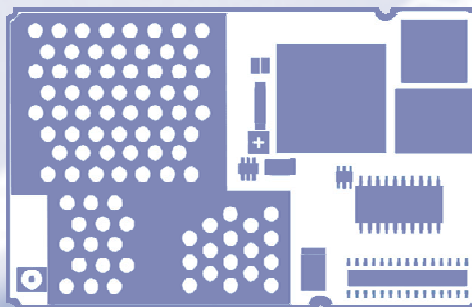# SIEMENS

Application Developer's Guide

Siemens Cellular Engines

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Application Note 24: **Application Developer's Guide**

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New document: "Application Developer's Guide" Version **v06**

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2.16	New Chapter "Remote SIM Access"

Preceding document: "Application Developer's Guide" Version v04
New document: "Application Developer's Guide" Version **v05**

Chapter	What is new
2	Added new functions in Figure 2, Figure 3
2.1.1.4	New Hint "GCF-Test"
2.4.1	Added example "Configure SLEEP mode 9".
2.7.3	Modified Figure 36- 43
2.8	Modified Figure 46- 51
2.9	Modified Figure 52- 61
2.9.1	Added AT commands ATV0 and AT\V0
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Chapter	What is new
2.2	Basic initialization explained in greater detail.
2.4	New chapter: "Power saving"
2.7.4	New chapter: "Calling line identification presentation (CLIP)"
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2.8	New chapter: "Voice call handling"
2.9	New chapter: "CSD"

| 2.11 | Added explanations on PDU mode. Basic initialization explained in greater detail. |
| 2.13 | New chapter: "Security" |

Preceding document: "Application Developer's Guide" Version v02
New document: "Application Developer's Guide" Version v03

Chapter	What is new
1.3	Added further abbreviations
2	Modified Figure 2 / Figure 3 "Overview ME"
2.2.4	New chapter: "Initialization of serial interface"
2.5.5	New chapter: "Entering SIM PIN2"
2.5.6	New chapter: "Entering SIM PUK2"
2.7	New chapter: "Supplementary services"
2.12	New chapter: "Phonebook"

1 Introduction

Because of the breadth of capabilities and features of the Siemens AG GSM/GPRS Module (further referred to as the Module), it can be difficult for the customer to design interfaces and choose suitable command sequences when implementing an application e.g. the MMI of an application.

Thus, many customers have found it helpful to be provided with advice on command sequences and proposals for small implementations.

This document is intended to provide exactly this help and make the startup of an MMI implementation much easier. Examples and useful descriptions have been included and will be continuously enhanced according to the customers' requirements.

1.1   Related documents

[1]   Hardware Interface Description of your Siemens Cellular Engine
[2]   AT Command Set of your Siemens Cellular Engine
[3]   Remote-SAT User's Guide
[4]   GPRS Startup User's Guide
[5]   Multiplexer User's Guide
[6]   Multiplexer Driver Developer's Guide for Windows 2000 and Windows XP
[7]   Multiplexer Driver Installation Guide for Windows 2000 and Windows XP
[8]   GSM 03.04 "Technical realization of the Short Message Service (SMS)"
[9]   GSM 07.07 "AT Command set for GSM Mobile Equipment (ME)"
[10]   GSM 11.10 "Mobile Station (MS) conformance specification"
[11]   GSM 02.07 "Mobile Stations (MS) features"
[12]   GSM 11.11 "Specification of the Subscriber Identity Module"
[13]   Remote SIM Access User's Guide
[14]   ComBridge. This program can be received from Siemens AG Com WM

1.2   Differences between supported products

This document covers the entire range of Siemens Cellular Engines. All examples have been chosen to be generally applicable to most product types. Yet, the diversity of the products implies that, due to hardware or software specific properties, functional differences occur regarding the implementation of features, AT commands and parameters. Therefore, please consult the documents supplied with your module, especially [1] and [2], to make sure whether or not a described feature is supported.

If an AT command or parameter behaves differently in various modules, the described command sequence presents only a typical example, accompanied by a footnote to indicate that module specific properties shall be gathered from other related documents.

1.3 Abbreviations

APN	-	Access Point Name
BS	-	Basic Service
CF	-	Call Forwarding
CFU	-	Call Forwarding Unconditional
CH	-	Call Hold
CBS	-	Cell Broadcast Message
CLI	-	Calling Line Identity
CLIP	-	Calling Line Identification Presentation
CLIR	-	Calling Line Identification Restriction
CSD	-	Circuit Switched Data
DIS	-	Digital identification signal
DN	-	Directory Number
EF	-	Elementary File
GCF	-	Global Certification Forum
GPRS	-	General Packet Radio Service
HDCL	-	High Level Data Link Control
ME	-	Mobile Equipment
MMI	-	Man Machine Interface
MT	-	Mobile Terminal
MS	-	Mobile Station
MPTY	-	Multiparty
PDP Context	-	Packet Data Protocol context
PDU	-	Protocol Data Unit
PIN	-	Personal Identification Number
PUK	-	Personal Unlocking Key
PW	-	Password
QoS	-	Quality of Service
RSA	-	Remote SIM Access
SAT	-	SIM Application Toolkit
SC	-	Service Center
SIM	-	Subscriber Identity Module
SME	-	Short-Message-Entity
SMS	-	Short Message System
TE	-	Terminal Equipment
UDUB	-	User Determined User Busy
URC	-	Unsolicited Result Code

Abbreviations related to phonebooks

SM	-	SIM phonebook
ME	-	Mobile Equipment phonebook
FD	-	SIM fixdialing phonebook
LD	-	Last dialing phonebook
MC	-	List of missed calls
RC	-	List of received calls
ON	-	List of own numbers

1.4 Conventions and definitions

1.4.1 Conventions

<…> Possible value ranges of AT command parameters.

Xxxx Placeholders used for PINs, PUKs and other passwords.

GCF-CC note: "Global Certification Forum - Certification Criteria". Important note regarding requirements, recommendations and/or test cases specified by GCF.

1.4.2 Definitions

Connected When two or more parties are involved in a call this situation is referred to as "connected".

Registered An ME is called "registered" when successfully logged into the GSM network.

Module Siemens wireless GSM/GPRS module.

Mobile Equipment
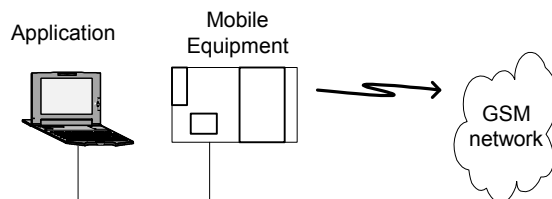
1.4.3   Flow chart symbols
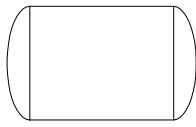
Start State
ME starts in this state.

End State
ME ends in this state.
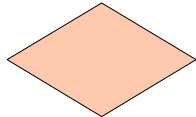
branching
AT command with execution true or false.

internal action

sequence
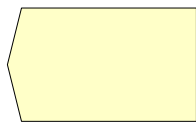
communication ME → network
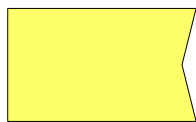
communication network → ME
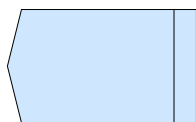
communication ME → TE

communication TE → ME
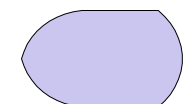
recommended/suggested display output
(if display available)

 timer

 data flow direction

 description

 optional part

 alternative way

 continuation see next page

 URC presentation

 SOS/ IMEI display

 mobile phone

 modul
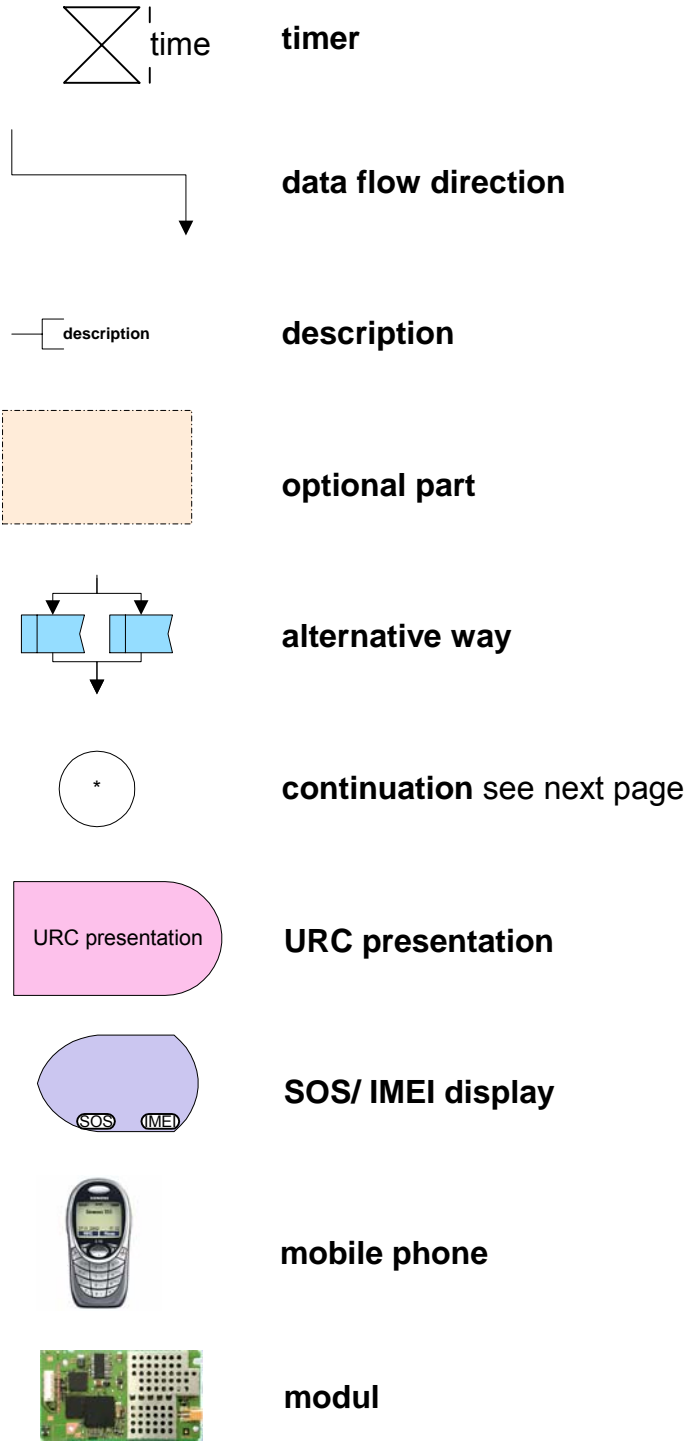
Figure 1: Flow chart symbols

2 Scenarios

Overview ME

ME is off

Switch on ME

If you build a Mobile Phone, Emergency Call must be possible anytime.

Switching off the ME is possible at anytime.

Switch off ME

Emergency call

Basic initialization

You can always get device information, but it´s recommended to request it from your application at this time.

Device information

Power saving

Entering PIN

*(1)

*(2)
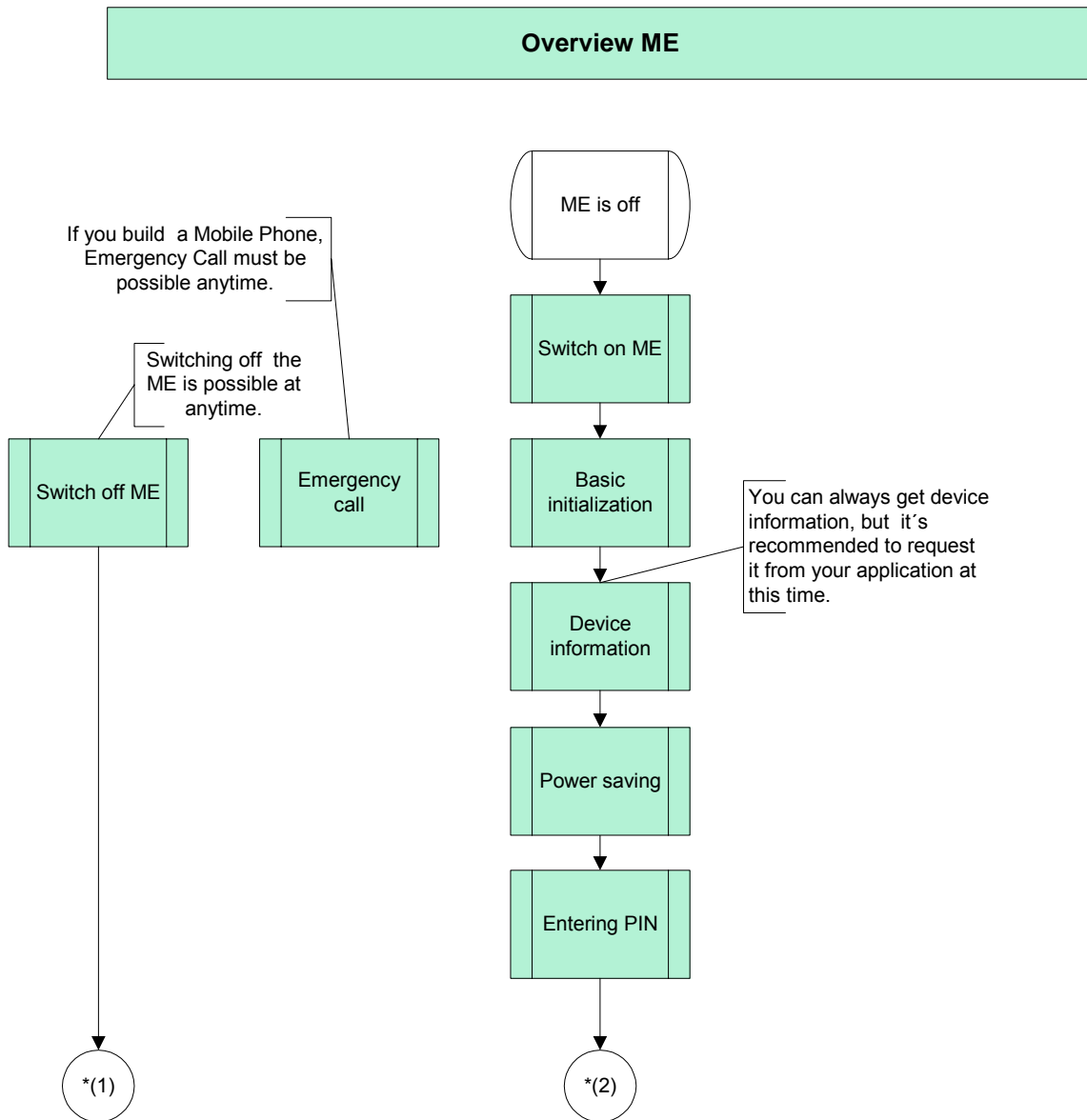
Figure 2: Overview ME – part 1

*(1)

*(2)

More features see your
Hardware Interface
Description.

| Initialization of monitor functions |
| Several Monitoring functions |

Monitoring

| Voice call handling initialization |
| Voice call handling functions |

Voice call handling

| GPRS initialization |
| Several GPRS functions |

GPRS

| Phonebook initialization |
| Several Phonebook functions |

Phonebook

| ... |
| SIM functions |

SIM

| ... initialization |
| Several ... functions |

...

| Supplemen-tary services initialization |
| Several Supplemen-tary services functions |

Supplementary services

| CSD initialization |
| CSD functions |

CSD

| SMS initialization |
| Several SMS functions |

SMS

| Security initialization |
| Security functions |

Security

| ... |
| Restart functions |

Restart

ME is off

Figure 3: Overview ME – part 2

2.1　Emergency call

2.1.1　Making an emergency call

2.1.1.1　Description

This chapter describes the AT commands used to make an emergency call. The emergency number for GSM 900/1800 frequency bands is 112, in GSM 850/1900 networks 911 and 08 are available. The availability of emergency numbers depends on the type of ME and the services offered according to national regulations. Siemens tri-band GSM/GPRS modules support all three numbers.

2.1.1.2　Used AT commands

ATD<number>;　　　-　　　Make an emergency call
ATH　　　　　　　-　　　Disconnect existing connection

For further details about the commands see [2].

