> has to be given.

After executing the command the TPU returns with an REPORT_OK. If writing fails in a TPU error, REPORT_ERROR is returned. Refer the table of available error messages.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|--------------------|-------------------|--------------------------|--------------------|
| AT+CPBW= | 8 | | |
| data_index[] | 1..4 | '0'..'9' | 30..39 |
| comma | 1 | , | 2C |
| quotes | 1 | " | 22 |
| data_number[] | 1..32 | +',', 'p', 'w', '0'..'9' | 2B, 70, 77, 30..39 |
| quotes | 1 | " | 22 |
| comma | 2 | , , | 2C 2C |
| quotes | 1 | " | 22 |
| data_name[] | 0..20 | all characters | 20...FE |
| quotes | 1 | " | 22 |
| Sum [bytes] | 17..71 | | |

3.1.1.25 AT_SET_AUTOANSWER_MODE

- to control the auto answer mode of the phone. The phone will send the new state.

To get the current mode <autoanswer_mode> has to be equal to **query_mode**.

To disable the auto answer mode <autoanswer_mode> has to be equal to **autoanswer_off** (default).

All other values enable the auto answer mode and are setting the number of call indications (rings) before automatically answering the call.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|--------------------|-------------------|----------------------|--------------|
| ATS0= | 5 | | |
| autoanswer_mode | 1..2 | see table below | |
| Sum [bytes] | 6 | | |

The following settings for auto answer are available:

| autoanswer_mode | Value | Description | Code [hex] |
|-----------------|-------|---------------------------------|---------------|
| AUTOANSWER_OFF | 0 | no auto answer | 30 |
| AUTOANSWER_ON | 1..99 | auto answer after <Value> rings | 30..39 |

3.1.1.26 AT_GET_AUTOANSWER_MODE

- to get the current setting of the autoanswer mode.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|--------------------|-------------------|----------------------|--------------|
| ATS0? | 5 | | |
| Sum [bytes] | 5 | | |

3.1.1.27 AT_GET_SENDBNUMBER_MODE

- to get the current setting for the calling line identification restriction mode (+CLIR); it allows a subscriber to enable or disable the presentation of its own phone number to the called party when originating a call.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|--------------------|-------------------|----------------------|--------------|
| AT+CLIR? | 8 | | |
| Sum [bytes] | 8 | | |

3.1.1.28 AT_SET_SENDBNUMBER_MODE

- to control the calling line identification restriction mode.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|--------------------|-------------------|----------------------|--------------|
| AT+CLIR= | 8 | | |
| sendnumber_mode | 1 | see table below | |
| Sum [bytes] | 9 | | |

The following settings for sending the own number are available:

| sendnumber_mode | Value | Description | Code [hex] |
|-----------------|-------|--------------------------------|---------------|
| SENDNUMBER_AUTO | 0 | use preset of the CLIR service | 30 |
| SENDNUMBER_ON | 1 | CLIR invocation | 31 |
| SENDNUMBER_OFF | 2 | CLIR suppression | 32 |

3.1.1.29 AT_GET_CURRENT_CALLS

- to get the list of the current calls. If command succeeds but no calls are available, no information response is sent to the handset. The TPU provides some information like state, type of the call and the number and the name when available of the other parties.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|--------------------|-------------------|----------------------|--------------|
| AT+CLCC | 7 | | |
| Sum [bytes] | 7 | | |

3.1.1.30 AT_READ_SMSC

- to return the current SMS service centre address.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|--------------------|-------------------|----------------------|--------------|
| AT+CSCA? | 8 | | |
| Sum [bytes] | 8 | | |

3.1.1.31 AT_WRITE_SMSC

- to change the SMS service centre address.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|--------------------|-------------------|-------------------------|--------------------|
| AT+CSCA= | 8 | | |
| quotes | 1 | " | 22 |
| data_number[] | 0..32 | '+', 'p', 'w', '0'..'9' | 2B, 70, 77, 30..39 |
| quotes | 1 | " | 22 |
| Sum [bytes] | 10..42 | | |

3.1.1.32 AT_LIST_SMS_MESSAGES

- to returns messages with a defined status from the current message storage of TPU. If there is a status of the message "received unread", the status in the storage changes to "received read".

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|--------------------|-------------------|----------------------|--------------|
| AT+CMGL= | 8 | | |
| list_sms_messages | 1 | see table below | |
| Sum [bytes] | 9 | | |

The following settings for the list SMS mode are available:

| list_sms_messages | Value | Description | Code [hex] |
|--------------------------|-------|------------------------------|---------------|
| LIST_SMS_RECEIVED_UNREAD | 0 | received and unread SMs only | 30 |
| LIST_SMS_RECEIVED_READ | 1 | received and read SMs only | 31 |
| LIST_SMS_STORED_UNSENT | 2 | stored and unsent SMs only | 32 |
| LIST_SMS_STORED_SENT | 3 | stored and sent SMs only | 33 |
| LIST_SMS_ALL | 4 | all SMs | 34 |

