980310 MH

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Modem integrated IC card reader
Protocol between modem and host computer.

1. General

The IC card (smart card) reader of the modem can be accessed in either of two operating modes:

- AT command mode
- on-line data mode

In the AT command mode each read/write operation involves an AT command sequence (as expected for a modem) where binary data follows after an ASCII ”handshake” (”AT*SC”, ”CONNICC”). This resembles the handling of fax commands (AT+F…). Only one card operation is performed for each AT command. This enables the host to send other AT commands for controlling the modem, while an IC card is inserted and activated. It also ensures that the modem does not get ”stuck” in any binary interaction with the host.

In the on-line data mode (called the *IC card mode* below) a virtual channel is opened to the IC card during a modem connection. By the <DLE>-encapsulation of IC card messages this data sent in a normal modem data stream will be redirected to the card reader.

For convenience and for length-of-message checking the IC card messages have the same format in both modes. Thus, the <DLE>-encapsulation is performed also in AT command mode.

For card with inverse convention (see ISO 7816-3) the inversion of characters is being taken care of by the reader, both when writing to the card and when reading from the card. The host does not have to bother about the inverse convention at all.

2. Command mode

The interaction between host and modem/IC-card reader is as follows:

Step	Host commands	Modem response	Comments
1	AT*SC<CR>		Prepare for a binary command
2		<CR><LF>CONNICC <CR><LF>	If ”ERROR”, the modem does not have an IC card reader
3	<DLE><STX><message> <DLE><ETX>		The message is described in chapter 5.
4		<DLE><STX><response> <DLE><ETX> <CR><LF>OK<CR><LF>	The response is described in chapter 5. ”OK” merely marks end of command procedure, does *not* reflect a successful card operation.
5	Any AT command		

<DLE> is code 10_{HEX}, <STX> is code 2 and <ETX> is code 3.

Any resending of a command/response due to checksum error should involve the full AT kommande procedure.

Timeouts:

From step 1 to 2:	1 second	(Indicating modem not in command mode or other problems in the communication with modem)
From step 2 to 3:	3 seconds	Time to *beginning* of 3. (Indicating host problems)
From step 3 to 4:	5 seconds	From *end* of 3 to *beginning* of 4, default value. Should cover card read/write time. A better suggestion for a timeout time can be obtained by command no. 6.

3. On-line data mode

In on-line data mode (”CONNECT”-state) the modem has opened a data connection and sends/receives data to/from the host. During such a connection commands can also be transferred to/from the IC card reader. This mode is called the *IC card mode* and is prepared by issuing the AT*SM command. In the *IC card mode* all <DLE>-encapsulated messages found in the data stream (*from* the host) will be sent to the card reader. Likewise, any answer from the card reader in the modem will be <DLE>-encapsulated and inserted in the data stream to the host. The messages to/from the IC card reader follows the format

<DLE><STX><message/response><DLE><ETX>

that is, the same format as in command mode.

Following commands apply:

AT*SM=1	Enter *IC card mode* during next data connection. When going on-hook again after a connection (successful or unsuccessful) this state is cleared. (It could also be cleared by issuing AT*SM=0 or in data mode by entering code 99, see chapter 5). This command is typically done before an ATD…. or an ATA-command. The modem answers ”OK”.
AT*SM=0	Leave the *IC card mode.* The modem answers ”OK”.
AT*SM?	Report *IC card mode.* The modem answers ”0” or ”1”, followed by ”OK”

Note: When modem is in synchronous mode or ”direct asynchronous” mode (AT\N1) the *IC card mode* cannot be used.

4. DLE encapsulation

If the <DLE> code happens to coincide with message data, an extra <DLE> has to be inserted. This applies both in command mode and in *IC card mode* (inside the <DLE>-frames).

When *IC card mode* has been entered (and the modem is in ”CONNECT”-state) it is important to remember that this <DLE> insertion has to be made in *all* data sent to the modem, not just the data inside the <DLE> frames. Likewise, <DLE> insertion must be expected in *all* data from the modem. If the modem is in ”CONNECT”-state but not in *IC card mode* (normal modem behaviour) the IC card is not accessible by <DLE> encapsulated commands, nor should any <DLE> insertion take place.

The extra <DLE>:s inserted by the the host will naturally be stripped off by the the modem. Thus, the data sent to the remote modem will not be affected by the IC card mode.