2.1.1.3　Flow chart
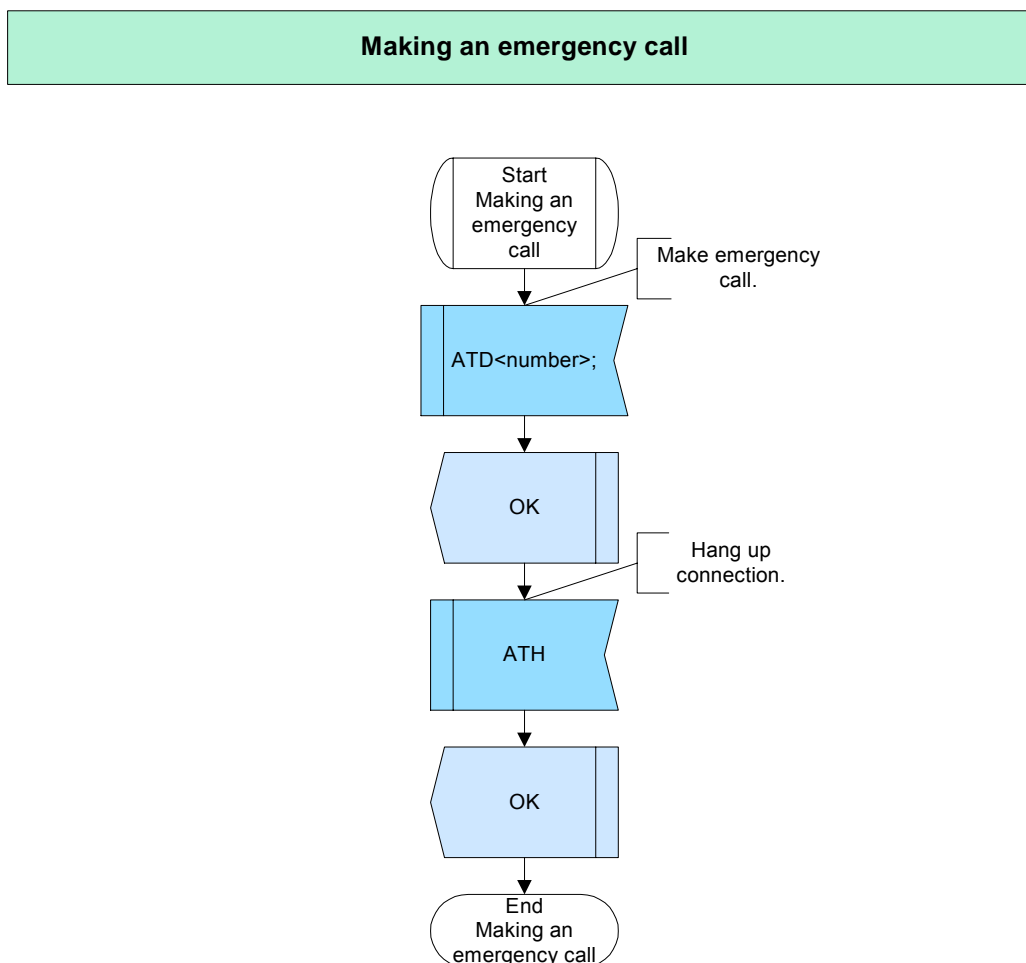
Figure 4: Making an emergency call

2.1.1.4   Hints

GCF-C note: When designing an application ensure that the following requirements be satisfied, even if no SIM card is inserted: The mobile must be able to dial emergency numbers and to activate the audio path. This ability shall be limited only to the emergency call numbers listed in Chapter 2.1.

2.1.1.5   Example

```
***************************************
Comment:  Making an emergency call
***************************************
***************************************
Comment:  Call 112
***************************************

Subscr 1     Send:ATD112;
Subscr 1   Receive:ATD112;
Subscr 1   Receive:
Subscr 1   Receive:OK

***************************************
Comment:  Hang up
***************************************

Subscr 1     Send:ATH
Subscr 1   Receive:ATH
Subscr 1   Receive:OK

***************************************
Comment:  Dialing an emergency number not supported by the network
***************************************

Subscr 1     Send:ATD911;
Subscr 1   Receive:ATD911;
Subscr 1   Receive: +CME ERROR: operation temporary not allowed
```

2.2 Basic initialization
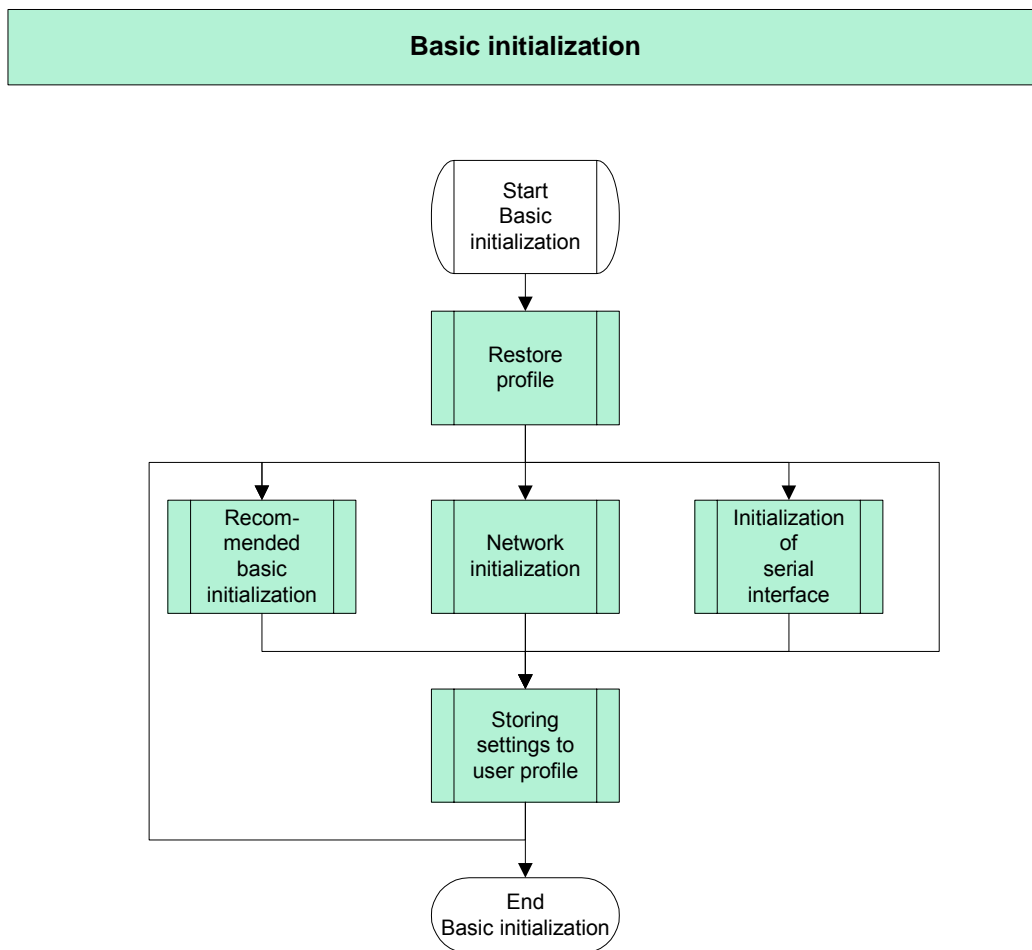
Figure 5: Basic initialization

2.2.1 Restore profile

2.2.1.1 Description

This chapter describes all the steps required to restore a profile. Two profiles are supported. First, use AT&V to check which profile is currently active. Depending on the result, you can enter AT&F to recall the factory settings or ATZ to restore the user profile saved with AT&W.

2.2.1.2 Used AT commands

AT&V	-	Display the current configuration
AT&F	-	Set all current parameters to manufacturer defaults
ATZ	-	Set all current parameters to user defined profile

For further details about the commands see [2].

2.2.1.3   Flow chart

Restore profile

```
                    ┌──────────────┐
                    │    Start     │
                    │   Restore    │──── Display current
                    │   profile    │      configuration
                    └──────┬───────┘
                           │
                    ┌──────▼───────┐
   Example: profile │    AT&V      │◄──────────────┐
   settings. ───────┤              │               │
                    └──────┬───────┘               │
                           │                       │
            ┌──────────────▼──────────────┐        │
            │ ACTIVE PROFILE:             │        │
            │ E1 Q0 V1 X4 &C1 &D2 &S0 \Q0 │        │
            │ S0:000 S3:013 S4:010 S5:008 │        │
            │ S6:000                      │        │
            │ S7:060 S8:000 S10:002       │        │
            │ S18:000                     │        │
            │ +CBST: 7,0,1                │        │
            │ +CRLP: 61,61,78,6           │        │
            │ +CR: 0                      │        │
            │ +FCLASS: 0                  │        │
            │ +ILRR: 0                    │        │
            │ +IPR: 0                     │        │
            │ +CMEE: 0                    │        │
            │ ^SCKS: 0,1                  │        │
            │ +CGSMS: 3                   │        │
            │ OK                          │        │
            └──────────────┬──────────────┘        │
                           │     Is the active profile
                      ┌────▼────┐   a user profile?   │
                  yes │  User   │                     │
              ┌───────┤ profile │                     │
              │       │ active? │                     │
              │       └────┬────┘                     │
              │            │ no                        │
              │            └──────────┐                │
         ┌────▼────┐              ┌───▼─────┐          │
     yes │ Restore │          yes │ Restore │          │
    ┌────┤ factory │         ┌────┤  user   │          │
    │    │settings?│         │    │settings?│          │
    │    └────┬────┘         │    └────┬────┘          │
    │         │ no           │         │ no            │
 ┌──▼──┐      │           ┌──▼──┐      └───────────────┘
 │ AT&F│      │           │ ATZ │
 └──┬──┘      │           └──┬──┘
    │         │              │
 ┌──▼──┐      │           ┌──▼──┐
 │ OK  │      │           │ OK  │
 └──┬──┘      │           └──┬──┘
    │         │              │
    └─────────┴──────────────┤
                             │
                      ┌──────▼───────┐
                      │     End      │
                      │   Restore    │
                      │   profile    │
                      └──────────────┘
```

Restore to factory settings. (points to AT&F)

Restore to user profile settings. (points to ATZ)

Figure 6: Restore profile

2.2.1.4　Hints

- Restoring a profile is possible at any time.

2.2.1.5　Example

```
**************************************
Comment:  Restore profile
**************************************
**************************************
Comment:  Display current configuration
**************************************

Subscr 1    Send:  AT&V
Subscr 1   Receive:  AT&V
Subscr 1   Receive:  ACTIVE PROFILE:
Subscr 1   Receive:  E1 Q0 V1 X4 &C1 &D2 &S0 \Q0
Subscr 1   Receive:  S0:000 S3:013 S4:010 S5:008 S6:000 S7:060 S8:000 S10:002 S18:000
Subscr 1   Receive:  +CBST: 7,0,1
Subscr 1   Receive:  +CRLP: 61,61,78,6
Subscr 1   Receive:  +CR: 0
Subscr 1   Receive:  +FCLASS: 0
Subscr 1   Receive:  +ILRR: 0
Subscr 1   Receive:  +IPR: 0
Subscr 1   Receive:  +CMEE: 2
Subscr 1   Receive:  ^SCKS: 0,1
Subscr 1   Receive:  +CGSMS: 3
Subscr 1   Receive:
Subscr 1   Receive:  OK


**************************************
Comment:  Restore manufacture defaults
**************************************

Subscr 1    Send:  AT&F
Subscr 1   Receive:  AT&F
Subscr 1   Receive:  OK


**************************************
Comment:  Display current configuration
**************************************

Subscr 1    Send:  AT&V
Subscr 1   Receive:  AT&V
Subscr 1   Receive:  ACTIVE PROFILE:
Subscr 1   Receive:  E1 Q0 V1 X4 &C1 &D2 &S0 \Q0
Subscr 1   Receive:  S0:000 S3:013 S4:010 S5:008 S6:000 S7:060 S8:000 S10:002 S18:000
Subscr 1   Receive:  +CBST: 7,0,1
Subscr 1   Receive:  +CRLP: 61,61,78,6
Subscr 1   Receive:  +CR: 0
Subscr 1   Receive:  +FCLASS: 0
Subscr 1   Receive:  +ILRR: 0
Subscr 1   Receive:  +IPR: 0
Subscr 1   Receive:  +CMEE: 0
Subscr 1   Receive:  ^SCKS: 0,1
Subscr 1   Receive:  +CGSMS: 3
Subscr 1   Receive:
Subscr 1   Receive:  OK
```

2.2.2   Recommended basic initialization

2.2.2.1   Description

This chapter lists basic settings we recommend to initialize each time the module is restarted:

- Choose the format of result codes for mobile equipment errors. By factory default (AT+CMEE=0), simply "ERROR" will be returned. For better error detection, we recommend to select either the numeric format (AT+CMEE=1) or the extended text format (AT+CMEE=2).
  Most of the applications will rather use the numeric format since parsing numeric values is easier. For testing and debugging, at earlier stages of development, the text format might be more effective to evaluate the product design. For the same reason the examples presented in this document are based on the setting AT+CMEE=2.

- Set the format of result codes for incoming call indication. By factory default (AT+CRC=0), each incoming call will simply be notified via "RING". AT+CRC=1 enables the extended format of ring indication "+CRING: <text>", where <text> identifies the type of incoming call, such as VOICE, REL ASYNC, FAX or GPRS.

- Activate hardware flow control with AT\Q3. Hardware flow control is required for circuit switched data (including fax) and packet switched data (GPRS) connections, for proper operation of CYCLIC SLEEP modes and for Multiplex mode.

The settings of the three commands can be stored to the user profile with AT&W. This way the preferred settings will be loaded each time the module is restarted, eliminating the need to send each command after restart.

2.2.2.2   Used AT commands

AT+CMEE   -   Report Mobile Equipment Error
AT+CRC   -   Set Cellular Result Codes for incoming call indication
AT\Qn   -   Flow control

For further details about the commands see [2].

2.2.2.3 Flow chart
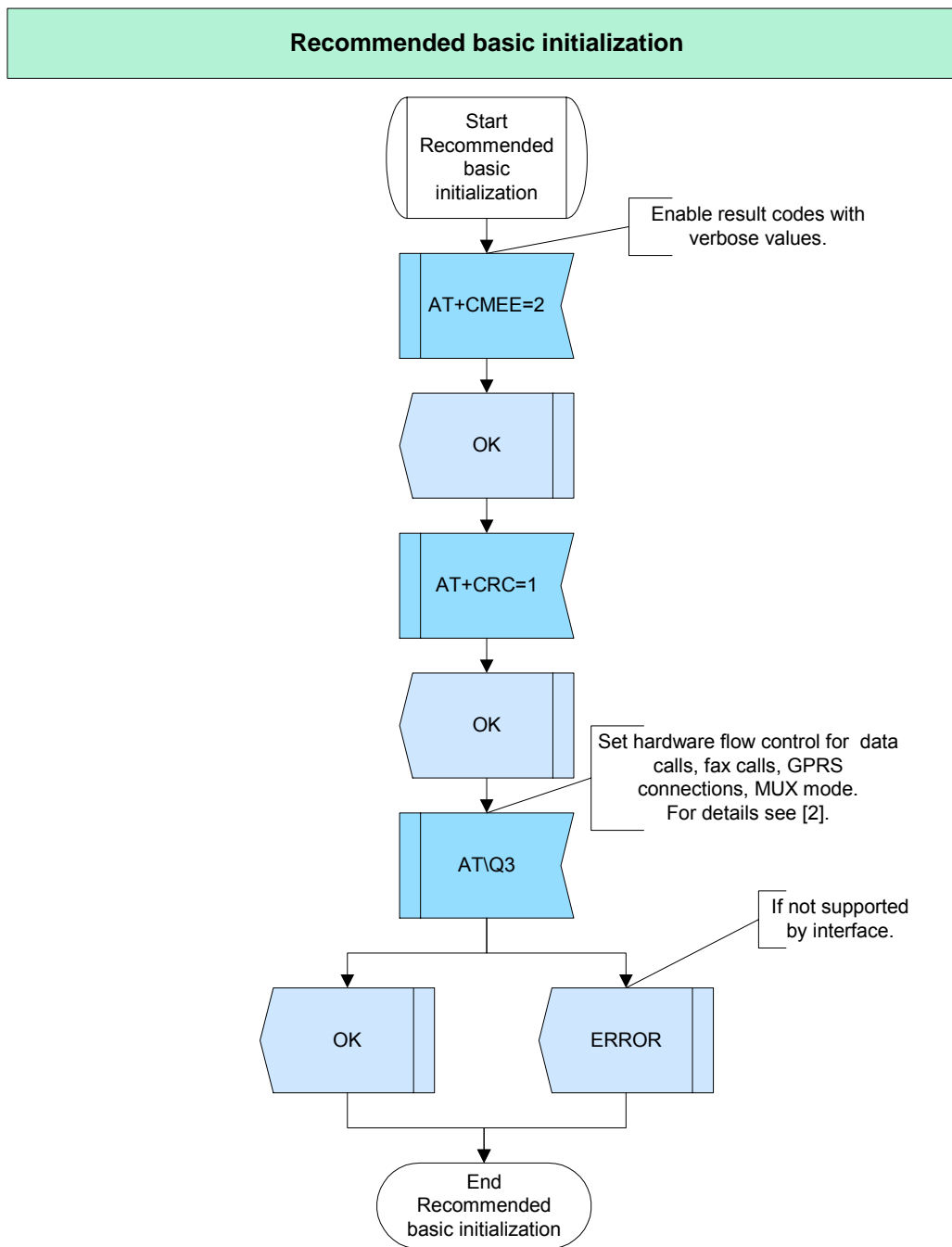
Figure 7: Recommended basic initialization

2.2.2.4   Hints

- Do not set AT+CRC=1 if you use Fax functionality with Microsoft Winfax Pro.