3.1.1.33 AT_READ_SMS_MESSAGE

- to returns the SMS message with the selected parameter from the current message storage. If the status is unread, it turns to read.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|------------------------------|-------------------|-------------------------------------|--------------|
| AT+CMGR= read_sms_message | 8 1.. 2 | storage index for the SMS (1-99) | 31..39 |
| Sum [bytes] | 9..10 | | |

3.1.1.34 AT_DELETE_SMS_MESSAGE

- to delete a selected message.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|--------------------------------|-------------------|-------------------------------------|--------------|
| AT+CMGD= delete_sms_message | 8 1..2 | storage index for the SMS (1-99) | 31..39 |
| Sum [bytes] | 9 ..10 | | |

3.1.1.35 AT_WRITE_SMS_MESSAGE

- to forward an SMS to the destination number and / or save an SMS on the SIM card. It contains the AT- Codes AT+CMGS and AT+CMGW, defined by b_sms_mode parameter. The SMS must be transmitted in PDU size.

Note: This command message is not a "normal" AT message. It contains more or changed information as the standard code.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|------------------------|-------------------|-------------------------|--------------|
| AT+CMGS= length_PDU | 8 1 | length of PDU string | |
| CR | 1 | < CR > | 0D |
| data[] | 0..179 | SMS message (PDU size) | 00..7F |
| control | 1 | < ctrl-Z > (ASCII = 26) | 1A |
| comma | 1 | , | 2C |
| sms_mode | 1 | see below | |
| Sum [bytes] | 14..193 | | |

The following state of sms_mode is possible:

| sms_mode | Value | Description | Code [hex] |
|-------------|-------|--------------------------------|------------|
| SMS_SEND | 1 | Send SMS to destination number | 31 |
| SMS_STORAGE | 2 | Storage SMS on SIM card | 32 |
| SMS_BOTH | 3 | Send and storage SMS | 33 |

3.1.1.36 AT_GET_SIM_IMSI

- to get the IMSI number from the SIM card.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|--------------------|-------------------|----------------------|--------------|
| AT+IMSI | 7 | | |
| Sum [bytes] | 7 | | |

3.1.1.37 AT_GET_PRODUCT_NUMBER

- to get the GSM module "Product Serial Number".

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|--------------------|-------------------|----------------------|--------------|
| AT+CGSN | 7 | | |
| Sum [bytes] | 7 | | |

3.1.2 Report Messages

- to send information like states, phone book entries etc. to the handset. The TPU sends spontaneous reports or reports as an answer of a handset command.

| Parameter | Length [bytes] | Possible elements | Value [hex.] |
|----------------------|-------------------|----------------------|--------------|
| ATC_message [8..255] | x | see below | |
| Sum [bytes] | x | | |

3.1.2.1 REPORT_COLP_INFO

- to deliver the number and if found in phonebook the name refers to the number after originating a call.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|--------------------|-------------------|-------------------------|--------------------|
| +COLP: | 6 | | |
| space | 1 | SPACE | 20 |
| quotes | 1 | " | 22 |
| data_number[] | 1..32 | '+', 'p', 'w', '0'..'9' | 2B, 70, 77, 30..39 |
| quotes | 1 | " | 22 |
| comma | 1 | , | 2C |
| comma | 1 | , | 2C |
| comma | 1 | , | 2C |
| comma | 1 | , | 2C |
| quotes | 1 | " | 22 |
| data_name[] | 0..20 | | 20...FE |
| Quotes | 1 | " | 22 |
| Sum [bytes] | 16..67 | | |

3.1.2.2 REPORT_CLIP_INFO

- to deliver (when available) the number and if found in phonebook the name refers to the number of a calling party when receiving a call.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|--------------------|-------------------|-------------------------|--------------------|
| +CLIP: | 6 | | |
| space | 1 | SPACE | 20 |
| quotes | 1 | " | 22 |
| data_number[] | 1..32 | '+', 'p', 'w', '0'..'9' | 2B, 70, 77, 30..39 |
| quotes | 1 | " | 22 |
| comma | 1 | , | 2C |
| comma | 1 | , | 2C |
| comma | 1 | , | 2C |
| comma | 1 | , | 2C |
| quotes | 1 | " | 22 |
| data_name[] | 0..20 | all characters | 20...FE |
| quotes | 1 | " | 22 |
| Sum [bytes] | 16..67 | | |

3.1.2.3 REPORT_MICROMUTE

- to confirm the execution of setting the microphone mute.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|--------------------|-------------------|----------------------|--------------|
| +CMUT: | 6 | | |
| space | 1 | SPACE | 20 |
| micromute_mode | 1 | see table below | |
| Sum [bytes] | 8 | | |

The following state of microphone mute is possible:

| micromute_mode | Value | Discription | Code [hex] |
|----------------|-------|-------------------------|---------------|
| MICROMUTE_OFF | 0 | microphone is activated | 30 |
| MICROMUTE_ON | 1 | microphone is muted | 31 |

3.1.2.4 REPORT_PHONE_VERSION

- to report the software version + date and time of GSM module software and of TPU. It contains also the hardware version of the TPU.