The strategy for IC card messages will be as follows:

The sender of a message:

Frame the message with <DLE><STX> and <DLE><ETX> as stated above.
If <DLE> is detected within the message, repeat the <DLE> in the output buffer. This should not affect any checksums or data length values.

The receiver of a message:

If detected:

any data…<DLE><STX>	Expect a message.
any data…<DLE><ETX>	End of message detected, start to process.
any data…<DLE><DLE>	Strip off one <DLE>.
any data…<DLE><DC4>	A card state change has occurred (see command 8). Strip both characters off (and report a state change).
any data…<DLE><not DLE, STX,ETX or DC4>	Should not happen but if it does: accept as data.

Added to these strategies, both the host and the modem in the on-line data mode naturally has to handle the channel separation i.e. the redirection of <DLE>-encapsulated data to/from the IC card task.

Any checksum or length of data checking should not include the <DLE><STX>, <DLE><ETX> or any extra <DLE>:s inserted.

5. Format of messages/responses

Message format, from host to modem:
(unless otherwise stated, all numbers are decimal)

<COMMAND>	<PARAMETER>	<DATA>	<LRC>
1 byte According to list below	1 byte Command-dependent	variable (may not be present)	1 byte Longitudinal Redundancy Check. Is XOR of command + parameter + data

Summary of commands:

Command	Name	Parameter	Data	Expected response
0	Set V_{PP} on/off	0/1	-	Done
1	Get entire ATR (answer to reset)	not used (=0)	-	ATR string
2	Deactivate	not used (=0)	-	Done
3	Get status	not used (=0)	-	Card status
4	Test card	not used (=0)	-	Card type
5	Repeat last message	not used (=0)	-	Last message
6	Get timeout time	not used (=0)	-	Timeout time in 0.1 seconds
7	Accept PIN-code entry	Coding	x	Number of digits entered
8	Set/reset state change alert	1/0	-	Done
9	Get configuration	not used (=0)	-	Configuration bitmask
20	Activate asynchronous card	T value	-	Historical bytes
21	Data to asynchronous card	0/PIN-offset	x	Card response
22	Data from asynchronous card	not used (=0)	x	Card response
23	Change frequency	Freq.*2	-	Done
24	Get specific interface parameters	not used (=0)	-	Protocol dependent data
30	Activate synchronous card	Card type	-	Card dependent
31	Data to synchronous card	0/PIN-offset	x	Card response
32	Data from synchronous card	not used (=0)	x	Card response
60	Show ”Crd” on display	Time (1/10 s)	-	Done
61	Toggle ”Crd”/”In” on display	Time (1/10 s)	-	Done
62	Toggle ”Crd”/”Out” on display	Time (1/10 s)	-	Done
63	Flash ”Err” on display	Time (1/10 s)	-	Done
64	Flash ”Pin” on display	Time (1/10 s)	-	Done
65	Restore display	not used (=0)	-	Done
66	Beep (on modem speaker)	Time (1/10 s)	-	Done
99	Exit from *IC card mode* (may only be sent in *IC card mode*)	=85	-	None

Response format, from modem to host:

<COMMAND>	<PARAMETER>	<DATA>	<LRC>
1 byte Echo of command from host	1 byte Command dependent If >127: Error code	variable (may not be present)	1 byte Is XOR of command + parameter + data

Typical codes in parameter byte:

Code	Name	Comments
126	Done, OK	May be replaced by command specific data
128	Card removed	(unexpectedly) If this code has been sent by the modem, as response to any command, the card has been deactivated. The card may then not longer be present, or the same or another card has been reinstalled. In these cases a new activate command has to be issued.
129	Unresponsive card	Time outs etc.
130	Parity errors	At least three errors during a card access
131	Wrong card type	Card type does not match expected
132	Unknown card type	No support of card type
133	Illegal command	Illegal command or command not implemented
134	Card not activated	Card must be activated before requested operation
135	Unnormal SW1SW2	SW1, SW2 was not 9000_{HEX} (for T=0)
136	Illegal parameter	
137	No support of V_{pp}	Desired programming voltage not available. (At present only 5V is supported)
138	ATR corrupted	Answer to reset string corrupted
139	Error in PTS procedure	The protocol type selection procedure went wrong
140	Bad procedure byte	Was neither ACK, NULL nor SW1 (for T=0)
141	SW1SW2 too early	SW1SW2 was received before all data was transferred (T=0)
142	Illegal command format	Could be frame error (<DLE><STX> missing etc.). See 255
143	Card is T=0	Other T value than 0 was expected
144	Card is T=1	Other T value than 1 was expected
145	Illegal value of TS byte	TS is first byte of Answer-to-reset string
146	Bad length	Length of message is wrong
147	No data available	
148	Too many digits in PIN	
149	Timeout at PIN procedure	
150	Illegal PIN character	A key other than 0-9 entered in PIN-code
151	PIN code not available	A PIN code is referred to but has not been entered
.		
255	LRC error	Last command from host was erroneous. Prompts host to resend last command. If this error is reported, the command echo byte might be corrupted (due to erroneous command byte from the host). The same goes for error code 142. The host had better test for a 255 or 142 parameter *before*