2.2.2.5   Example

****

Comment: Recommended basic initialization
****

****

Comment: Enable the extended error result code
****

Subscr 1   Send: AT+CMEE=2
Subscr 1   Receive: AT+CMEE=2
Subscr 1   Receive: OK

****

Comment: Set Cellular Result Codes for incoming call indication
****

Subscr 1   Send: AT+CRC=1
Subscr 1   Receive: AT+CRC=1
Subscr 1   Receive: OK

****

Comment: Set hardware flow control for data calls, fax calls, GPRS connections, MUX mode
****

Subscr 1   Send: AT\Q3
Subscr 1   Receive: AT\Q3
Subscr 1   Receive: OK

2.2.3 Network initialization

2.2.3.1 Description

This chapter describes options to make the network registration more transparent. It shows how to set up your ME to automatically select an operator. If you activate the presentation of the URC "+CREG:" for network registration, you will be notified each time the status of the network registration changes.

2.2.3.2 Used AT commands

AT+COPS   -   Operator selection
AT+CREG   -   Network registration

For further details about the commands see [2].

2.2.3.3 Flow Chart
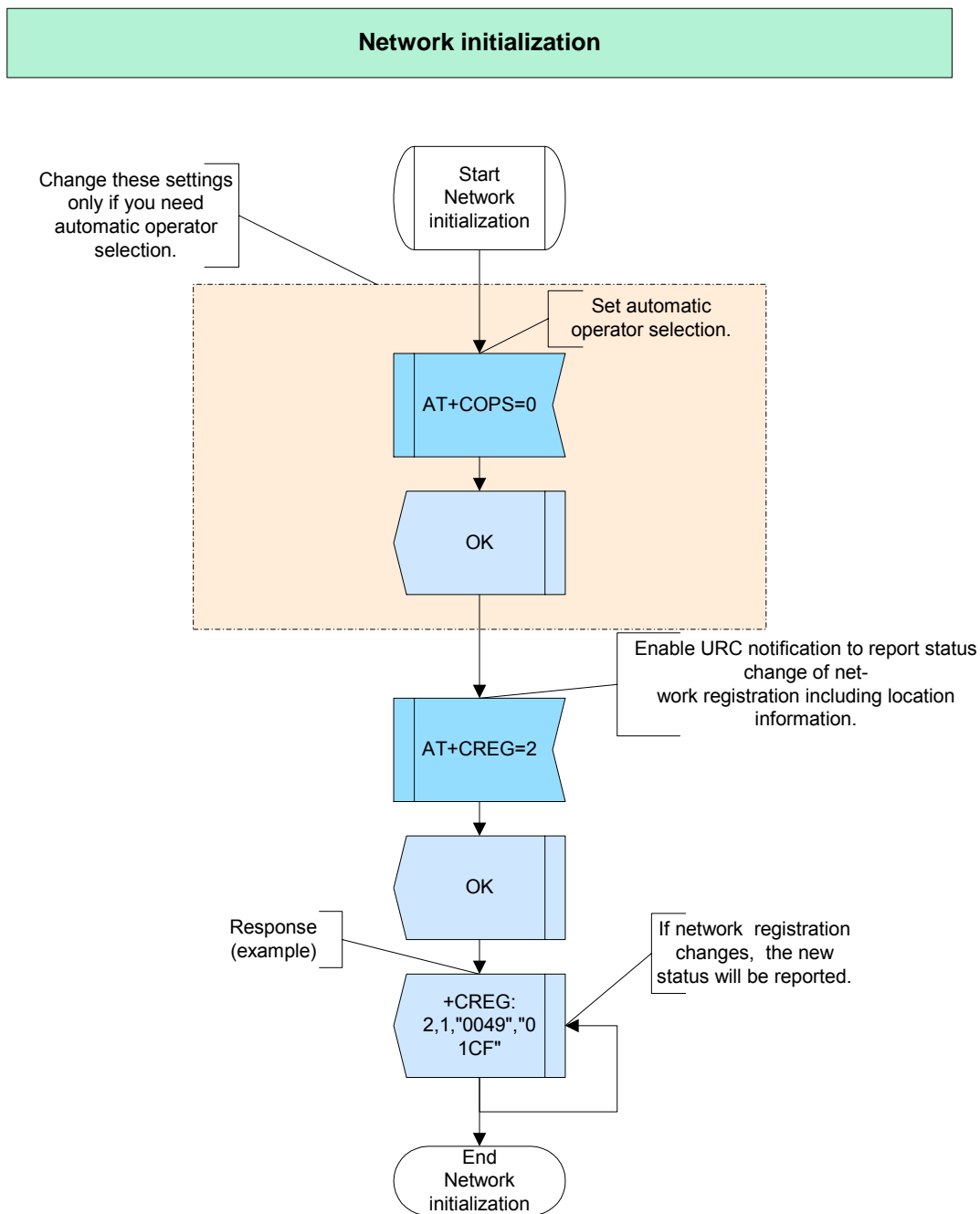
Figure 8: Network initialization

2.2.3.4 Hints

- Before entering the PIN, AT+COPS can only be used to set operator selection to automatic mode.

2.2.3.5   Example

```
***************************************
Comment:  Network initialization
***************************************
***************************************
Comment:  Set automatic operator selection
***************************************

Subscr 1     Send:  AT+COPS=0
Subscr 1   Receive:  AT+COPS=0
Subscr 1   Receive:  OK


***************************************
Comment:  Enable URC notification for network registration
***************************************

Subscr 1     Send:  AT+CREG=2
Subscr 1   Receive:  AT+CREG=2
Subscr 1   Receive:  OK
```

2.2.4   Initialization of serial interface

2.2.4.1   Description

For many applications it is crucial to make settings on the serial interface to ensure reliable operation. We recommend using the following AT commands to adjust these settings:

With AT+IPR the baud rate between the application and module can be chosen. It may, depending on the application, be wise to use a higher baud rate when transmitting large amounts of data.

AT&C, AT&D and AT&S are provided to configure the behavior of the status lines (DCD, DTR, DSR). Depending on the configuration made the status of the lines will indicate different events such as: Presence of a data carrier, data mode/command mode etc.

2.2.4.2   Used AT commands

AT&C   -   Set circuit Data Carrier Detect (DCD) function mode
AT&D   -   Set circuit Data Terminal Ready (DTR) function mode
AT&S   -   Set circuit Data Set Ready (DSR) function mode
AT+IPR   -   Set fixed local rate

For further details about the commands see [2].

2.2.4.3 Flow Chart
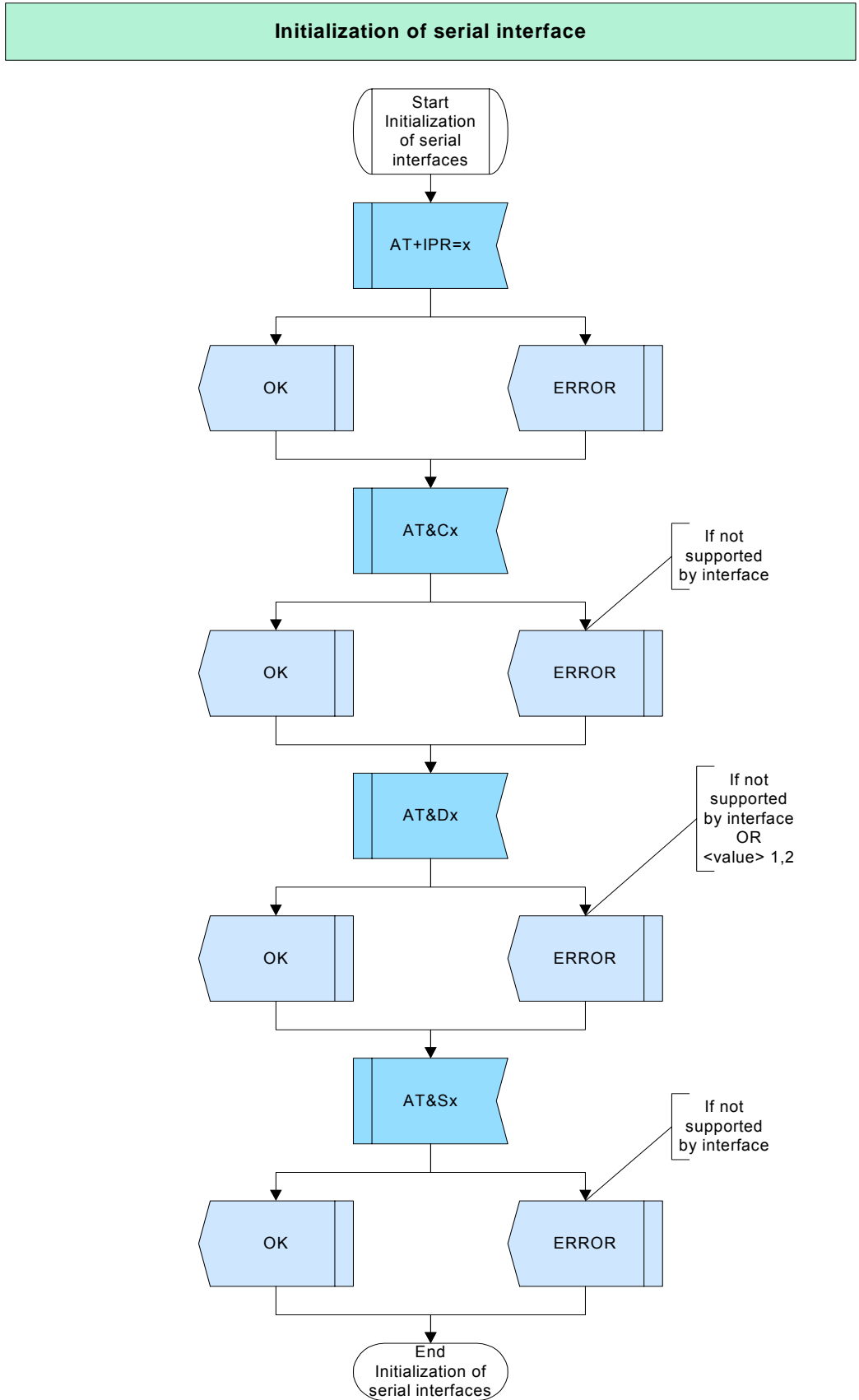
Figure 9: Initialization of serial interface

2.2.4.4   Hints

• Autobauding is not compatible with Multiplexer mode.

2.2.4.5   Example

****
Comment: Initialization of serial interface
****
****
Comment: Query bit rate
****

Subscr 1   Send: AT+IPR?
Subscr 1   Receive: AT+IPR?
Subscr 1   Receive: +IPR: 0
Subscr 1   Receive:
Subscr 1   Receive: OK

****
Comment: Set bit rate per second (baud) AT+IPR=0 (Autobauding)
****

Subscr 1   Send: AT+IPR=0
Subscr 1   Receive: AT+IPR=0
Subscr 1   Receive: OK

****
Comment: Set circuit (DCD) function mode (AT&C0 default, AT&C1 presence of data carrier only))
****

Subscr 1   Send: AT&C0
Subscr 1   Receive: AT&C0
Subscr 1   Receive: OK

****
Comment: Set circuit (DTR) function mode
****

Subscr 1   Send: AT&D2
Subscr 1   Receive: AT&D2
Subscr 1   Receive: OK

****
Comment: Set circuit (DSR) function mode
****

Subscr 1   Send: AT&S0
Subscr 1   Receive: AT&S0
Subscr 1   Receive: OK

2.2.5   Storing settings to user profile

2.2.5.1   Description

This chapter describes how to store the current settings to the user profile.

2.2.5.2   Used AT commands

AT&W   -   Store current configuration to user defined profile

For further details about the commands see [2].

2.2.5.3   Flow chart
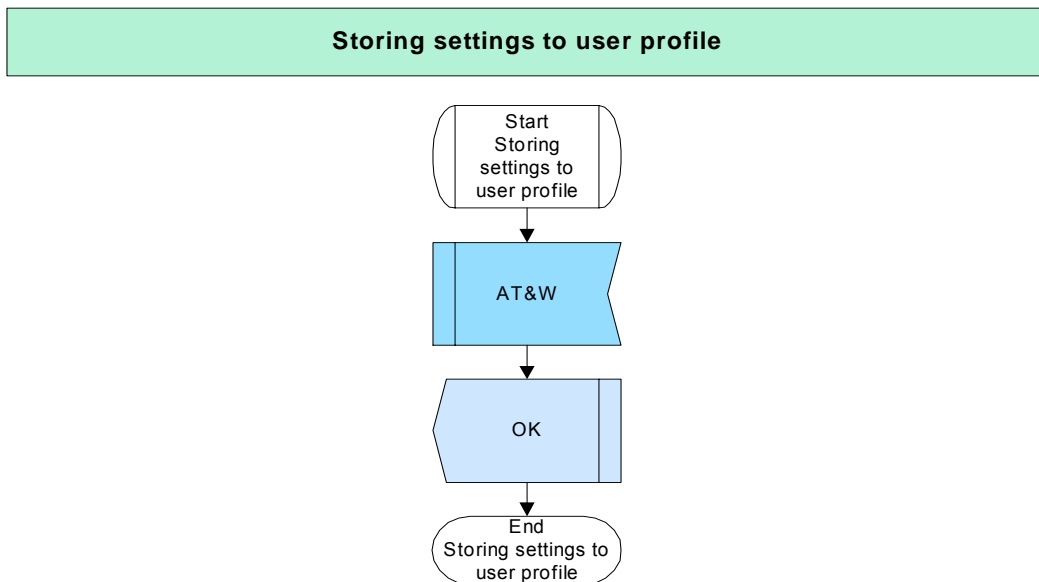
Figure 10: Storing settings to user profile

2.2.5.4   Hints

- Not all settings can be added to the user profile. Please refer to [2] for a list of settings storable with AT&W.

2.2.5.5   Example

```
***************************************
Comment:  Storing settings to user profile
***************************************
***************************************
Comment:  Storing settings
***************************************
Subscr 1    Send:  AT&W
Subscr 1  Receive:  AT&W
Subscr 1  Receive:  OK
```

2.3   Device information
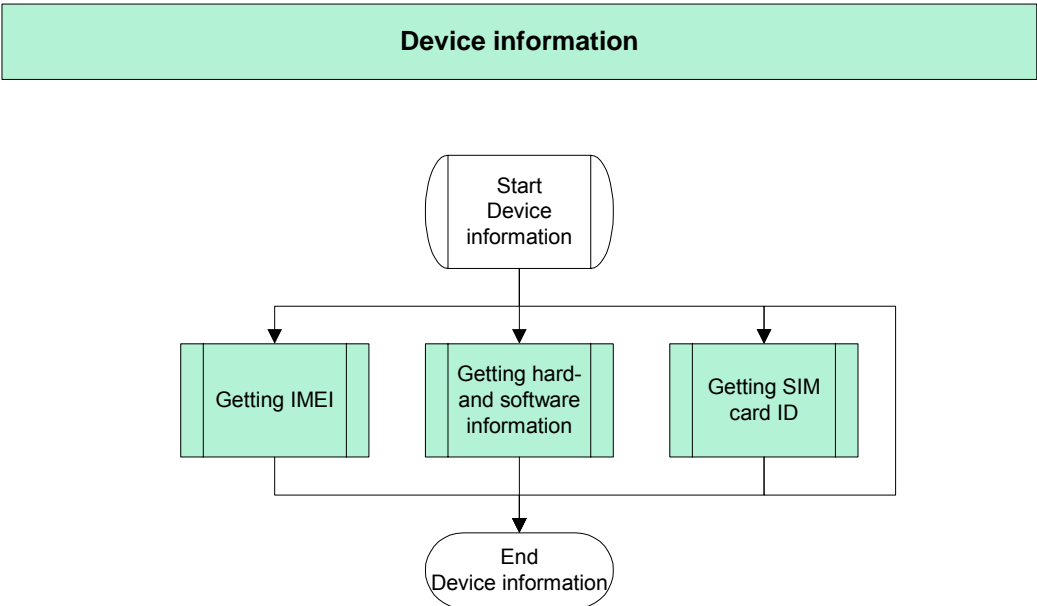
Figure 11: Getting device information

2.3.1 Getting IMEI

2.3.1.1 Description

This chapter describes how to get the IMEI of your ME. The IMEI (International Mobile Equipment Identity) is a unique 15-digit number to identify every individual mobile equipment.