Note: This report message is not a “normal” AT response message. It contains more or changed information as the standard code.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|--------------------|-------------------|----------------------|--------------|
| +CGMR: | 6 | | |
| space | 1 | SPACE | 20 |
| quotes | 1 | “ | 22 |
| GSM_SW_Ver[] | 1...40 | all characters | 20...FE |
| quotes | 1 | “ | 22 |
| comma | 1 | , | 2C |
| quotes | 1 | “ | 22 |
| TPU_SW_Ver[] | 1...20 | all characters | 20...FE |
| quotes | 1 | “ | 22 |
| comma | 1 | , | 2C |
| quotes | 1 | “ | 22 |
| TPU_HW_Ver[] | 1...5 | all characters | 20...FE |
| b_quotes | 1 | “ | 22 |
| Sum [bytes] | 18...80 | | |

The following examples explain the version size:

- The software version of the GSM module GSM_SW_Ver[]
“release_revision code date time” example “310_6250.51 806216 032199 17:04”
- The software version of TPU TPU_SW_Ver[]
“version number date time” example “01.01 012202 18:02”
- The hardware version of TPU TPU_HW_Ver[]
“version number” example “3”

3.1.2.5 REPORT_PHONESTATE

- to inform about the activity state of the TPU. The TPU should send the state after start up and every time when it has changed. If HA sends the command AT_GET_SUPPORTED_PHONESTATE the TPU will report a list of the supported phone states. When the TPU reports a list the single states have to be separated with SPACE.

Note: This report message is not a “normal” AT response message. It contains more or changed information as the standard code.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|--------------------|-------------------|----------------------|--------------|
| +CPAS: | 6 | | |
| space | 1 | SPACE | 20 |
| data_state | 1 | see table below | |
| Sum [bytes] | 8 | | |

Example for data_state[length] when reporting the supported states: +CPAS:20302033

The following phone activity states are possible:

| data_state | PAS Value | Description | Code [hex] |
|------------------------|--------------|--|---------------|
| STATE_READY | 0 | phone is ready for use | 30 |
| STATE_UNAVAILABLE | 1 | ME does not allows commands from TE | 31 |
| STATE_UNKNOWN | 2 | ME is not guaranteed to respond to instructions | 32 |
| STATE_RINGING | 3 | there is an incoming call – ringing | 33 |
| STATE_CALL_IN_PROGRESS | 4 | call in progress | 34 |
| STATE_ASLEEP | 5 | ME is in low functionality state, unable to process commands | 35 |
| STATE_DIAL_IN_PROGRESS | 6 | phone choose a number currently | 36 |

3.1.2.6 REPORT_PHONEBOOK_MEMORY

- to return the current selected phone book.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|--------------------|-------------------|----------------------|--------------|
| +CPBS: | 6 | | |
| space | 1 | SPACE | 20 |
| quotes | 1 | “ | 22 |
| data_storage [] | 2 | see list in 3.1.1.19 | |
| quotes | 1 | “ | 22 |
| Sum [bytes] | 11 | | |

3.1.2.7 *REPORT_PHONEBOOK_ENTRIES*

- to deliver the requested phone book entries. A new report is sent for every entry.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|--------------------|-------------------|-------------------------|--------------------|
| +CPBR: | 6 | | |
| space | 1 | SPACE | 20 |
| data_index[] | 1..4 | '0'..'9' | 30..39 |
| comma | 1 | , | 2C |
| quotes | 1 | " | 22 |
| data_number[] | 0..32 | '+', 'p', 'w', '0'..'9' | 2B, 70, 77, 30..39 |
| quotes | 1 | " | 22 |
| comma | 1 | , | 2C |
| comma | 1 | , | 2C |
| quotes | 1 | " | 22 |
| data_name[] | 0..20 | all characters | 20...FE |
| quotes | 1 | " | 22 |
| Sum [bytes] | 15..70 | | |

3.1.2.8 *REPORT_LAST_CALL_LIST*

- to deliver the requested last call list entries. A new report is sent for every entry.

Note: This report message is not a "normal" AT response message. It contains more or changed information as the standard code.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|--------------------|-------------------|-------------------------|--------------------|
| +CDCR: | 6 | | |
| space | 1 | SPACE | 20 |
| data_index[] | 1..2 | '0'..'9' | 30..39 |
| comma | 1 | , | 2C |
| quotes | 1 | " | 22 |
| data_number[] | 0..32 | '+', 'p', 'w', '0'..'9' | 2B, 70, 77, 30..39 |
| quotes | 1 | " | 22 |
| comma | 1 | , | 2C |
| comma | 1 | , | 2C |
| quotes | 1 | " | 22 |
| data_name[] | 0..20 | all characters | 20...FE |
| quotes | 1 | " | 22 |
| Sum [bytes] | 15..68 | | |