		disregarding any illegal command bytes.

6. Command description

Command 0: Set programming voltage V_{pp} on or off
This command is used for changing state of V_{pp}. However, for asynchronous cards (T=0 and T=1) this command should normally not be used, since the card itself prompts for V_{pp} on/off. The card reader acts upon these prompts (many cards do not have a separate V_{pp}).

When used, the command contains the desired state in the parameter:

Parameter value	
1	Set V_{pp} in active state
0	Set V_{pp} in idle state.

Response may be:

Parameter value	
126	Done
137	An activation of V_{pp} was requested but the card reader could not support the proper voltage as specified by the card in the Answer To Reset string.

Command 1: Get entire ATR
The full Answer-to-Reset string is returned, including historical bytes. A response for a T=0 card is typically:

<1><126><ATR-response><LRC>

Specific error codes might be 128,129, 130, 138 and 145.
ATR string is sent in all cases except in case of error codes 128 or 129.
The command does not change the inactive/active state. If the card was inactive, it activates the card temporarily to get the ATR string, then deactivates it again. The command tries to recover any ATR string regardless of card type.

Command 2: Deactivate
Switch off power supply to card, marks inactive state internally in IC card task of modem. Response on this command is most probably ”Done, OK”, even if card was already inactive or even absent.

Command 3: Get status
Used for reporting basic status of the card/card reader.
Response may be:

Parameter value	
1	Card present (properly inserted) but not activated
2	Card activated
3	Card absent and has not been inserted since last ”get status” command.
4	Card absent but was inserted since last ”get status” command.

Note: In this case, ”card removed” is *not* reported as error code 128, since it may be a quite expected response to the query.

Command 4: Test card
Used for getting information about type of card.
Response may be:

Parameter value	
0 - 15	T-value of an asynchronous card
16 - 31	T-value plus 16, indicating the primary T-value but also that the card supports more than one protocol. The full protocol support has to be checked by the host through the ”get entire ATR”-command. (A possible strategy is also to try to activate, specifying the desired T-value)
32 - 47	Synchronous card type (not supported yet).

Specific error codes are 128, 129, 132 and 138.
Note: Though actually accessing the card by this command, the card has to be *activated* before any read/write operations.

Command 5: Repeat last message
Could be sent by the host if the LRC check or the length check proved that the last message from the modem was corrupted. A normal response to this command is a new attempt on last message from the modem.
The corresponding function in the other direction is performed by error code 255.

Command 6: Get timeout time
This command is used to get a suggestion for a suitable timeout time, i.e. the maximum time for the host to wait for an answer from the card reader. The maximum time may depend on card type and clock frequency used in the card reader. It is calculated based upon a 256 byte data transfer to or from the card. In all cases, the card reader will check for timeouts of the card according to specifications in ISO 7816-3 (block and character waiting times) and report such timeouts to the host (by error code 129). Thus, the host should not overdo the timeout checking and could use a rather long timeout time. The command 7, ”accept PIN-code entry” requires a timeout long enough to cover the operators keying sequence.

The timeout time reported does not include the cryptographic calculations which may be substantially longer than all the other card operations. The host should add at least 2 seconds to the timeout time when such a calculation has been ordered.
The default timeout time is 5 seconds (value=50).

The command may be sent when a card has been activated. If not activated, the modem will always suggest the default value.
The response is <6><Time in 0.1 second units><LRC>.

Command 7: Accept PIN-code entry
The command is issued when the card user is expected to start entering the PIN-code on the keypad of the modem. A response of this command is transmitted when the typing is done, indicating number of digits entered.

The PIN-code entered is not (due to safety aspects) transmitted back to the host, but is stored temporarily in the modem. When a subsequent command 21 (or 31), that is a ”data to card” command, with a non-zero PIN-offset is transmitted, the stored PIN-code is copied onto the data and submitted to the card (see command 21). The stored PIN-code will be erased after being sent to the card or if a command other than 21 (or 31) is issued.