2.3.1.2 Used AT commands

AT+GSN/ AT+CGSN   -   Request TA serial number identification (IMEI)
ATD*#06#;   -   GSM service code to request IMEI

For further details about the commands see [2].

2.3.1.3 Flow chart
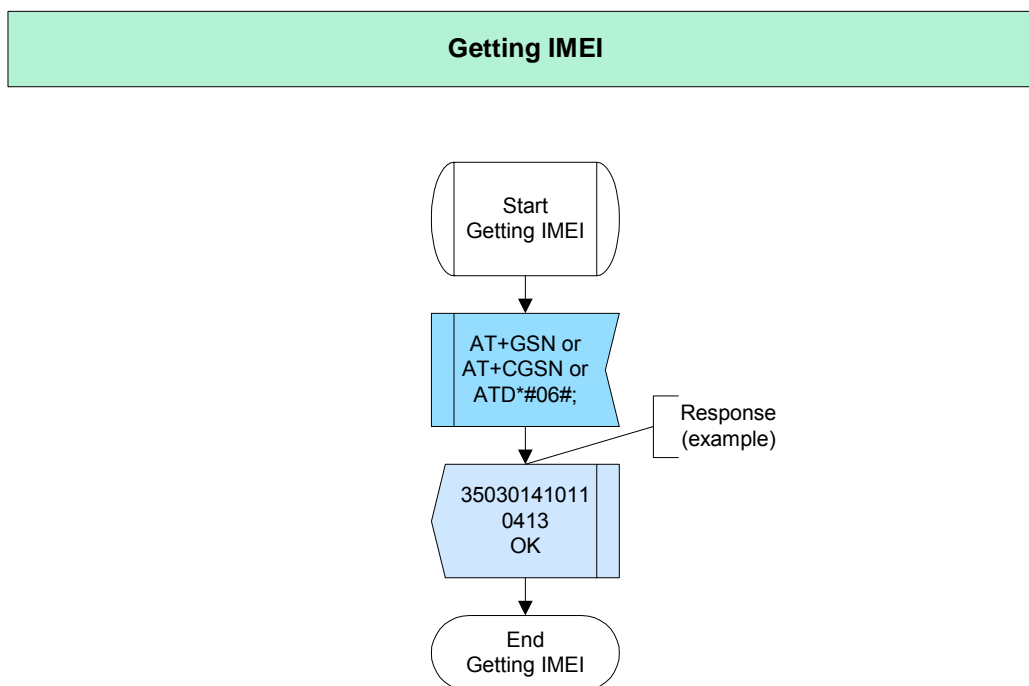
Figure 12: Getting IMEI

2.3.1.4 Hints

- The IMEI will be needed, for example, to request the Master Phone Code of your ME from your ME distributor.

2.3.1.5 Example

```
***************************************
Comment:  Getting IMEI
***************************************
***************************************
Comment:  Request IMEI
***************************************
Subscr 1     Send:  AT+GSN
Subscr 1   Receive:  AT+GSN
Subscr 1   Receive:  350450410105301
Subscr 1   Receive:
Subscr 1   Receive:  OK


***************************************
Comment:  Request IMEI
***************************************
Subscr 1     Send:  AT+CGSN
Subscr 1   Receive:  AT+CGSN
Subscr 1   Receive:  350450410105301
Subscr 1   Receive:
Subscr 1   Receive:  OK


***************************************
Comment:  Request IMEI
***************************************
Subscr 1     Send:  ATD*#06#;
Subscr 1   Receive:  ATD*#06#;
Subscr 1   Receive:  350450410105301
Subscr 1   Receive:
Subscr 1   Receive:  OK
```

2.3.2 Getting hardware and software information

2.3.2.1 Description

This chapter describes how to get additional information about your ME.

2.3.2.2 Used AT commands

ATI	-	Display product identification information
AT+GMI / AT+CGMI	-	Request manufacturer identification
AT+GMM / AT+CGMM	-	Request TA model identification
AT+GMR / AT+CGMR	-	Request TA revision identification of software status

For further details about the commands see [2].

2.3.2.3   Flow chart
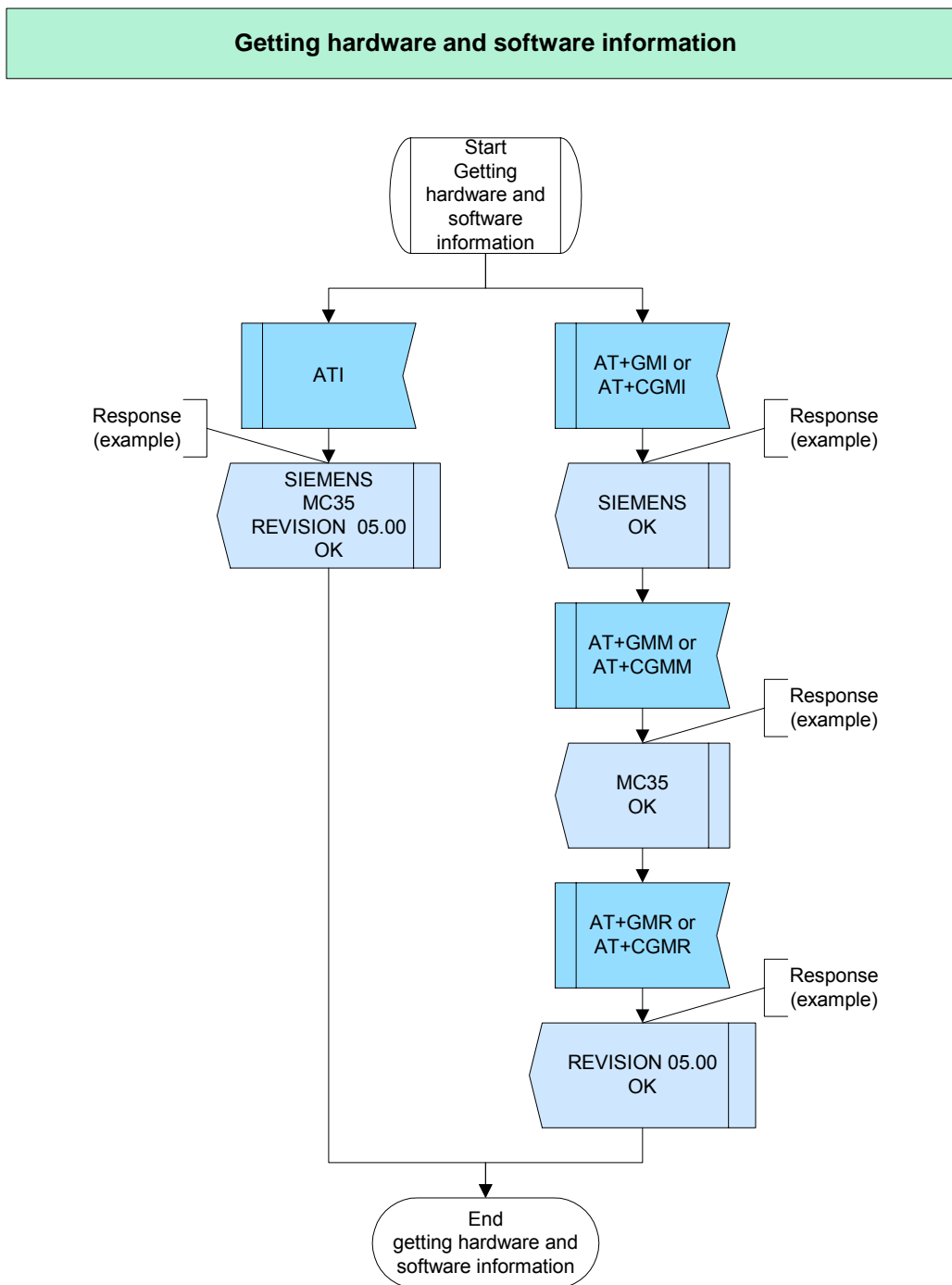
Figure 13: Getting hardware and software information

2.3.2.4   Hints

Not applicable.

2.3.2.5 Example

```
****************************************
Comment:  Getting hardware and software information
****************************************
****************************************
Comment:  Request product identification information
****************************************


Subscr 1     Send:  ATI
Subscr 1   Receive:  ATI
Subscr 1   Receive:  SIEMENS
Subscr 1   Receive:  MC45
Subscr 1   Receive:  REVISION 02.04
Subscr 1   Receive:
Subscr 1   Receive:  OK


****************************************
Comment:  Request manufacturer identification
****************************************


Subscr 1     Send:  AT+GMI
Subscr 1   Receive:  AT+GMI
Subscr 1   Receive:  SIEMENS
Subscr 1   Receive:
Subscr 1   Receive:  OK


****************************************
Comment:  Request TA model identification
****************************************


Subscr 1     Send:  AT+GMM
Subscr 1   Receive:  AT+GMM
Subscr 1   Receive:  MC45
Subscr 1   Receive:
Subscr 1   Receive:  OK


****************************************
Comment:  Request revision identification of software status
****************************************


Subscr 1     Send:  AT+GMR
Subscr 1   Receive:  AT+GMR
Subscr 1   Receive:  REVISION 02.04
Subscr 1   Receive:
Subscr 1   Receive:  OK


****************************************
Comment:  Request manufacturer identification
****************************************


Subscr 1     Send:  AT+CGMI
Subscr 1   Receive:  AT+CGMI
Subscr 1   Receive:  SIEMENS
Subscr 1   Receive:
Subscr 1   Receive:  OK


****************************************
```

Comment: Request TA model identification
****

Subscr 1   Send: AT+CGMM
Subscr 1   Receive: AT+CGMM
Subscr 1   Receive: MC45
Subscr 1   Receive:
Subscr 1   Receive: OK

****
Comment: Request revision identification of software status
****

Subscr 1   Send: AT+CGMR
Subscr 1   Receive: AT+CGMR
Subscr 1   Receive: REVISION 02.04
Subscr 1   Receive:
Subscr 1   Receive: OK

2.3.3 Getting SIM card ID

2.3.3.1 Description

This chapter describes how to get the identification number of the used SIM card.

2.3.3.2 Used AT commands

AT^SCID   -   Display SIM card identification number

For further details about the commands see [2].

2.3.3.3 Flow chart
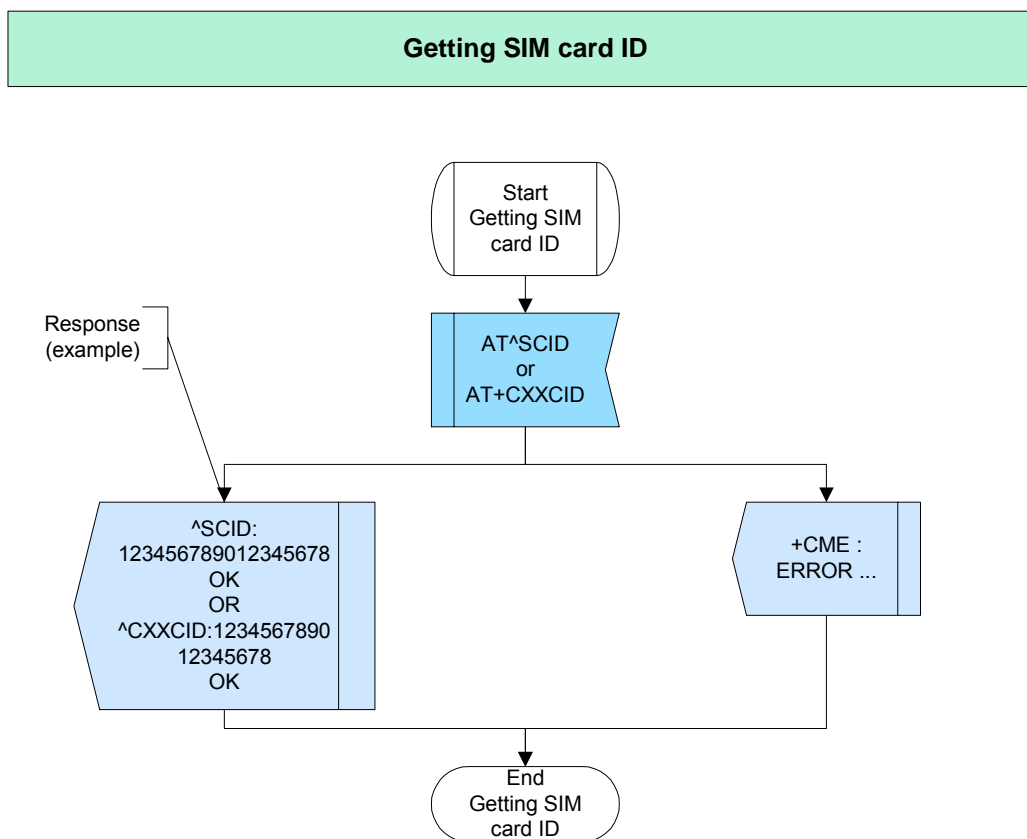
Figure 14: Getting SIM card ID

2.3.3.4 Hints

Not applicable.

2.3.3.5   Example

```
***************************************
Comment:  Getting SIM card ID
***************************************
***************************************
Comment:  Request SIM card ID with AT^SCID
***************************************
Subscr 1     Send:  AT^SCID
Subscr 1   Receive:  AT^SCID
Subscr 1   Receive:  ^SCID: 8949222021600262149
Subscr 1   Receive:
Subscr 1   Receive:  OK


***************************************
Comment:  Request SIM card ID with AT+CXXCID
***************************************
Subscr 1     Send:  AT+CXXCID
Subscr 1   Receive:  AT+CXXCID
Subscr 1   Receive:  +CXXCID: 8949222021600262149
Subscr 1   Receive:
Subscr 1   Receive:  OK
```

2.4 Power saving

2.4.1 CYCLIC and NON-CYCLIC SLEEP mode

2.4.1.1 Description

SLEEP mode reduces the functionality of the module to a minimum and, thus, minimizes the current consumption. Settings can be made using the AT+CFUN command. SLEEP mode falls into two categories:

- NON-CYCLIC SLEEP mode, activated with AT+CFUN=0
- CYCLIC SLEEP modes, selectable with AT+CFUN=5 or 6. Further modes 7, 8 and 9 are product dependent and specified in [1] and [2].

AT+CFUN=1 is the full functionality level, where power saving is deactivated.

What is the difference between the two SLEEP mode categories?

- In NON-CYCLIC SLEEP mode the AT interface is permanently blocked. The first wake-up event (e.g. a URC, an incoming call) will stop power saving and take the module back to full functionality AT+CFUN=1.
- CYCLIC SLEEP mode gives you greater flexibility to use the module when power saving is activated: First, the AT interface remains accessible, allowing characters to be sent or received while the module stays in the selected SLEEP mode. Second, when an event occurs (such as a call, a URC, data transfer, GPRS transfer), power saving is halted for the duration of the event and a mode-specific follow-up time, and will then be resumed.

Please consult [1] and [2] for more details on the SLEEP modes supported by your module, especially timing characteristics and different wake-up conditions depending on the selected SLEEP mode.

The command AT^SCFG can be used to configure the wake up time for power saving mode 9. The default value is 20 seconds. Note that the AT^SCFG command is not supported by all products, for details see [2].