3.1.2.9 REPORT_NAME

_ - to deliver the first phone book entry which refers to the <data_searchstring>. If no entry referring to the string could be found, the next possible entry will be delivered. For example <data_searchstring>="E" and no entry is beginning with "E" in the phonebook, an entry beginning with "F" will be send. A new command has to be sent for every entry.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|--------------------|-------------------|-------------------------|--------------------|
| +CPBF: | 6 | | |
| space | 1 | SPACE | 20 |
| data_index[] | 1..4 | '0'..'9' | 30..39 |
| comma | 1 | , | 2C |
| quotes | 1 | " | 22 |
| data_number[] | 0..32 | '+', 'p', 'w', '0'..'9' | 2B, 70, 77, 30..39 |
| quotes | 1 | " | 22 |
| comma | 1 | , | 2C |
| comma | 1 | , | 2C |
| quotes | 1 | " | 22 |
| data_name[] | 0..20 | all characters | 20..FE |
| quotes | 1 | " | 22 |
| Sum [bytes] | 15..70 | | |

3.1.2.10 REPORT_AUTOANSWER_MODE

- to confirm the execution of setting the auto answer mode and to inform the HA about the current setting. If the TPU lost the settings, it can start a requests to the HA by sending the parameter 99 spontaneous. In this case the HA answers with the SET_AUTOANSWER_MODE message.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|--------------------|-------------------|----------------------|--------------|
| ATS0: | 5 | | |
| space | 1 | SPACE | 20 |
| autoanswer_mode[] | 1..2 | see table below | |
| Sum [bytes] | 7..8 | | |

The following modes for autoanswer are possible:

| autoanswer_mode | Value | Description | Code [hex] |
|--------------------|-------|---------------------------------|---------------|
| AUTOANSWER_OFF | 0 | no auto answer | 30 |
| AUTOANSWER_ON | 1..99 | Auto answer after <Value> rings | 30..39 |
| AUTOANSWER_UNKNOWN | 255 | status unknown | FF |

3.1.2.11 REPORT_SENDBNUMBER_MODE

- to confirm the execution of setting the calling line identification restriction mode (+CLIR). It allows a calling subscriber to enable or disable the presentation of its own phone number to the called party when originating a call.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|--------------------|-------------------|----------------------|--------------|
| +CLIR: | 6 | | |
| space | 1 | SPACE | 20 |
| sendnumber_mode | 1 | see table below | |
| comma | 1 | , | 2C |
| provided_mode | 1 | see table below | |
| Sum [bytes] | 10 | | |

The following modes for setting the adjustment for outgoing calls are possible:

| sendnumber_mode | Value | Description | Code [hex] |
|-----------------|-------|--------------------------------------|---------------|
| SENDNUMBER_AUTO | 0 | use subscription of the CLIR service | 30 |
| SENDNUMBER_ON | 1 | CLIR invocation | 31 |
| SENDNUMBER_OFF | 2 | CLIR suppression | 32 |

The following modes, which shows the subscriber CLIR service status in the network are possible:

| provided_mode | Value | Description | Code [hex] |
|------------------------|-------|---|---------------|
| CLIR_NOT_PROVIDED | 0 | CLIR not provided | 30 |
| CLIR_PERM_PROVIDED | 1 | CLIR provided in permanent mode | 31 |
| UNKNOWN | 2 | unknown (e.g. no network, etc.) | 32 |
| CLIR_TEMP_PRES_REST | 3 | CLIR temporary mode presentation restricted | 33 |
| CLIR_TEMP_PRES_ALLOWED | 4 | CLIR temporary mode presentation allowed | 34 |

3.1.2.12 REPORT_ERROR

- to report an error status report immediately. It contains the error result code "+CME ERROR:". Error messages will be reported by the TPU under the following conditions:

- immediately after the TPU is powered on
- as soon as the error conditions starts
- immediately following a command that cannot be executed because the error condition that was reported prevents the execution of the command
- whenever the TEL receives an AT command that cannot be executed because the network is not available
- If the line is busy (the GSM module transfers the message "busy"), the phone must be send error message ERR_REMOTE_PARTYBUSY automatically.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|---------------------------------------|-------------------|--------------------------|--------------|
| +CME ERROR: space data_error[] | 11 1 1..2 | SPACE see table below | 20 |
| Sum [bytes] | 13..14 | | |

The following error messages are available:

| data_error | Error Value | Description | Code [hex] |
|-----------------------------|----------------|--|---------------|
| ERR_PHONE_DEFECT | 0 | phone defect | 30 |
| ERR_NOCON_TOPHONE | 1 | no connection to phone | 31 |
| ERR_OPER_NOTALLOWED | 3 | operation not allowed | 33 |
| ERR_OPER_NOTSUPPORTED | 4 | operation not supported | 34 |
| ERR_NEEDPHONE_SIMPIN | 5 | need phone to SIM PIN – GSM only | 35 |
| ERR_NEED_SIMCARD | 10 | need SIM card – GSM only | 31 30 |
| ERR_NEED_PIN | 11 | need PIN, also for unlock code in USA | 31 31 |
| ERR_NEED_PUK | 12 | need PUK – GSM only | 31 32 |
| ERR_SIM_FAILURE | 13 | activation of SIM card failed | 31 33 |
| ERR_SIM_BUSY | 14 | SIM card is busy with other actions | 31 34 |
| ERR_WRONG_PIN | 16 | incorrect password | 31 36 |
| ERR_NEED_PIN_2 | 17 | SIM PIN2 required | 31 37 |
| ERR_NEED_PUK_2 | 18 | SIM PUK2 required | 31 38 |
| ERR_MEMORY_FULL | 20 | no free space in memory | 32 30 |
| ERR_INVALID_INDEX | 21 | invalid index | 32 31 |
| ERR_ENTRY_NOTFOUND | 22 | not found | 32 32 |
| ERR_MEMORY_FAILURE | 23 | memory failure | 32 33 |
| ERR_TEXTSTRING_TOLONG | 24 | too many characters in text string | 32 34 |
| ERR_INCHAR_INTSTRING | 25 | invalid characters in text string | 32 35 |
| ERR_DIALSTRING_TOLONG | 26 | dial string too long | 32 36 |
| ERR_INVCHAR_INDSTRING | 27 | invalid characters in dial string | 32 37 |
| ERR_NO_NETWORK | 30 | no network service | 33 30 |
| ERR_NETWORK_NOT_ALLO WED | 32 | Network not allowed – emergency call only | 33 32 |
| ERR_MEMLOC_EMPTY | 95 | specified memory location is empty | 39 35 |
| ERR_NETWORK_BUSY | 96 | no lines are available/all lines are busy | 39 36 |
| ERR_ENTIRE_MEMEMPTY | 97 | the entire telephone memory is empty | 39 37 |
| ERR_REMOTE_PARTYBUSY | 99 | the remote party is busy | 39 39 |

3.1.2.13 REPORT_SMS_ERROR

- to report an SMS error status report immediately. It contains the error result code “+CMS ERROR:”. Error messages will be reported by the TPU under the following conditions:

- immediately after the TEL is powered on
- as soon as the error conditions starts
- immediately following a command that cannot be executed because the error condition that was reported prevent the execution of the command

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|--------------------|-------------------|----------------------|--------------|
| +CMS ERROR: | 11 | | |
| space | 1 | SPACE | 20 |
| data_error[] | 1..3 | see table below | |
| Sum [bytes] | 13..15 | | |

The following error messages are available:

| data_error | Error Value | Description | Code [hex] |
|-----------------------|----------------|--|---------------|
| ERR_DEFAULT_FROM_GSM | 1..127 | Error cause values from the GSM recommendation 04.11 Annex E-2 | 30..39 |
| ERR_SMS_RESERVED | 301 | SMS service of ME reserved | 33 30 31 |
| ERR_OPER_NOTALLOWED | 302 | Operation not allowed | 33 30 32 |
| ERR_OPER_NOTSUPPORTED | 303 | Operation not supported | 33 30 33 |
| ERR_INVALID_PDU_MODE | 304 | Invalid PDU mode parameter | 33 30 34 |
| ERR_INVALID_TEXT_MODE | 305 | Invalid Text mode parameter | 33 30 35 |
| ERR_NEED_SIMCARD | 310 | SIM not insered | 33 31 30 |
| ERR_NEED_PIN | 311 | SIM PIN required | 33 31 31 |
| ERR_NEED_PH_SIM | 312 | PH-SIM PIN required | 33 31 32 |
| ERR_SIM_FAILURE | 313 | SIM failure | 33 31 33 |
| ERR_NEED_PUK | 316 | SIM PUK required | 33 31 36 |
| ERR_NEED_PIN_2 | 317 | SIM PIN2 required | 33 31 37 |
| ERR_NEED_PUK_2 | 318 | SIM PUK2 required | 33 31 38 |
| ERR_INVALID_MEM_INDEX | 321 | Invalid memory index | 33 32 31 |
| ERR_SIM_MEM_FULL | 322 | SIM memory full | 33 32 32 |
| ERR_UNKNOWN_SC | 330 | SC address unknown | 33 33 30 |
| ERR_NO_CNMA_EXPECTED | 340 | no +CNMA acknowledgement expected | 33 34 30 |

3.1.2.14 REPORT_REGISTER_NETWORK

– to deliver the current state of the network registration. The TPU has to send the status after start up and every time when state has changed.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|--------------------|-------------------|----------------------|--------------|
| +CREG: | 6 | | |
| space | 1 | SPACE | 20 |
| data_reg | 1 | see table below | |
| Sum [bytes] | 8 | | |

The following network states are available:

| data_reg | Value | Discription | Code [hex] |
|-----------------------|-------|--------------------------------------|---------------|
| REGISTER_UNREGISTERED | 0 | no service available, not registered | 30 |
| REGISTER_HOME_NETWORK | 1 | registered | 31 |
| REGISTER_SEAR_FOR_SER | 2 | searching for service | 32 |
| REGISTER_DENIED | 3 | registration denied – GSM only | 33 |
| REGISTER_UNKNOWN | 4 | unknown | 34 |
| REGISTER_ROAMING | 5 | registered roaming | 35 |

3.1.2.15 REPORT_NETWORK_OPERATOR

- to response to the command messages AT_GET_CURRENT_NETWORK_OPERATOR and AT_GET_AVAILABLE_NETWORK_OPERATOR. The message contains the operator in numeric size. There must be transmit one message for every operator.