The command 7 contains a parameter and three additional bytes of data:
<7><Coding type><Max length><Timeout><”Enter” key><LRC>

Coding type:	The way to code and to store the digits entered on the keypad: 0: ASCII 1: BCD (two digits/byte) 2: binary (one digit/byte)
Max length:	Maximum number of digits to be entered. Max. allowed is 16.
Timeout:	Timeout time, in 0.1 second units, between digits and after last digit (if not max. or ”Enter” key). If null, a reasonable default value is used.
”Enter” key:	If non-zero, an ASCII value for a key treated as an ”ENTER”-key, to be pressed after last PIN digit has been entered. The following special keys can be selected: * (code 42), # (code 35), ”R” (code 82), ∞ (last number dial, code 61), ↑ (code 24) and ↓ (code 25). A natural choice would be ”#”.

The expected response is:
<7><No. of digits entered><LRC>
Specific error codes, sent instead of no. of digits, are 148, 149 and 150.

The parameters in the command are treated as follows:
- If max. no. of digits is reached, and no ”Enter” key was specified, the response is sent and the entering of PIN-code regarded as successful. No. of digits is returned in the response. Any keys pressed after that are discarded.
- If an ”Enter” key was specified and that key was pressed, the entering is considered successful if max. no. of digits was not exceeded. If more than max. digits, error 148 is returned.
- If a timeout occured, and no ”Enter” key was specified, number of digits is returned and the PIN-code entered could be treated as a correct input. The modem does not impose any lower limit for number of digits entered, but that may be handled by the host using the information in the response. If a timeout occured when an ”Enter” key was specified the input is considered erroneous and error code 149 is returned.

For each PIN digit entered, the display will acknowledge it by showing a bar, in much the same way as asterisks are commonly displayed in password entering procedures.

Command 8: Set/reset state change alert
It is possible to make the IC card reader to send a character to the host whenever a card is inserted or pulled out. This character, sent spontaneously without any AT-sequence, is the <DC4> character (code 14_{HEX}). In on-line command mode it is preceeded by a <DLE> character (<DLE><DC4> is sent). In this way, the application in the host may be alerted when the card state has changed (inserted/pulled out). It is then up to the application to enquire about the actual state through the ”get status” command (command 3).

To set the state change alert mode, the parameter should be set to 1. To switch it off, issue the command with the parameter=0. The respons is always ”Done, OK”.

The state change alert mode is reset at power on and is unaffected by any ”ATZ” command.

Command 9: Get configuration
The command is issued to get information about the modem/IC-card readers hardware and software configuration (capabilities). The response contains a bit mask in its parameter byte, and one data byte containing a product code:

<9><126><Bit mask><Product code byte><LRC>

The product code can be any number 0-255 and identifies the product/brand name.
The bit mask is as follows:

	The card reader has:
Bit 0	Three digit LED display
Bit 1	Numerical keypad (keys 0-9, *,#,↑,↓,∞,R)
Bit 2	Beep tone
Bit 3-6	Reserved for future use
Bit 7	Always null (otherwise the parameter byte is an error code)

Command 20: Activate asynchronous card
Sent by the host to activate the card and to get the historical data. The expected protocol T value is sent as the parameter. If the card does not support the protocol, error code 131, 143 or 144 is received from the modem and the card is not activated. In case of 131, the commands ”test card” or ”get entire ATR” can be used for detecting mysterious cards.
If already activated, no actual reset is performed. In this case, if a true reset is wanted, the host must first deactivate the card (by command no. 2).

Expected response:
<20><126><historical bytes><LRC>

Specific error codes are 128,129, 131, 137, 143 or 144. For these error codes, no historical bytes are transmitted.

Command 21: Data to asynchronous card
The normal command for conveying data to the IC card, whether it is file selection, keys, PIN-codes or other file contents. The card must have been previously activated.

The format is:
<21><0><data (for T=0: typically 5-byte header + data)><LRC>
(for PIN, see separate clause below)

Expected response is:
<21><126 or error code><card response><LRC>

T=0
For T=0, a successful response is:
<21><126><SW1SW2><LRC>
SW1SW2 is $90_{HEX}00_{HEX}$ if no errors. Other values are warned by error code 135 or 141 but may not necessarily indicate an error (i.e. GET RESPONSE handling for EMV cards).
The procedure byte is not sent to the host (unless it was SW1).