2.4.1.2 Used AT commands

AT+CFUN	-	Set phone functionality
ATD	-	Mobile originated call to dial a number
ATA	-	Answer call
ATH	-	Disconnect existing connection
+++	-	Switch from data mode or PPP online mode to command mode
AT+CSQ	-	Signal quality
AT^SCFG	-	Extended configuration setting (not supported by all products)

For further details about the commands see [2].

2.4.1.3 Flow chart
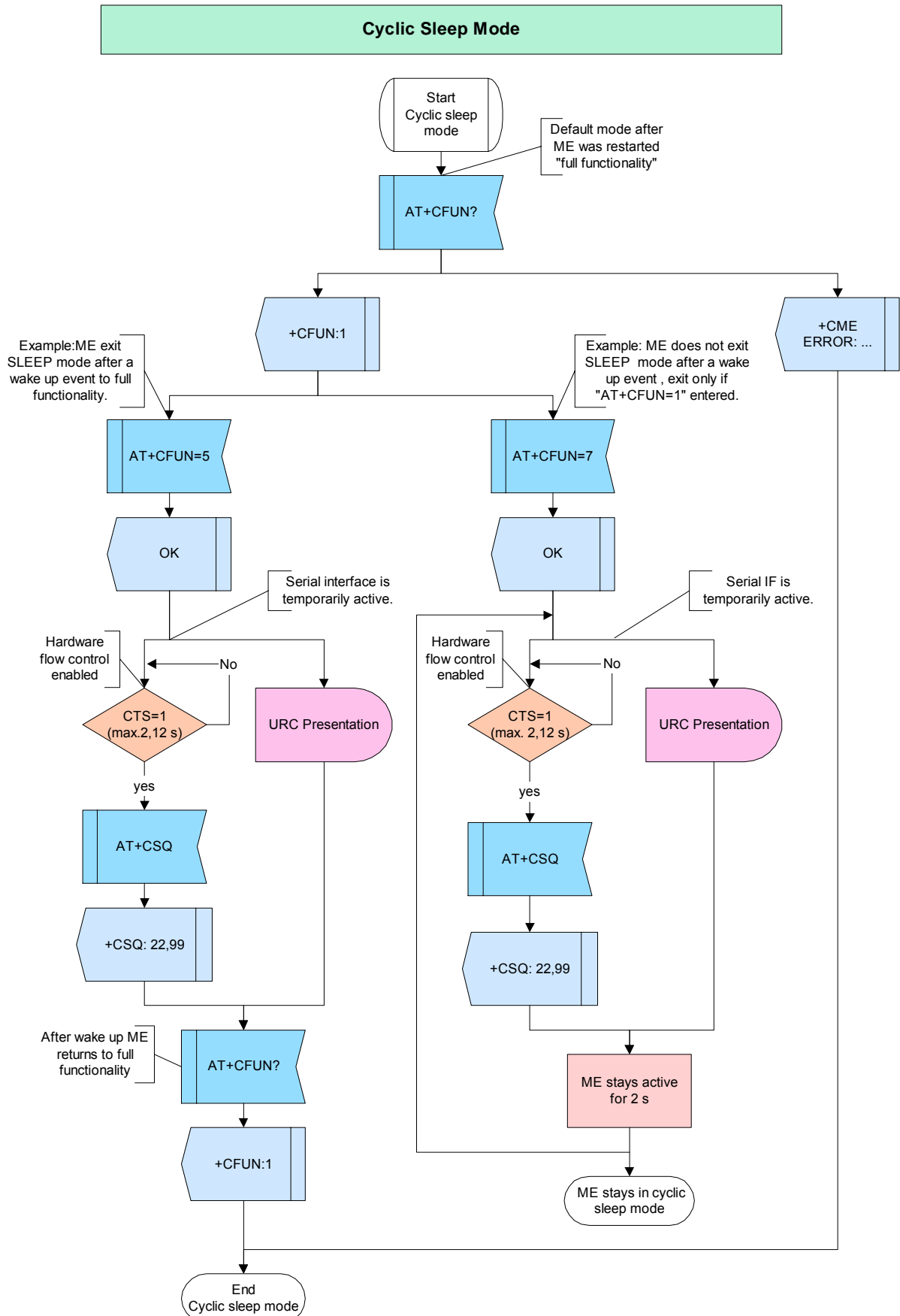
Figure 15: CYCLIC SLEEP mode
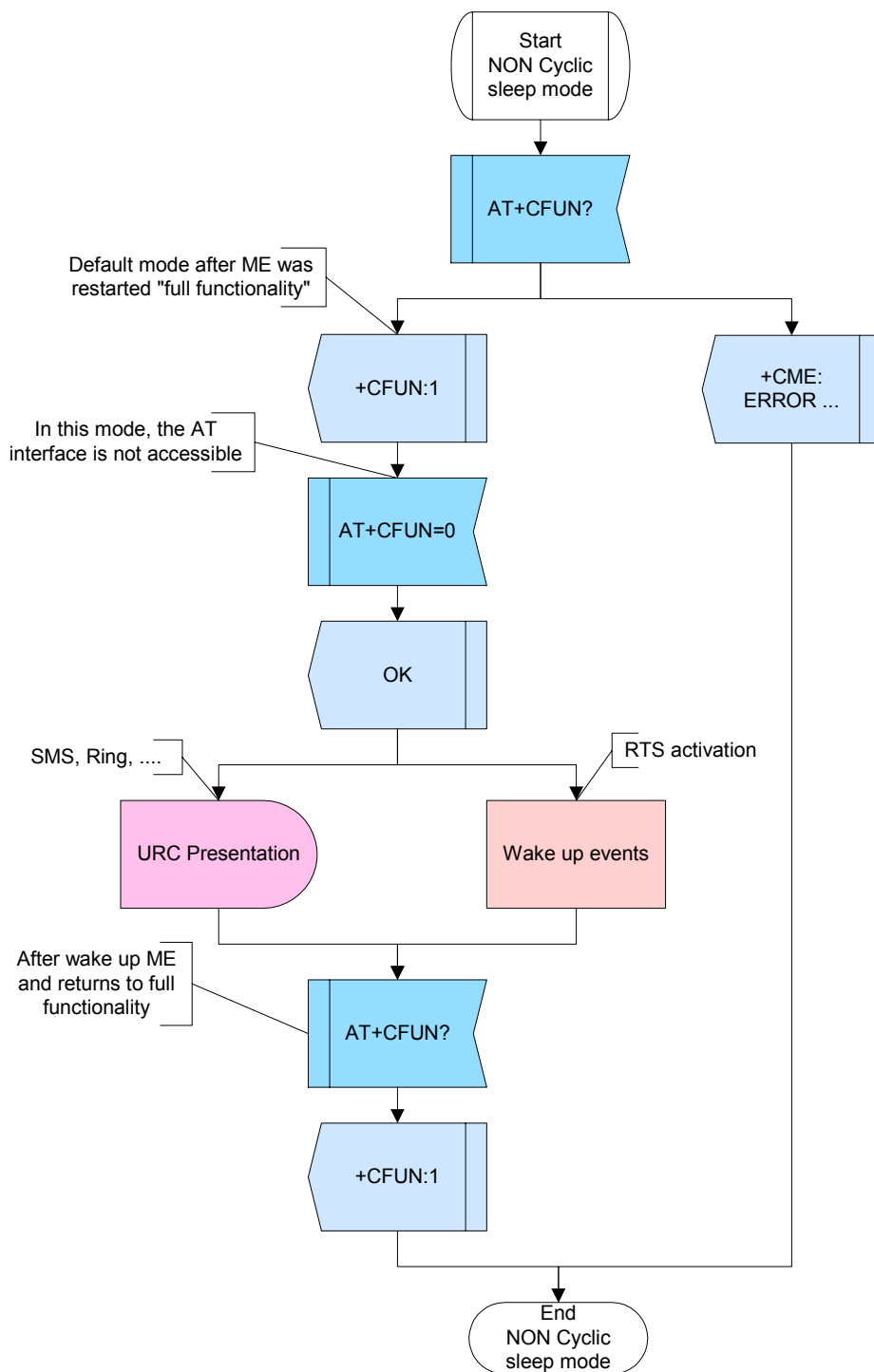
Figure 16: NON-CYCLIC SLEEP mode

Configuration CYCLIC SLEEP mode 9

Start
Configuration
CYCLIC SLEEP
mode 9

Optional

AT^SCFG?

^SCFG: "Audio/AMR","00101"
^SCFG: "GPRS/ATS0/withAttach","on"
^SCFG: "GPRS/RingOnIncomingData","off"
^SCFG: "PowerSaver/Mode9/Timeout","20"
^SCFG: "Radio/Band/HandOver","0"
^SCFG: "URC/CallStatus/CIEV","restricted"
^SCFG: "URC/CallStatus/SLCC","verbose"
^SCFG: "URC/Datamode/Ringline","off"
^SCFG: "URC/Ringline","local"
^SCFG: "URC/Ringline/ActiveTime","2"
OK

AT^SCFG="Power
Save/Mode9/
Timeout","5"

Wake up time
set to 5 sec.
(minimum
timeout)

^SCFG:
"PowerSaver/Mode9/
Timeout","5"
OK

End
Configuration
CYCLIC SLEEP
mode 9

Figure 17:Configuration CYCLIC SLEEP mode 9

2.4.1.4 Hints

- The AT+CFUN command can be executed before or after entering PIN1. Yet, please keep in mind that power saving works properly only when PIN authentication has been done. If you attempt to activate power saving while the SIM card is not inserted or the PIN not correctly entered, the selected <fun> level will be set, though power saving does not take effect. For the same reason, power saving cannot be used if the module operates in Alarm mode.
- To check whether power saving is on, you can query the status of AT+CFUN if you have chosen CYCLIC SLEEP mode. In all SLEEP modes, you can monitor the status LED controlled by the SYNC pin (if the LED is connected). The LED behaviour varies with the type of module, for details please refer to [1] and [2].

2.4.1.5   Example

Example 1:

```
***************************************
Comment:  CYCLIC SLEEP mode
***************************************
***************************************
Comment:  Query status of functionality level
***************************************

Subscr 2     Send:  AT+CFUN?
Subscr 2   Receive: AT+CFUN?
Subscr 2   Receive: +CFUN: 1
Subscr 2   Receive:
Subscr 2   Receive: OK


***************************************
Comment:  Set CYCLIC SLEEP mode 5
***************************************

Subscr 2     Send:  AT+CFUN=5
Subscr 2   Receive: AT+CFUN=5
Subscr 2   Receive: OK
Subscr 2     Send:  AT+CFUN?
Subscr 2   Receive: AT+CFUN?
Subscr 2   Receive: +CFUN: 5
Subscr 2   Receive:
Subscr 2   Receive: OK


***************************************
Comment:  CYCLIC SLEEP mode 5 is set. ME wakes up by incoming data call.
***************************************

Subscr 1     Send:  ATD00441522400023
Subscr 1   Receive: ATD00441522400023
Subscr 2   Receive:
Subscr 2   Receive: RING
Subscr 2     Send:  ATA
Subscr 2   Receive: ATA
Subscr 2   Receive:
Subscr 2   Receive: CONNECT 9600/RLP
Subscr 1   Receive:
Subscr 1   Receive: CONNECT 9600/RLP
Subscr 2     Send:  +++
Subscr 1   Receive: +++
Subscr 2   Receive:
Subscr 2   Receive: OK
Subscr 2     Send:  ATH
Subscr 2   Receive: ATH
Subscr 2   Receive: OK
Subscr 1   Receive:
Subscr 1   Receive: NO CARRIER
```

```
****************************************
Comment:  Request current status of functionality level
****************************************

Subscr 2     Send:  AT+CFUN?
Subscr 2   Receive:  AT+CFUN?
Subscr 2   Receive:  +CFUN: 1
Subscr 2   Receive:
Subscr 2   Receive:  OK


****************************************
Comment:  Set CYCLIC SLEEP mode 7
****************************************

Subscr 2     Send:  AT+CFUN=7
Subscr 2   Receive:  AT+CFUN=7
Subscr 2   Receive:  OK
Subscr 2     Send:  AT+CFUN?
Subscr 2   Receive:  AT+CFUN?
Subscr 2   Receive:  +CFUN: 7
Subscr 2   Receive:
Subscr 2   Receive:  OK


****************************************
Comment:  Enter an AT command (ME will not wake up)
****************************************

Subscr 2     Send:  AT+CSQ
Subscr 2   Receive:  AT+CSQ
Subscr 2   Receive:  +CSQ: 17,99
Subscr 2   Receive:
Subscr 2   Receive:  OK


****************************************
Comment:  Switch CYCLIC SLEEP mode off
****************************************

Subscr 2     Send:  AT+CFUN?
Subscr 2   Receive:  AT+CFUN?
Subscr 2   Receive:  +CFUN: 7
Subscr 2   Receive:
Subscr 2   Receive:  OK
Subscr 2     Send:  AT+CFUN=1
Subscr 2   Receive:  AT+CFUN=1
Subscr 2   Receive:  OK
Subscr 2     Send:  AT+CFUN?
Subscr 2   Receive:  AT+CFUN?
Subscr 2   Receive:  +CFUN: 1
Subscr 2   Receive:
Subscr 2   Receive:  OK
```

Example 2:

```
***************************************
Comment:  NON-CYCLIC SLEEP mode
***************************************
***************************************
Comment:  Request current status of functionality level.
***************************************


Subscr 2     Send:  AT+CFUN?
Subscr 2   Receive: AT+CFUN?
Subscr 2   Receive: +CFUN: 1
Subscr 2   Receive:
Subscr 2   Receive: OK


***************************************
Comment:  Set ME to NON-CYCLIC SLEEP mode.
***************************************


Subscr 2     Send:  AT+CFUN=0
Subscr 2   Receive: AT+CFUN=0
Subscr 2   Receive: OK


***************************************
Comment:  Wake up subscriber 2 by incoming call (URC).
***************************************


Subscr 1     Send:  ATD00441522400023
Subscr 1   Receive: ATD00441522400023
Subscr 2   Receive:
Subscr 2   Receive: RING
Subscr 2   Receive:
Subscr 2   Receive: RING
Subscr 2     Send:  ATA
Subscr 2   Receive: ATA
Subscr 2   Receive:
Subscr 2   Receive: CONNECT 9600/RLP
Subscr 1   Receive:
Subscr 1   Receive: CONNECT 9600/RLP
Subscr 2     Send:  +++
Subscr 2   Receive:
Subscr 2   Receive: OK
Subscr 1   Receive: +++
Subscr 2     Send:  ATH
Subscr 2   Receive: ATH
Subscr 2   Receive: OK
Subscr 1   Receive:
Subscr 1   Receive: NO CARRIER


***************************************
Comment:  After wake-up of ME, query status of functionality level.
***************************************


Subscr 2     Send:  AT+CFUN?
Subscr 2   Receive: AT+CFUN?
Subscr 2   Receive: +CFUN: 1
Subscr 2   Receive:
Subscr 2   Receive: OK
```

Example 3:

****

Configuration CYCLIC SLEEP mode 9 (not supported by all products)
****

****

Comment: Query various ME parameters.
****

Subscr 1   Send: AT^SCFG?
Subscr 1   Receive: AT^SCFG?
Subscr 1   Receive: ^SCFG: "Audio/AMR","00101"
Subscr 1   Receive: ^SCFG: "GPRS/ATS0/withAttach","on"
Subscr 1   Receive: ^SCFG: "GPRS/RingOnIncomingData","off"
Subscr 1   Receive: ^SCFG: "PowerSaver/Mode9/Timeout","20"
Subscr 1   Receive: ^SCFG: "Radio/Band/HandOver","0"
Subscr 1   Receive: ^SCFG: "URC/CallStatus/CIEV","restricted"
Subscr 1   Receive: ^SCFG: "URC/CallStatus/SLCC","verbose"
Subscr 1   Receive: ^SCFG: "URC/Datamode/Ringline","off"
Subscr 1   Receive: ^SCFG: "URC/Ringline","local"
Subscr 1   Receive: ^SCFG: "URC/Ringline/ActiveTime","2"
Subscr 1   Receive:
Subscr 1   Receive: OK

****

Comment: Set timeout value for power saving mode 9
****

Subscr 1   Send: AT^SCFG="PowerSaver/Mode9/Timeout","5"
Subscr 1   Receive: AT^SCFG="PowerSaver/Mode9/Timeout","5"
Subscr 1   Receive: ^SCFG: "PowerSaver/Mode9/Timeout","5"
Subscr 1   Receive:
Subscr 1   Receive: OK