Note: This report message is not a “normal” AT response message. It contains more or changed information as the standard code.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|--------------------------|-------------------|---------------------------|--------------|
| +COPS: | 6 | | |
| space | 1 | SPACE | 20 |
| present_number_numeric | 1..2 | name of current operator | 30..39 |
| comma | 1 | , | 2C |
| max_number | 1..2 | number of whole operators | 30..39 |
| comma | 1 | , | 2C |
| data_mode | 1 | see table below | |
| comma | 1 | , | 2C |
| quotes | 1 | “ | 22 |
| data_operator_numeric[] | 1..5 | ‘0’..‘9’ | 30..39 |
| quotes | 1 | “ | 22 |
| Sum [bytes] | 16..23 | | |

The following value for the data_mode are possible:

| data_mode | Value | Description | Code [hex] |
|----------------|-------|----------------------------|---------------|
| MODE_AUTOMATIC | 0 | Set operator automatically | 30 |
| MODE_MANUAL | 1 | Set operator manual | 31 |

3.1.2.16 REPORT_PREFFERED_NETWORK_OPERATOR

–to response to the command message AT_GET_PREFFERED_NETWORK_OPERATOR. This message contains the operator name of the preferred list of networks in numeric and long alphanumeric size. There must be transmit one message for every operator.

Note: This report message is not a “normal” AT response message. It contains more or changed information as the standard code.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|--------------------------|-------------------|----------------------------|--------------|
| +CPOL: | 6 | | |
| space | 1 | SPACE | 20 |
| present_operator_numeric | 1..2 | name of current operator | 30..39 |
| comma | 1 | , | 2C |
| max_number | 1..2 | number of listed operators | 30..39 |
| comma | 1 | , | 2C |
| quotes | 1 | “ | 22 |
| data_operator_numeric[] | 1..5 | ‘0’..‘9’ | 30..39 |
| quotes | 1 | “ | 22 |
| Sum [bytes] | 14..19 | | |

3.1.2.17 REPORT_NETWORK_FIELDSTRENGTH

- to display the field strength on the HA. It is send in an interval whilst the TPU is powered on.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|-----------------------|-------------------|----------------------|--------------|
| +CSQ: | 5 | | |
| space | 1 | SPACE | 20 |
| data_fieldstrength[] | 1..2 | see table below | |
| comma | 1 | , | 2C |
| data_biterrorrate[] | 1..2 | see table below | |
| Sum [bytes] | 10..12 | | |

The following values for the field strength and bit error rate are possible:

| data_fieldstrength | Value | Description | Code [hex] |
|--------------------|-------|----------------------------|---------------|
| FIELDSTRENGTH | 0..31 | value of field strength | 30..39 |
| NOT_AVAILABLE | 99 | parameter is not available | 39 39 |

| data_biteerrorrate | Value | Description | Code [hex] |
|--------------------|-------|----------------------------|---------------|
| BIT_ERROR_RATE | 0..7 | value of bit error rate | 30..37 |
| NOT_AVAILABLE | 99 | parameter is not available | 39 39 |

3.1.2.18 REPORT_CURRENT_CALLS

- to sent the list of the current calls. The TPU provides some information like state, type of the call and the number and the name when available. A new report is sent for every call.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|--------------------|-------------------|-------------------------|--------------------|
| +CLCC: | 6 | | |
| space | 1 | SPACE | 20 |
| data_callid[] | 1 | 1..9 | 31..39 |
| comma | 1 | , | 2C |
| data_direction | 1 | see table below | |
| comma | 1 | , | 2C |
| data_callstate | 1 | see table below | |
| comma | 1 | , | 2C |
| data_calltype | 1 | see table below | |
| comma | 1 | , | 2C |
| data_mpty | 1 | see table below | |
| comma | 1 | , | 2C |
| quotes | 1 | " | 22 |
| data_number[] | 1..32 | '+', 'p', 'w', '0'..'9' | 2B, 70, 77, 30..39 |
| quotes | 1 | " | 22 |
| comma | 1 | , | 2C |
| comma | 1 | , | 2C |
| quotes | 1 | " | 22 |
| data_name[] | 0..20 | all characters | 20..FE |
| quotes | 1 | " | 22 |
| Sum [bytes] | 24..75 | | |

The following data directions could be provided by the network:

| data_direction | Value | Description | Code [hex] |
|-----------------------|-------|---------------------------------------|---------------|
| DIR_MOBILE_ORIGINATED | 1 | mobile originated (MO) call, outgoing | 31 |
| DIR_MOBILE_TERMINATED | 2 | mobile terminated (MT) call, incoming | 32 |

The following call states are possible:

| data_callstate | Value | Description | Code [hex] |
|--------------------|-------|-------------------------|---------------|
| CALLSTATE_ACTIVE | 0 | this is the active call | 30 |
| CALLSTATE_HELD | 1 | this is a held call | 31 |
| CALLSTATE_DIALING | 2 | outgoing call, dialling | 32 |
| CALLSTATE_ALERTING | 3 | outgoing call, alerting | 33 |
| CALLSTATE_INCOMING | 4 | incoming call, ringing | 34 |
| CALLSTATE_WAITING | 5 | incoming call, waiting | 35 |