Responses in case of error take two forms:

<21><xx><SW1,SW2><LRC>	for error codes xx=135 and 141.
<21><xx><LRC>	for error codes xx= 128, 129, 130, 134, 137, 140 and 146.

T=1
The T=1 protocol is handled transparently by the IC card reader. It relays any block sent from the host directly to the IC card, after stripping off the host-to-modem header. Likewise, any answer by the card is sent back to the host, framed by the modem-to-host header. As a consequence, all the scenarios described in ISO 7816-3/Amd.1 should be handled by the host. This includes CRC or LRC checking of the prologue and information field of the T=1 block, block chaining, request for change of information field size (IFSC and IFSD) etc. This goes for the request for waiting time extension too, in this case the card reader monitors the S(WTX response) as it has to allow for a longer timeout and not report ”unresponsive card” to the host.
The command 24 might be helpful in setting up some parameters for the T=1 interface software in the host.

The format is typically:
<21><0><prologue + information + epilogue fields><LRC>
Note: The LRC should not be confused with the epilogue field, which is the internal checksum of the T=1 block (prologue + information fields) and may be CRC or LRC.

Expected response is:
<21><126><prologue + information + epilogue fields><LRC>
or, if an error occurred:

<21><xx><LRC>	for error codes xx= 128, 129, 130, 134, 137 and 146.

PIN-code transmission

After the command 7, when PIN-code has been entered and has been temporarily stored in the modem, the PIN-code can be copied onto a part of the data field of a subsequent command 21. This can be used for a VERIFY PIN, UNBLOCK PIN and similar instructions to the card. For T=0 and T=1, the INS-byte of the data is checked for legal PIN operations. The command format for PIN operations is:

<21><PIN offset><data><LRC>

where PIN offset is the position, relative to the start of the data field, where to copy the previously entered PIN-code. PIN offset must be a non-zero byte, 255 is treated as offset 0. There should be a reserved field for the PIN in the data field. This field should be padded (by the host) with whatever is desired according to the card in use, specially if the length of the field is greater than the number of PIN bytes entered. The modem does no such padding. For T=1, a new checksum of the epilogue field is calculated by the modem, since data will be changed.

The response is like ”normal” command 21, as above. After that, the PIN-code in the modem will be erased, it is valid for one uninterrupted command pair only (of commands 7 and 21). If the ”data to card” command states a PIN offset, but no PIN-code is present in the modem, the error code 151 is sent.

Command 22: Data from asynchronous card

The normal read command. The card must have been previously activated.

The format is:

<22><0><data (For T=0: typically 5-byte header)><LRC>

Expected response is:

<22><126 or error code><card response><LRC>

T=0

For T=0, a successful response is:

<21><126><card data + SW1SW2><LRC>

SW1SW2 is $90_{HEX}00_{HEX}$ if no errors. Other values are warned by error code 135 or 141 but may not necessarily indicate an error (i.e. GET RESPONSE handling for EMV cards). The procedure byte is not sent to the host (unless it was SW1).

Responses in case of error take three forms:

<21><xx><data + SW1,SW2><LRC>	for error code xx=135.
<21><xx><SW1,SW2><LRC>	for error code xx=141.
<21><xx><LRC>	for error codes xx= 128, 129, 130, 134, 137 and 140.

Note: For commands to the card that does not lead to any data beeing transferred, the command ”data to” (no. 21) should be used rather than the ”data from” (no. 22) command. When P3 in the header is null in a ”data from” command, the card reader expects 256 byte to be transmitted from the card (see ISO 7816-3, clause 8.2.1).

T=1

As the block structure for T=1 is independent of the data direction, the internal procedures in the IC card reader are the same whether data is transferred to or from the card. Thus, the host

can use any of commands 21 and 22 for all T=1 transmissions and does not have to separate between ”data from” and ”data to” commands. (See command 21 for description).

Command 23: Change frequency

For asynchronous cards, the modem chooses a card frequency according to the contents of the ATR-string from the card. The chosen frequency is as high as allowed according to the recommendations in ISO 7816-3, table 6. However, with detailed knowledge about type and brand of the inserted card, the host may switch to another frequency. For example, Philips DX cards may be run on 8 Mhz which is faster than the recommendations according to its clock rate conversion factor (F) in the ATR string. The switch to the higher frequency is performed by command 23, and the IC card reader in the modem adjusts waiting times and bit rates (to the card) accordingly.