2.5 Entering PIN
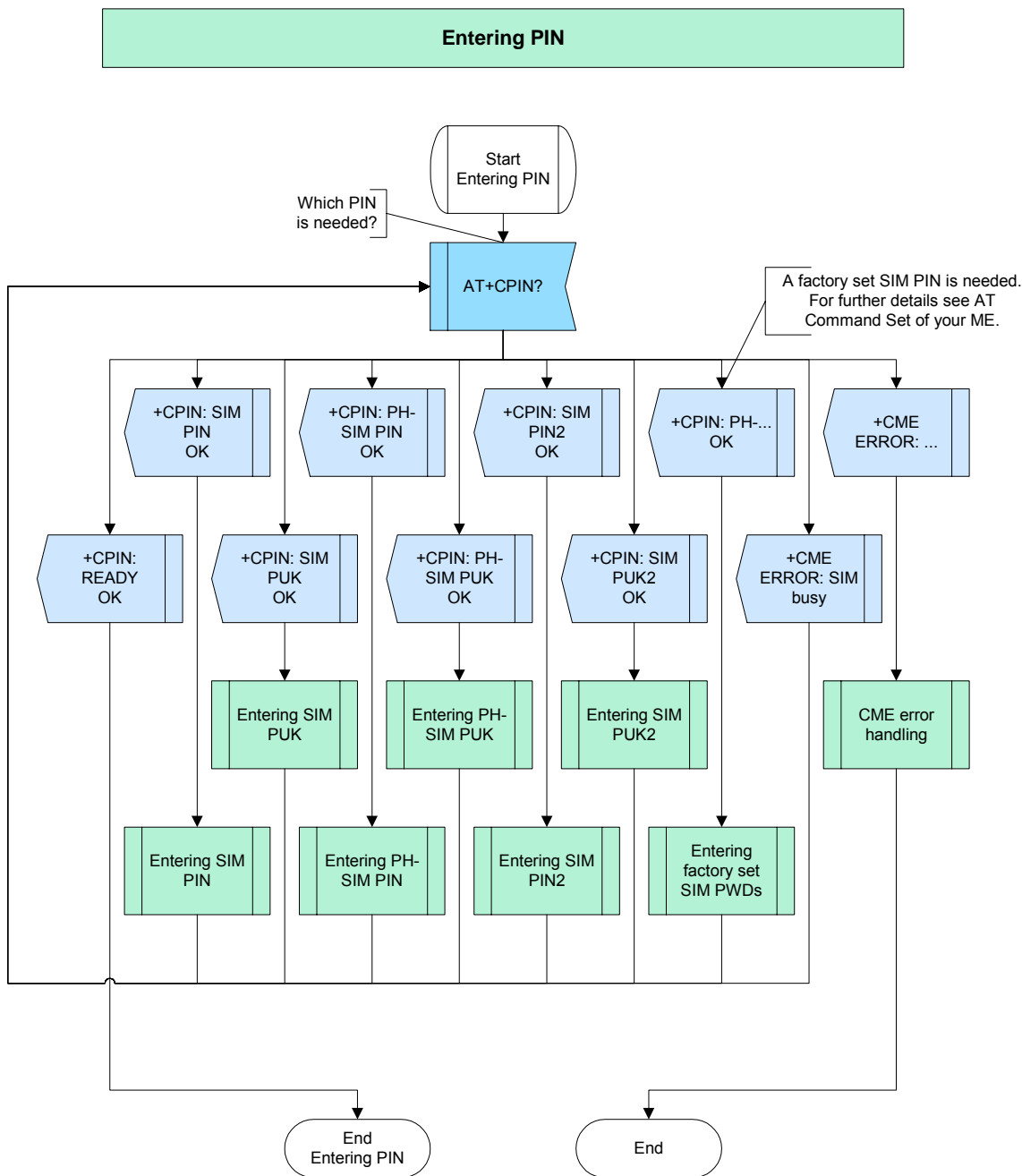
Figure 18: Entering PIN

2.5.1   Entering SIM PIN

2.5.1.1   Description

This chapter describes how to enter the SIM PIN. You will also see what happens when a wrong SIM PIN is entered three times.

2.5.1.2   Used AT commands

AT^SPIC   -   Display PIN counter
AT+CPIN   -   Enter PIN

For further details about the commands see [2].

2.5.1.3 Flow chart
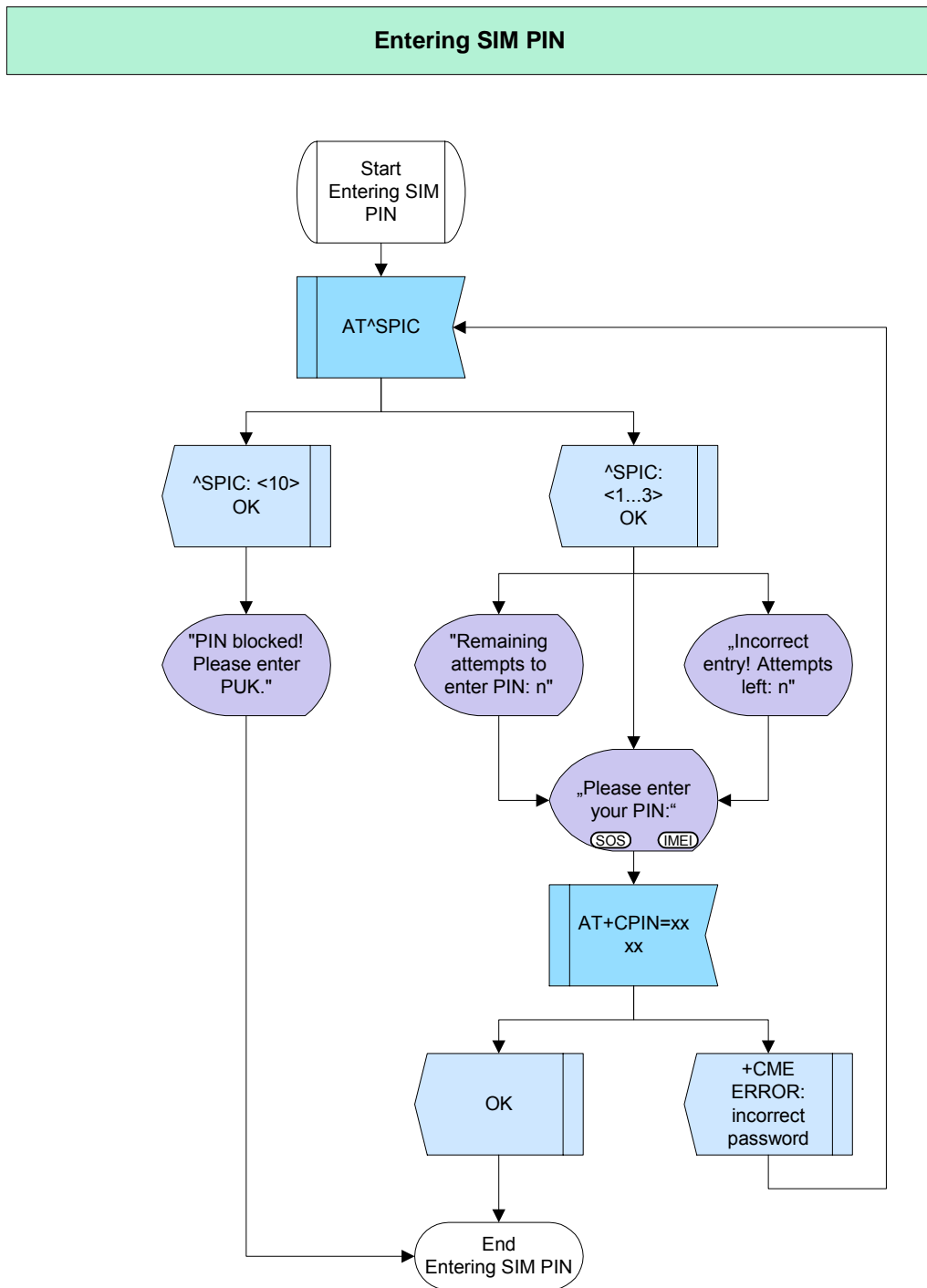
Figure 19: Entering SIM PIN

2.5.1.4 Hints

Not applicable.

2.5.1.5   Example

```
****************************************
Comment:  Entering SIM PIN
****************************************

****************************************
Comment:  Request PIN counter.
****************************************


Subscr 1     Send:  AT^SPIC
Subscr 1   Receive: AT^SPIC
Subscr 1   Receive: ^SPIC: 3
Subscr 1   Receive:
Subscr 1   Receive: OK


****************************************
Comment:  Enter wrong PIN first time.
****************************************


Subscr 1     Send:  AT+CPIN=1234
Subscr 1   Receive: AT+CPIN=1234
Subscr 1   Receive: +CME ERROR: incorrect password


****************************************
Comment:  Request PIN counter.
****************************************


Subscr 1     Send:  AT^SPIC
Subscr 1   Receive: AT^SPIC
Subscr 1   Receive: ^SPIC: 2
Subscr 1   Receive:
Subscr 1   Receive: OK


****************************************
Comment:  Enter wrong PIN second time.
****************************************


Subscr 1     Send:  AT+CPIN=1234
Subscr 1   Receive: AT+CPIN=1234
Subscr 1   Receive: +CME ERROR: incorrect password


****************************************
Comment:  Request PIN counter.
****************************************


Subscr 1     Send:  AT^SPIC
Subscr 1   Receive: AT^SPIC
Subscr 1   Receive: ^SPIC: 1
Subscr 1   Receive:
Subscr 1   Receive: OK


****************************************
Comment:  Enter wrong PIN third time.
****************************************
Subscr 1     Send:  AT+CPIN=1234
Subscr 1   Receive: AT+CPIN=1234
Subscr 1   Receive: +CME ERROR: incorrect password
****************************************
```

Comment: Request PIN counter.
****

Subscr 1   Send: AT^SPIC
Subscr 1   Receive: AT^SPIC
Subscr 1   Receive: ^SPIC: 10
Subscr 1   Receive:
Subscr 1   Receive: OK

****
Comment: Request required PIN.
****

Subscr 1   Send: AT+CPIN?
Subscr 1   Receive: AT+CPIN?
Subscr 1   Receive: +CPIN: SIM PUK
Subscr 1   Receive:
Subscr 1   Receive: OK

2.5.2   Entering SIM PUK

2.5.2.1   Description

This chapter describes how to enter the SIM PUK. The SIM PUK is needed after entering a wrong SIM PIN three times. You have two ways to enter the PUK. The flow chart gives an example of both ways and shows what happens when entering a wrong PUK. After entering a wrong PUK ten times, your SIM will be blocked and you have to ask your provider for a new one.

2.5.2.2   Used AT commands

AT+CPIN   -   Enter PIN
ATD   -   Dial command used with GSM code
AT^SPIC   -   Display PIN counter

For further details about the commands see [2].

2.5.2.3   Flow chart
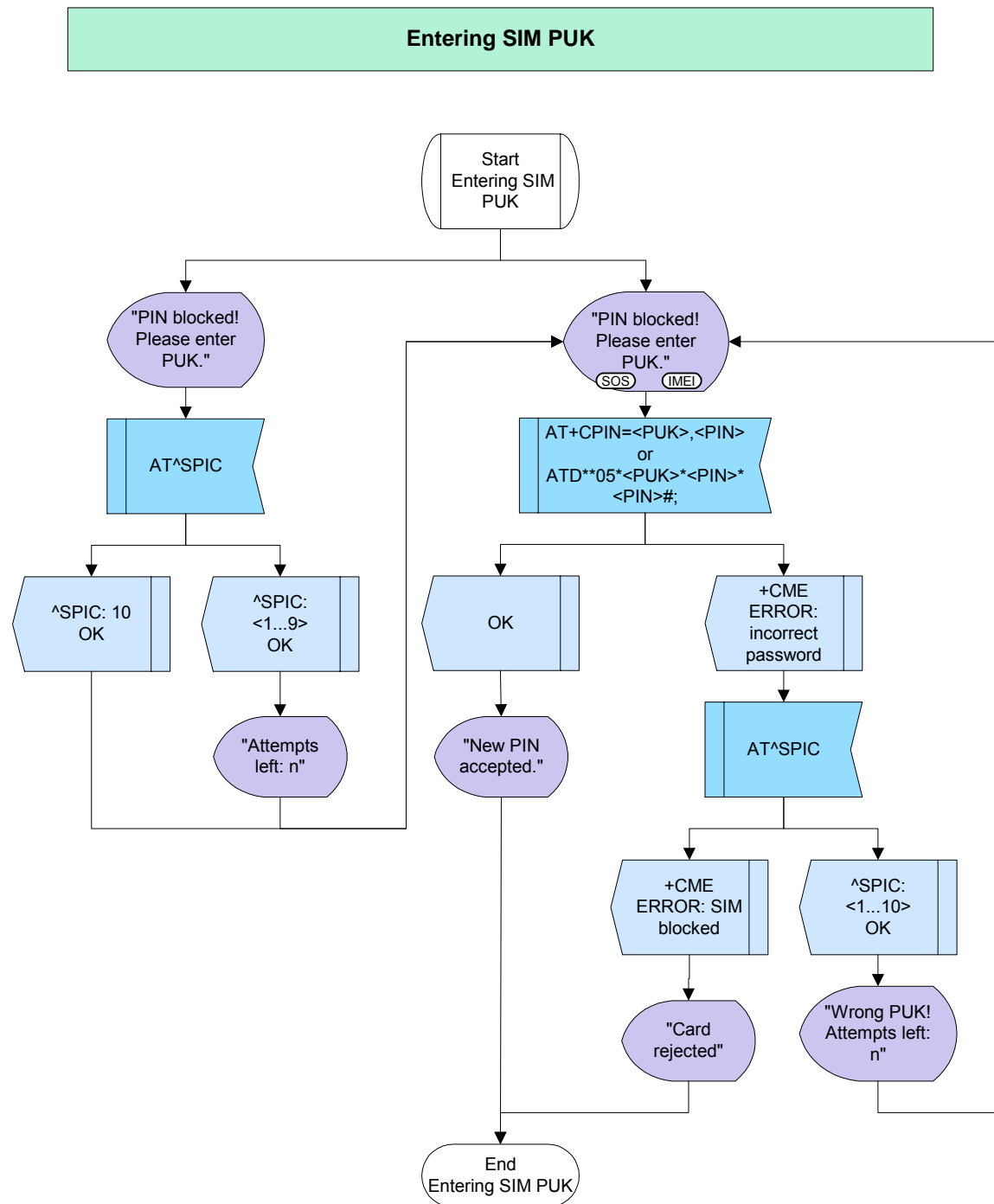
Figure 20: Entering SIM PUK

2.5.2.4   Hints

Not applicable.

2.5.2.5   Example

```
****************************************
Comment:  Entering SIM PUK
****************************************

****************************************
Comment:  Entering 3 times the wrong PIN
Comment:  First failure to enter PIN.
****************************************


Subscr 1    Send:  AT+CPIN=1111
Subscr 1   Receive:  AT+CPIN=1111
Subscr 1   Receive:  +CME ERROR: incorrect password


****************************************
Comment:  Second failure to enter PIN.
****************************************


Subscr 1    Send:  AT+CPIN=1111
Subscr 1   Receive:  AT+CPIN=1111
Subscr 1   Receive:  +CME ERROR: incorrect password


****************************************
Comment:  Third failure to enter PIN.
****************************************


Subscr 1    Send:  AT+CPIN=1111
Subscr 1   Receive:  AT+CPIN=1111
Subscr 1   Receive:  +CME ERROR: incorrect password


****************************************
Comment:  Request PIN counter
****************************************


Subscr 1    Send:  AT^SPIC
Subscr 1   Receive:  AT^SPIC
Subscr 1   Receive:  ^SPIC: 10
Subscr 1   Receive:
Subscr 1   Receive:  OK


****************************************
Comment:  Entering wrong PUK by using AT+CPIN command
****************************************


Subscr 1    Send:  AT+CPIN=12345679,0000
Subscr 1   Receive:  AT+CPIN=12345679,0000
Subscr 1   Receive:
Subscr 1   Receive:  +CME ERROR: incorrect password


****************************************
Comment:  Request PIN counter
****************************************

Subscr 1    Send:  AT^SPIC
Subscr 1   Receive:  AT^SPIC
Subscr 1   Receive:  ^SPIC: 9
Subscr 1   Receive:
Subscr 1   Receive:  OK
****************************************
```

Comment: Entering wrong PUK by using AT+CPIN command
****

Subscr 1   Send: AT+CPIN=12345679,0000
Subscr 1   Receive: AT+CPIN=12345679,0000
Subscr 1   Receive:
Subscr 1   Receive: +CME ERROR: incorrect password

****
Comment: Request PIN counter
****

Subscr 1   Send: AT^SPIC
Subscr 1   Receive: AT^SPIC
Subscr 1   Receive: ^SPIC: 8
Subscr 1   Receive:
Subscr 1   Receive: OK

****
Comment: Entering wrong PUK by using ATD command
****

Subscr 1   Send: ATD **05*12345679*0000*0000#;
Subscr 1   Receive: ATD **05*12345679*0000*0000#;
Subscr 1   Receive:
Subscr 1   Receive: +CME ERROR: incorrect password

****
Comment: Request PIN counter
****

Subscr 1   Send: AT^SPIC
Subscr 1   Receive: AT^SPIC
Subscr 1   Receive: ^SPIC: 7
Subscr 1   Receive:
Subscr 1   Receive: OK

****
Comment: Entering correct PUK
****

Subscr 1   Send: AT+CPIN=12345678,0000
Subscr 1   Receive: AT+CPIN=12345678,0000
Subscr 1   Receive:
Subscr 1   Receive: OK
Subscr 1   Receive:
Subscr 1   Receive: +CREG: 2
Subscr 1   Send: AT+CPIN?