The following call types are possible:

| data_calltype | Value | Description | Code [hex] |
|-----------------------------|-------|---|---------------|
| CALLTYPE_VOICE | 0 | voice call | 30 |
| CALLTYPE_DATA | 1 | data call | 31 |
| CALLTYPE_FAX | 2 | fax call | 32 |
| CALLTYPE_V_FOL_D_VOICE_MODE | 3 | voice call followed by data, voice mode | 33 |
| CALLTYPE_ALT_V_D_VOICE_MODE | 4 | alternating voice/data call, voice mode | 34 |
| CALLTYPE_ALT_V_F_VOICE_MODE | 5 | alternating voice/fax call, voice mode | 35 |
| CALLTYPE_V_FOL_D_DATA_MODE | 6 | voice call followed by data, data mode | 36 |
| CALLTYPE_ALT_V_D_DATA_MODE | 7 | alternating voice/data call, data mode | 37 |
| CALLTYPE_ALT_V_F_FAX_MODE | 8 | alternating voice/fax call, fax mode | 38 |
| CALLTYPE_UNKNOWN | 9 | unknown | 39 |

This parameter shows when the call is a member of a conference call:

| data_mpty | Value | Description | Code [hex] |
|----------------------|-------|---|---------------|
| MPTY_NOT_CONF_MEMBER | 0 | call is not one of multiparty (conference) call parties | 30 |
| MPTY_CONF_MEMBER | 1 | call is one of multiparty (conference) call parties | 31 |

3.1.2.19 REPORT_SMSC

- to sent the current SMS service centre address.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|--------------------|-------------------|-------------------------|--------------------|
| +CSCA: | 6 | | |
| space | 1 | SPACE | 20 |
| quotes | 1 | " | 22 |
| data_number[] | 0..32 | '+', 'p', 'w', '0'..'9' | 2B, 70, 77, 30..39 |
| quotes | 1 | " | 22 |
| Sum [bytes] | 9..41 | | |

3.1.2.20 REPORT_SMS_INDICATOR

- to select the procedure for message reception from the network.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|--------------------|-------------------|----------------------|--------------|
| +CNMI: | 6 | | |
| Space | 1 | SPACE | 20 |
| Mode | 1 | 2 | 32 |
| Comma | 1 | , | 2C |
| ind_routing | 1 | 0 .. 3 | 30..33 |
| Comma | 1 | , | 2C |
| broadc_messages | 1 | 0 .. 3 | 30..33 |
| Comma | 1 | , | 2C |
| Status_report | 1 | 0 .. 2 | 30..32 |
| Comma | 1 | , | 2C |
| Buffer_code | 1 | 0 .. 1 | 30..31 |
| Sum [bytes] | 16 | | |

Rules

- (1) <mode> controls the processing of unsolicited result codes. Only <mode>=2 is supported.
- (2) <ind_routing> sets the result code indication routing for SMS-delivers. Default is 0.
 - 0: Buffer unsolicited result codes in TPU
 - 1: Discard indication and reject new received messages unsolicited result codes when TPU-HS link is reserved. Otherwise forward them directly to the HS.
 - 2: Buffer unsolicited result codes in the TPU when TPU-HS link is reserved and flush them to the HS after reservation. Otherwise forward them directly to the HS.
 - 3: Forward unsolicited result codes directly to the HS.
- (3) <broadc_messages> set the rules for storing received Cell Broadcast Messages. Depending on its coding scheme, the setting of select CBM types and <broadc_messages>.
 - 0: No CBM indications are routed to the HS, The CBMs are stored.
 - 1: The CBM is stored and a indication of the memory location is routed to the customer application .
 - 2: New CBMs are routed directly to the HS.
 - 3: Class 3 CBMs as <broadc_messages>=2, other classes CBMs as <broadc_messages>=1.
- (4) <status_report> for SMS-status reports. Default is 0
 - 0: No SMS stutus reports are routed
 - 1: SMS status reports are routed using unsolicited code.
 - 2: SMS status reports are stored and routed using the unsolicited result code.
- (5) <buffer_code> default is 0 (TPU buffer of unsolicited result codes is flushed to the customer application when <mode> 1 .. 3 is entered.

3.1.2.21 REPORT_READ_SMS_MESSAGES

- to response to the command messages AT_READ_SMS_MESSAGES. This message contains the complete SMS in PDU size. The PDU message of the GSM module becomes change from BCD code into Bytes, before they are write in the Data[] buffer.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|--------------------|-------------------|--------------------------|--------------|
| +CMGR: | 6 | | |
| Space | 1 | SPACE | 20 |
| sms_status | 1 | see below | |
| Comma | 1 | , | 2C |
| Comma | 1 | , | 2C |
| Length_PDU | 1 | length of the PDU string | |
| CR | 1 | < CR > | 0D |
| LF | 1 | < LF > | 0A |
| Data[] | 0..179 | SMS message (PDU size) | 00..FF |
| Sum [bytes] | 13..192 | | |