The format is:

<23><x><LRC>	where x is frequency in MHz multiplied by 2. If, for example, 6.5 Mhz is wanted, x should be set to 13.

Specific error codes are 128, 134 and 136. The chosen frequency is not checked against any limits at all.

Command 24: Get specific interface parameters

With this command, some interface parameters can be retrieved from the ATR string. The parameters are specific to the protocol in use. The parameters may also be retrieved by the ”get entire ATR” command, but the command 24 relieves the host from some calculations (of the BWT/WWT) and from dealing with the structure of the ATR string.
The parameters are:

T=0

WWT	Work waiting time, in 0.1 second units. It covers, with margins, the maximum time between a character sent by the card and the previous character, sent by the card or by the IC card reader. The WWT value is calculated with regard to the card frequency in use.

T=1

IFSC	Information field size for the card. Value is 1-254 (32 is default). The value is taken from the ATR string and is not changed by any IFS request block from the host.
BWT	Block waiting time, in 0.1 second units. It covers, with margins, the maximum time from the last character received by the card to the first character beeing sent from the card. If used by the host in timeouts, at least 0.5 s should be added to allow for both card-to-modem and modem-to-host transmissions. The BWT value is calculated with regard to the card frequency in use.

EDC type — Form of error detection code to be used in the epilogue field of the block frame for T=1. Value=0 is LRC, value=1 is CRC.
It should not be confused with the checksum in the frame of the host-to-modem layer of communication, described above in chapter 5. That checksum is always LRC.

The character waiting time (CWT) and the guardtimes (BGT and N) are dealt with in the modem only. The IFSD (information field size for the interface device) is 32 by default and can be changed to a higher value as described in ISO 7816-3, Amd. 1, by the use of an IFS request block. The modem can support an IFSD of max. 254 bytes.

The format of the response is:
For T=0: <24><126><WWT><LRC>
and for T=1: <24><126><IFSC><BWT><EDC type><LRC>

Specific error codes are 128, 134 and 147. The data bytes are not transmitted after these codes.

Command 30-32: Synchronous card operations
Not implemented yet. Message structure and behaviour will depend on card type as specified in parameter of command 30 (activate).

Command 60: Show ”Crd” on display
Displays the text ”Crd” on the modem LED display for a specified amount of time. The time in 0.1 second units is specified in the parameter. A value 0 means ”forever” (until other display command). The response is <60><126><LRC>.

Command 61: Toggle ”Crd”/”In” on display
Makes the modem LED display toggle between the text ”Crd” and the text ”In” with a specified frequency. The time (for each text) in 0.1 second units is specified in the parameter. A value 0 means a stable text ”In” (until other display command). The response is <61><126><LRC>.

Command 62: Toggle ”Crd”/”Out” on display
As above, but text ”Out” instead of ”In”.

Command 63: Flash ”Err” on display
As above, but toggling between ”Err” and a blank display. A value 0 means a stable text ”Err”.

Command 64: Flash ”Pin” on display

As for ”Err” but displaying the text ”Pin”. If used before the ”Accept PIN” command (command no. 7), it is to be remembered that the entering of the first digit resets the display and starts showing the feedback bar segments instead (see command 7).

Command 65: Restore display
Restore the display to normal modem behaviour. The response is <65><126><LRC>.

ATT: The LED commands 60-64 may conflict with the modems own use of the display, specially during call, answer and connection phases. The behaviour will depend on toggling times etc. but will generally be acceptable.

Command 66: Beep
Makes the modem speaker beep for a specified length of time. The time value is given in the parameter in 0.1 second units. Max value is 30 (3 seconds). If bit 7 is set in the parameter (128 is added), the beep will use a higher frequency. The value 132 thus gives a high frequency beep of 0.4 seconds. The response is <65><126><LRC>.

The beep command is only allowed when modem has got such a feature (see command no. 9), otherwise the error 133 is returned.

Command 99: Exit from card mode
Leaves the *IC card mode* (no automatic deactivation of the card). Only used in the *IC card mode* itself.

The format is:
<99><85><LRC>

There is no response. After this, <DLE> insertion and detection should immediately be turned off . If this leads to potential trouble the host has better stay in *IC card mode* (until it is automatically turned off after the session).
The *IC card mode* can be reentered during the present data connection only by issuing AT*SM=1 in on-line command mode (when escaped through ”+++”).