****
Comment: Entering wrong PUK by using AT+CPIN command
****
Subscr 1   Send: AT+CPIN=12345679,0000
Subscr 1   Receive: AT+CPIN=12345679,0000
Subscr 1   Receive:
Subscr 1   Receive: +CME ERROR: incorrect password

2.5.3   Entering PH SIM PIN

2.5.3.1   Description

This chapter describes how to enter the PH-SIM PIN. The PH-SIM PIN is needed, if you have locked your ME to a special SIM card (referred to as "PS" lock). You will also see what happens when a wrong PH SIM PIN is entered three times.

2.5.3.2   Used AT commands

AT+CPIN   -   Enter PIN
AT^SPIC   -   Display PIN counter

For further details about the commands see [2].

2.5.3.3 Flow chart
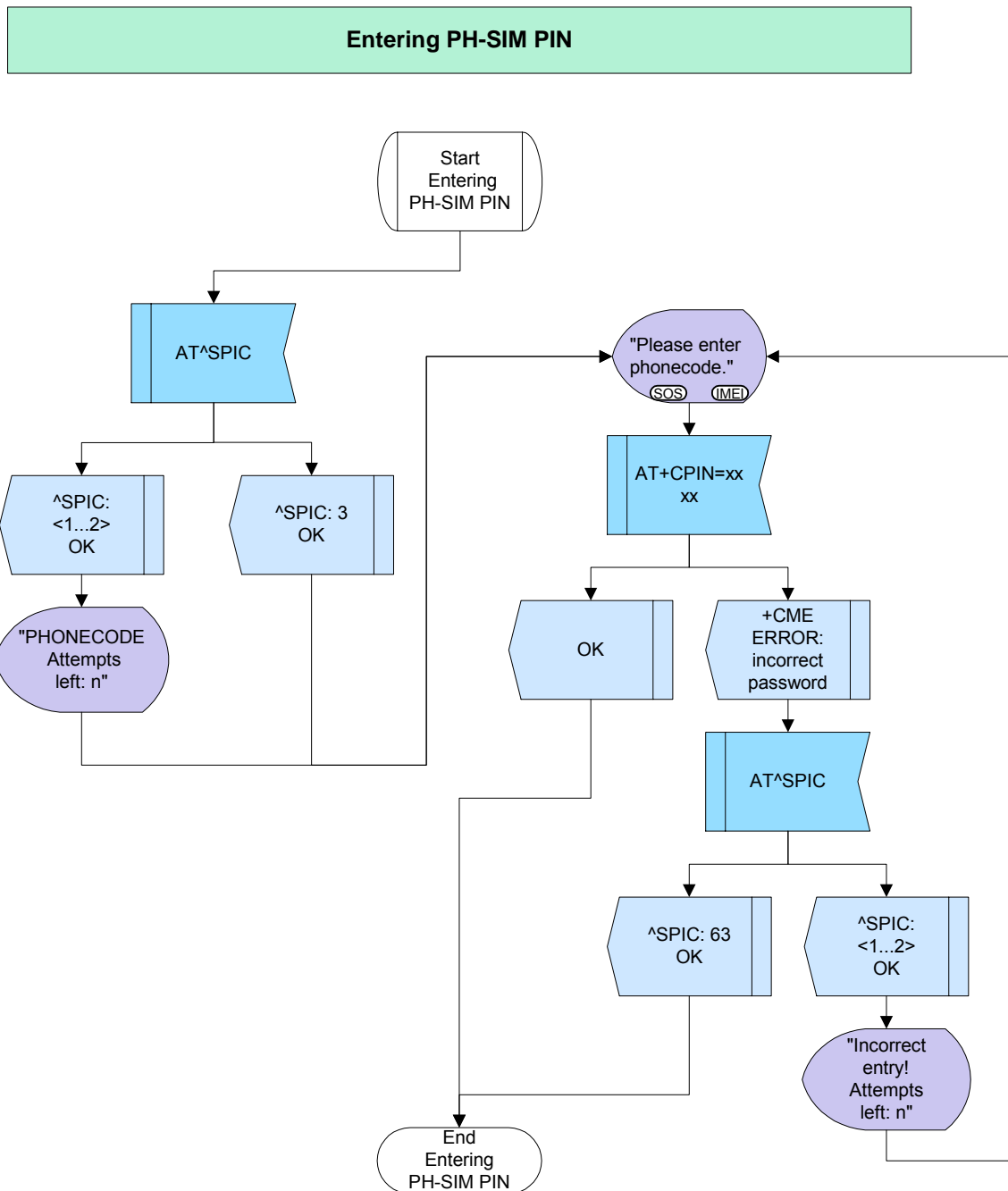
Figure 21: Entering PH-SIM PIN

2.5.3.4 Hints

Not applicable.

2.5.3.5   Example

```
****************************************
Comment:  Entering PH-SIM PIN
****************************************
****************************************
Comment:  Request required PIN.
****************************************


Subscr 1     Send:  AT+CPIN?
Subscr 1   Receive: AT+CPIN?
Subscr 1   Receive:  +CPIN: PH-SIM PIN
Subscr 1   Receive:
Subscr 1   Receive:  OK


****************************************
Comment:  Request PIN counter.
****************************************


Subscr 1     Send:  AT^SPIC
Subscr 1   Receive: AT^SPIC
Subscr 1   Receive:  ^SPIC: 3
Subscr 1   Receive:
Subscr 1   Receive:  OK


****************************************
Comment:  Entering wrong PH-SIM PIN first time.
****************************************


Subscr 1     Send:  AT+CPIN=5555
Subscr 1   Receive: AT+CPIN=5555
Subscr 1   Receive:  +CME ERROR: incorrect password


****************************************
Comment:  Request PIN counter.
****************************************


Subscr 1     Send:  AT^SPIC
Subscr 1   Receive: AT^SPIC
Subscr 1   Receive:  ^SPIC: 2
Subscr 1   Receive:
Subscr 1   Receive:  OK


****************************************
Comment:  Entering wrong PH-SIM PIN second time.
****************************************


Subscr 1     Send:  AT+CPIN=5555
Subscr 1   Receive: AT+CPIN=5555
Subscr 1   Receive:  +CME ERROR: incorrect password


****************************************
Comment:  Request PIN counter.
****************************************


Subscr 1     Send:  AT^SPIC
Subscr 1   Receive: AT^SPIC
Subscr 1   Receive:  ^SPIC: 1
```

Subscr 1 Receive:
Subscr 1 Receive: OK

****
Comment: Entering correct PH-SIM PIN.
****

Subscr 1   Send: AT+CPIN=1234
Subscr 1 Receive: AT+CPIN=1234
Subscr 1 Receive:
Subscr 1 Receive: OK

****
Comment: Request required PIN.
****

Subscr 1   Send: AT+CPIN?
Subscr 1 Receive: AT+CPIN?
Subscr 1 Receive: +CPIN: READY
Subscr 1 Receive:
Subscr 1 Receive: OK

2.5.4 Entering PH SIM PUK

2.5.4.1 Description

This chapter describes how to enter the PH-SIM PUK. The PH-SIM PUK (also referred to as Master Phone Code) is needed after entering a wrong PH-SIM PIN three times.

You have two ways to enter the Master Phone Code. The flow chart gives an example of both ways and shows what happens when entering a wrong Master Phone Code. After entering a wrong Master Phone Code, you have to wait several minutes before trying the next Master Phone Code. The time to wait is defined by an algorithm explained in [2].

2.5.4.2 Used AT commands

AT+CPIN	-	Enter PIN
ATD*#0003*Master Phone Code#;	-	Entering Master Phone Code
AT^SPIC	-	Display PIN counter

For further details about the commands see [2].

2.5.4.3 Flow chart
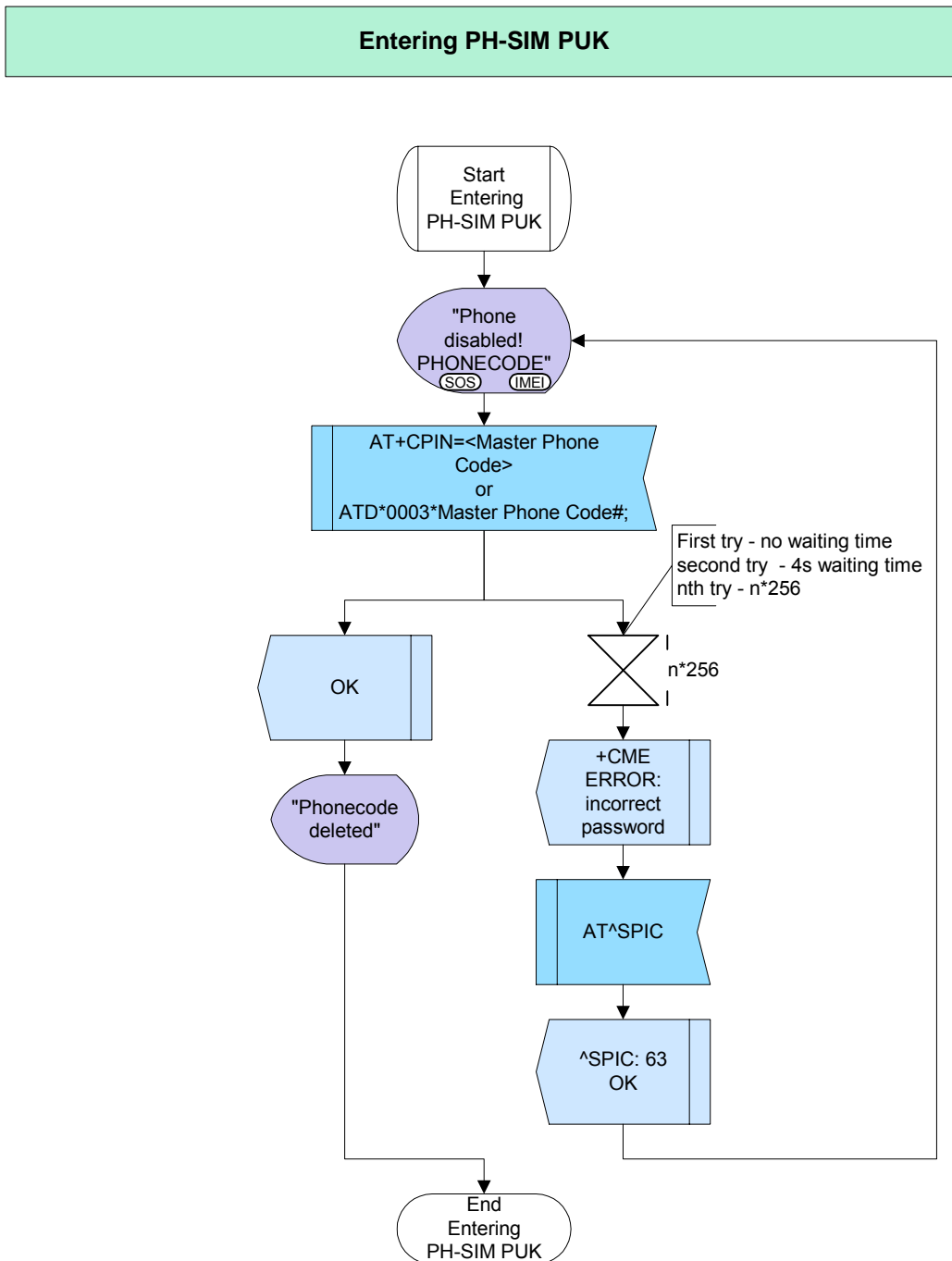
Figure 22: Entering PH-SIM PUK

2.5.4.4 Hints

Not applicable.

2.5.4.5 Example

```
****************************************
Comment:  Entering PH-SIM PUK
****************************************
****************************************
Comment:  Entering wrong PH-SIM PIN 3 times.
****************************************

Subscr 1     Send:  AT+CPIN=0815
Subscr 1   Receive:  AT+CPIN=0815
Subscr 1   Receive:
Subscr 1   Receive:  +CME ERROR: incorrect password
Subscr 1     Send:  AT^SPIC
Subscr 1   Receive:  AT^SPIC
Subscr 1   Receive:  ^SPIC: 2
Subscr 1   Receive:
Subscr 1   Receive:  OK
Subscr 1     Send:  AT+CPIN=0815
Subscr 1   Receive:  AT+CPIN=0815
Subscr 1   Receive:
Subscr 1   Receive:  +CME ERROR: incorrect password
Subscr 1     Send:  AT^SPIC
Subscr 1   Receive:  AT^SPIC
Subscr 1   Receive:  ^SPIC: 1
Subscr 1   Receive:
Subscr 1   Receive:  OK
Subscr 1     Send:  AT+CPIN=0815
Subscr 1   Receive:  AT+CPIN=0815
Subscr 1   Receive:
Subscr 1   Receive:  +CME ERROR: incorrect password
Subscr 1     Send:  AT^SPIC
Subscr 1   Receive:  AT^SPIC
Subscr 1   Receive:  ^SPIC: 63
Subscr 1   Receive:
Subscr 1   Receive:  OK


****************************************
Comment:  Request required PIN.
****************************************

Subscr 1     Send:  AT+CPIN?
Subscr 1   Receive:  AT+CPIN?
Subscr 1   Receive:  +CPIN: PH-SIM PUK
Subscr 1   Receive:
Subscr 1   Receive:  OK


****************************************
Comment:  Request PIN counter.
****************************************

Subscr 1     Send:  AT^SPIC
Subscr 1   Receive:  AT^SPIC
Subscr 1   Receive:  ^SPIC: 63
Subscr 1   Receive:
Subscr 1   Receive:  OK


****************************************
```

Comment: Entering wrong PH-SIM PUK.
****

Subscr 1   Send: AT+CPIN=12345678
Subscr 1   Receive: AT+CPIN=12345678
Subscr 1   Receive:
Subscr 1   Receive: +CME ERROR: incorrect password

****
Comment: Entering wrong PH-SIM PUK.
****

Subscr 1   Send: AT+CPIN=12345678
Subscr 1   Receive: AT+CPIN=12345678
Subscr 1   Receive:
Subscr 1   Receive: +CME ERROR: incorrect password

****
Comment: Entering wrong PH-SIM PUK.
****

Subscr 1   Send: AT+CPIN=12345678
Subscr 1   Receive: AT+CPIN=12345678
Subscr 1   Receive:
Subscr 1   Receive: +CME ERROR: incorrect password

****
Comment: Entering correct PH-SIM PUK.
****

Subscr 1   Send: AT+CPIN=18424923
Subscr 1   Receive: AT+CPIN=18424923
Subscr 1   Receive:
Subscr 1   Receive: OK

2.5.5   Entering SIM PIN2

2.5.5.1   Description

This chapter describes how to enter the SIM PIN2. The SIM PIN2 is needed to use the following functions:

- AT+CACM – Accumulated call meter (reset ACM value)
- AT+CAMM – Accumulated call meter maximum (set ACMmax value)
- AT+CLCK or AT^SLCK – Facility lock to "FD" (activate Fixed dialing phonebook)
- AT+CPUC – Price per unit and currency table (change currency or units)
- Editing the "FD" phonebook with AT+CPBW

For details about using PIN2 see [2]. After entering a wrong SIM PIN2 three times you have to enter PUK2 to unblock PIN2.