The following values for the SMS status are available:

| sms_status | Value | Description | Code [hex] |
|--------------------------|-------|-------------------------|---------------|
| LIST_SMS_RECEIVED_UNREAD | 0 | Received and unread SMS | 30 |
| LIST_SMS_RECEIVED_READ | 1 | Received and read SMS | 31 |
| LIST_SMS_STORED_UNSENT | 2 | Stored and unsent SMS | 32 |
| LIST_SMS_STORED_SENT | 3 | Stored and sent SMS | 33 |

3.1.2.22 REPORT_LIST_SMS_MESSAGES

- to response to the command messages AT_LIST_SMS_MESSAGES. This message contains the complete SMS in PDU size. There must be transmit one message for every SMS. The PDU message from the GSM module becomes change from BCD code into Bytes, before they are written in the Data[] buffer.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|--------------------|-------------------|--------------------------|--------------|
| +CMGL: | 6 | | |
| Space | 1 | SPACE | 20 |
| sms_index | 1..2 | storage index of the SMS | 30..39 |
| Comma | 1 | , | 2C |
| sms_status | 1 | see below | |
| Comma | 1 | , | 2C |
| comma | 1 | , | 2C |
| Length_PDU | 1 | length of the PDU string | |
| CR | 1 | < CR > | 0D |
| LF | 1 | < LF > | 0A |
| Data[] | 0..179 | SMS message (PDU size) | 00..FF |
| Sum [bytes] | 15..195 | | |

The following values for the SMS status are available:

| sms_status | Value | Description | Code [hex] |
|--------------------------|-------|-------------------------|---------------|
| LIST_SMS_RECEIVED_UNREAD | 0 | Received and unread SMS | 30 |
| LIST_SMS_RECEIVED_READ | 1 | Received and read SMS | 31 |
| LIST_SMS_STORED_UNSENT | 2 | Stored and unsent SMS | 32 |
| LIST_SMS_STORED_SENT | 3 | Stored and sent SMS | 33 |

3.1.2.23 REPORT_CLASS3_SMS_MESSAGES

- to indicate an Class 3 message reception. The Message are directly routed to the application. The PDU message from the GSM module becomes change from BCD code into Bytes, before they are written in the Data[] buffer.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|--------------------|-------------------|------------------------|--------------|
| +CMT: | 5 | | |
| space | 1 | SPACE | 20 |
| Length_PDU | 1 | length of PDU string | |
| CR | 1 | < CR > | 0D |
| LF | 1 | < LF > | 0A |
| Data[] | 0..179 | SMS message (PDU size) | 00..FF |
| Sum [bytes] | 9..188 | | |

3.1.2.24 REPORT_SIM_IMSI

- to report the IMSI number of the SIM card.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|--------------------|-------------------|----------------------|--------------|
| +CIMI: | 6 | | |
| space | 1 | SPACE | 20 |
| quotes | 1 | " | 22 |
| data_number[] | 1...15 | IMSI number | 30..39 |
| quotes | 1 | " | 22 |
| Sum [bytes] | 10..24 | | |

3.1.2.25 REPORT_PRODUCT_NUMBER

- to report the "Product Serial Number" of the GSM module.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|--------------------|-------------------|-----------------------|--------------|
| +CGSN: | 6 | | |
| space | 1 | SPACE | 20 |
| quotes | 1 | " | 22 |
| data_number[] | 1...20 | product serial number | 30..39 |
| quotes | 1 | " | 22 |
| Sum [bytes] | 10..29 | | |

3.2 Data Commands

To use AT commands during a data connection (e.g. while the application is in online mode), it is necessary to switch to offline mode.

3.2.1 Switch from Online to Offline Mode

To switch from online mode to offline mode, the “+++” sequence must be sent. Following that, the TPU gets back to offline mode with an acknowledge (3.1.2) response, and an AT command can be sent.

3.2.2 Back to Online Mode

If a connection has been established and the TPU is in command mode, this command allows you to return to online data mode.

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|--------------------|-------------------|----------------------|--------------|
| ATO | 3 | | |
| Sum [bytes] | 3 | | |

- to response the command will be transmitted:

| Parameter | Length [bytes] | Possible Elements | Value [hex.] |
|--------------------|-------------------|----------------------|--------------|
| OK | 2 | | |
| Sum [bytes] | 2 | | |

4 References

| No. | Title or Link | Version | Author |
|-----|---|---------|---------|
| [1] | GSM 07.07 (ETSI TS 100 916): "AT command set for GSM Mobile Equipment (ME)", Release 1998 | 7.5.0 | ETSI |
| [2] | GSM 07.05 (ETSI TS 100 585): "Use of Data Terminal Equipment - Data Circuit terminating Equipment (DTE – DCE) interface for Short Message Service (SMS) and Cell Broadcast Service (CBS)" | 7.0.1 | ETSI |
| [3] | GSM 02.30: "Man-Machine-Interface (MMI) of the Mobile Station (MS) " | 5.3.0 | ETSI |
| [4] | GSM 03.41: "Technical realization of Short Message Service Cell Broadcast (SMSCB)" | 5.3.0 | ETSI |
| [5] | AT commands interface guide | 004 | WAVECOM |