2.5.5.2   Used AT commands

AT+CPIN2   -   Enter PIN2
AT^SPIC   -   Display PIN counter

For further details about the commands see [2].

2.5.5.3   Flow chart
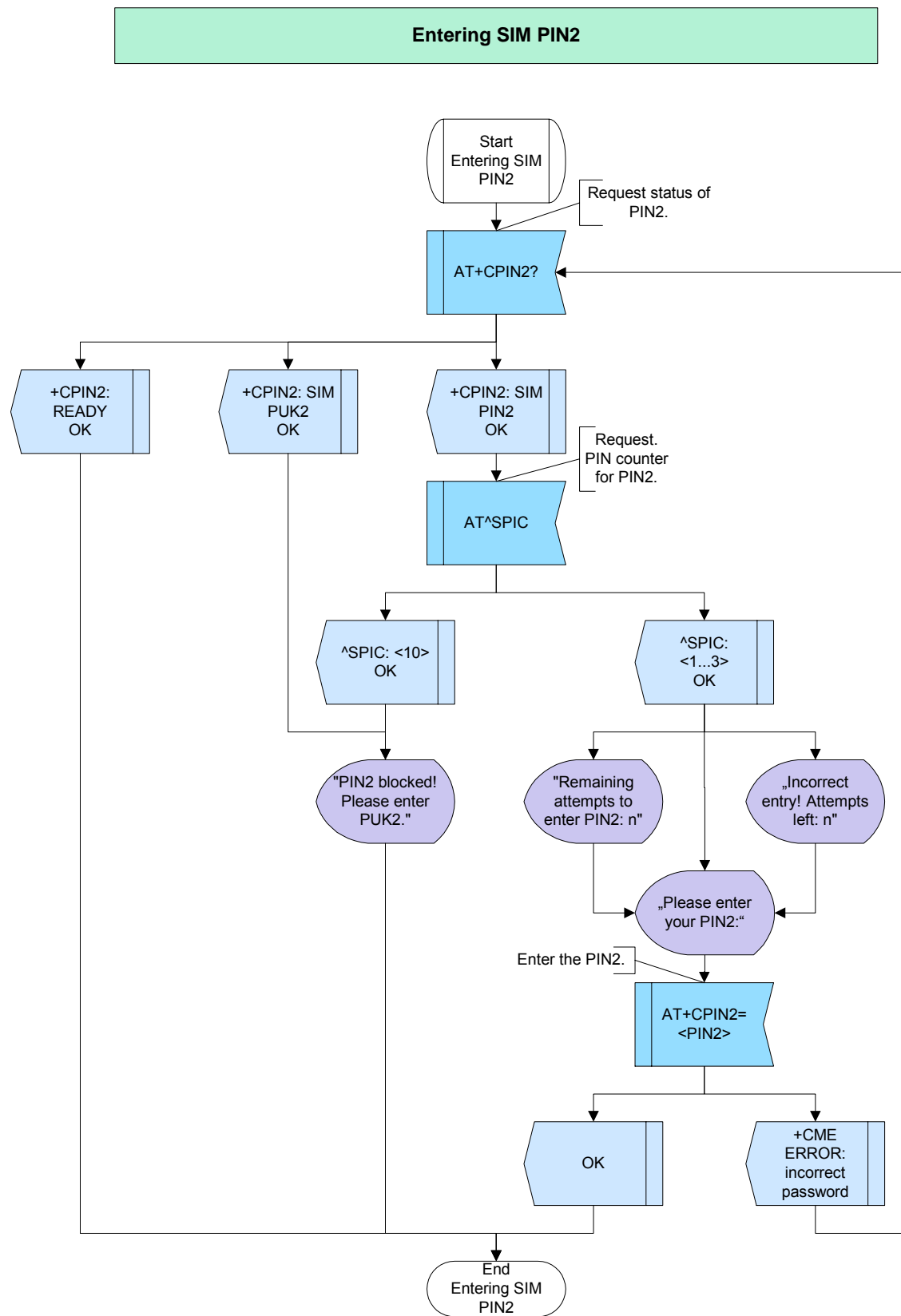
Figure 23: Entering SIM PIN2

2.5.5.4   Hints

- To edit the Fixed dialing phonebook, PIN2 validation must be performed before.

2.5.5.5   Example

```
***************************************
Comment:  Entering SIM PIN2
Comment:  Request state of SIM PIN2
***************************************


Subscr 1     Send:  AT+CPIN2?
Subscr 1   Receive: AT+CPIN2?
Subscr 1   Receive: +CPIN2: SIM PIN2
Subscr 1   Receive:
Subscr 1   Receive: OK


***************************************
Comment:  Request PIN counter
***************************************


Subscr 1     Send:  AT^SPIC
Subscr 1   Receive: AT^SPIC
Subscr 1   Receive: ^SPIC: 3
Subscr 1   Receive:
Subscr 1   Receive: OK


***************************************
Comment:  Entering a wrong PIN2
***************************************


Subscr 1     Send:  AT+CPIN2=5678
Subscr 1   Receive: AT+CPIN2=5678
Subscr 1   Receive: +CME ERROR: incorrect password


***************************************
Comment:  Request state of SIM PIN2
***************************************


Subscr 1     Send:  AT+CPIN2?
Subscr 1   Receive: AT+CPIN2?
Subscr 1   Receive: +CPIN2: SIM PIN2
Subscr 1   Receive:
Subscr 1   Receive: OK


***************************************
Comment:  Request PIN counter
***************************************


Subscr 1     Send:  AT^SPIC
Subscr 1   Receive: AT^SPIC
Subscr 1   Receive: ^SPIC: 2
Subscr 1   Receive:
Subscr 1   Receive: OK
```

****
Comment: Entering a wrong PIN2
****

Subscr 1   Send: AT+CPIN2=5678
Subscr 1   Receive: AT+CPIN2=5678
Subscr 1   Receive: +CME ERROR: incorrect password

****
Comment: Request state of SIM PIN2
****

Subscr 1   Send: AT+CPIN2?
Subscr 1   Receive: AT+CPIN2?
Subscr 1   Receive: +CPIN2: SIM PIN2
Subscr 1   Receive:
Subscr 1   Receive: OK

****
Comment: Request PIN counter
****

Subscr 1   Send: AT^SPIC
Subscr 1   Receive: AT^SPIC
Subscr 1   Receive: ^SPIC: 1
Subscr 1   Receive:
Subscr 1   Receive: OK

****
Comment: Entering a wrong PIN2
****

Subscr 1   Send: AT+CPIN2=5678
Subscr 1   Receive: AT+CPIN2=5678
Subscr 1   Receive: +CME ERROR: incorrect password
Subscr 1   Send: AT+CPIN2?
Subscr 1   Receive: AT+CPIN2?
Subscr 1   Receive: +CPIN2: SIM PUK2
Subscr 1   Receive:
Subscr 1   Receive: OK

2.5.6   Entering SIM PUK2

2.5.6.1   Description

This chapter describes how to enter the SIM PUK2. The SIM PUK2 is needed after entering a wrong SIM PIN2 three times to unblock the features that need PIN2 authentication. You have two ways to enter the PUK2. The flow chart gives an example of both ways and shows what happens when entering a wrong PUK2. After entering a wrong PUK2 ten times, all PIN2 dependent features will be blocked. Contact your provider to obtain a new SIM card.

2.5.6.2   Used AT commands

AT+CPIN2   -   Enter PIN2
AT^SPIC   -   Display PIN counter

For further details about the commands see [2].

2.5.6.3 Flow chart

Entering SIM PUK2

Start
Entering SIM
PUK2

Request status of
PIN2.

AT+CPIN2?

+CPIN2: SIM
PUK2

Request PIN
counter.

AT^SPIC

^SPIC: 10
OK

^SPIC:
<1...9>
OK

"Attempts
left: n"

*
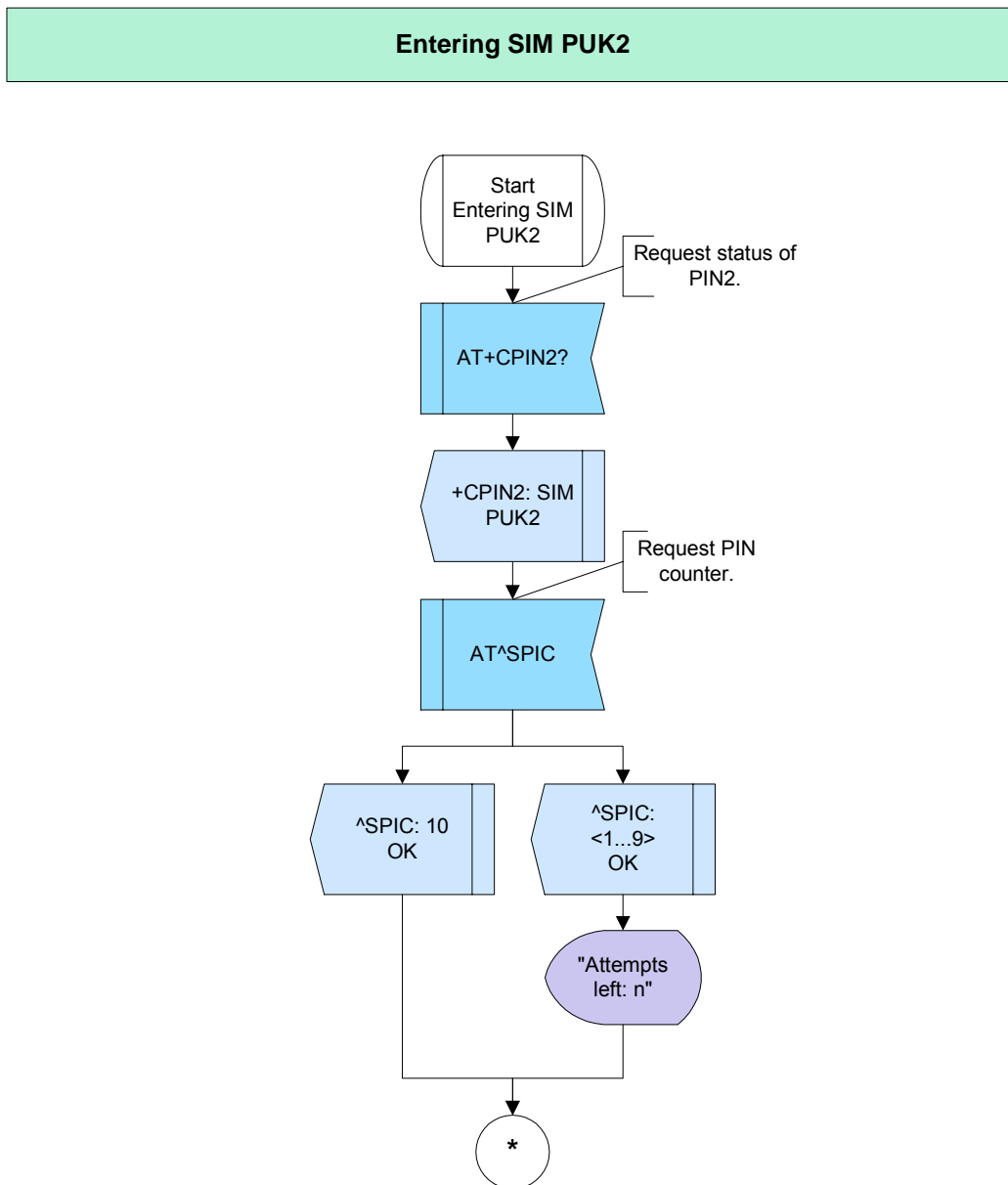
Figure 24: Entering SIM PUK2 - part 1
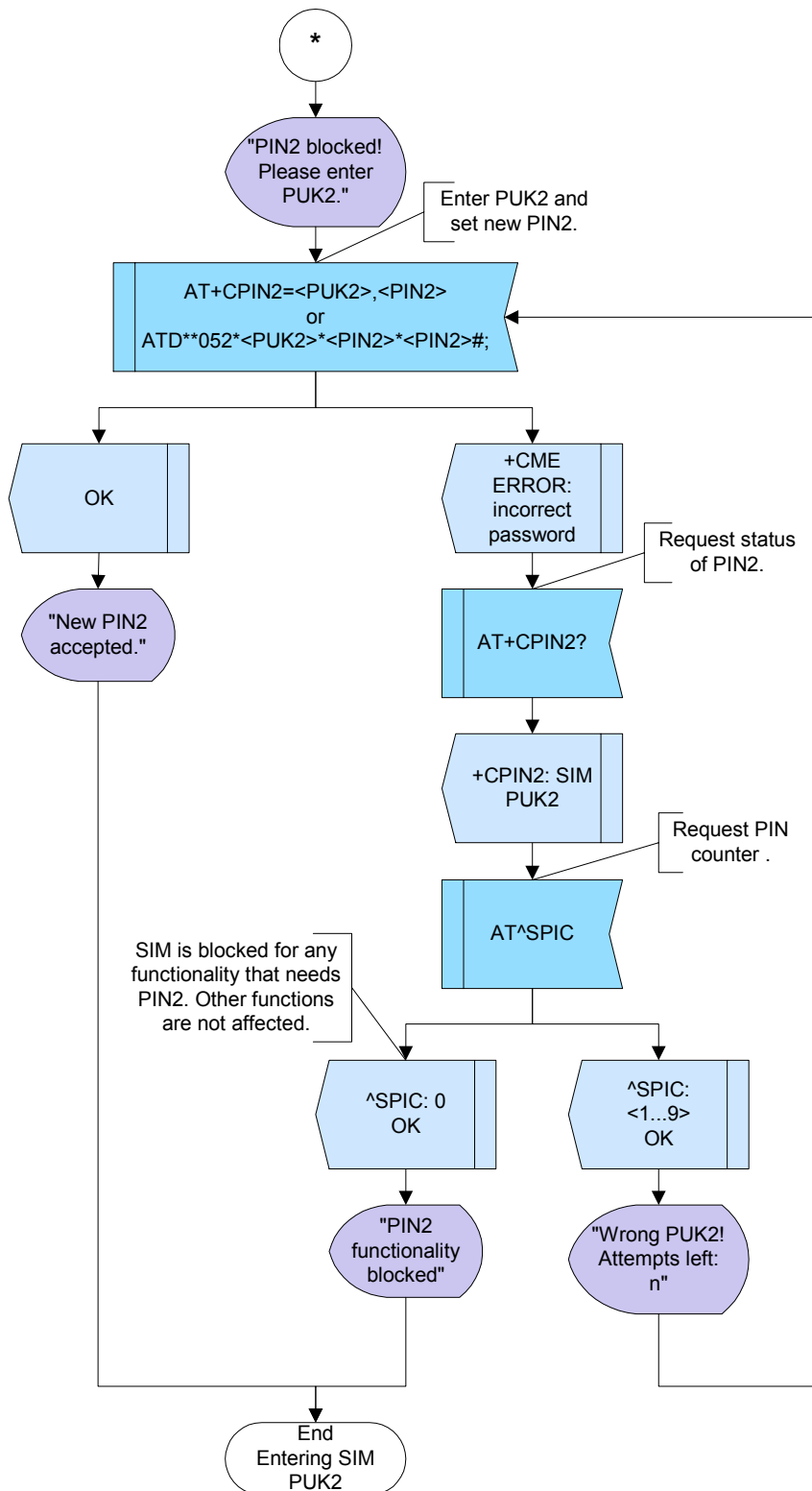
Figure 25: Entering SIM PUK2 - part 2

2.5.6.4   Hints

Not applicable.

2.5.6.5 Example

```
****************************************
Comment:  Entering SIM PUK2
****************************************
****************************************
Comment:  Request state of SIM PIN2
****************************************


Subscr 1    Send:  AT+CPIN2?
Subscr 1    Receive: AT+CPIN2?
Subscr 1    Receive: +CPIN2: SIM PUK2
Subscr 1    Receive:
Subscr 1    Receive: OK


****************************************
Comment:  Request PIN counter
****************************************


Subscr 1    Send:  AT^SPIC
Subscr 1    Receive: AT^SPIC
Subscr 1    Receive: ^SPIC: 10
Subscr 1    Receive:
Subscr 1    Receive: OK


****************************************
Comment:  Entering wrong PUK2
****************************************


Subscr 1    Send:  AT+CPIN2=1234567,1234
Subscr 1    Receive: AT+CPIN2=1234567,1234
Subscr 1    Receive: +CME ERROR: incorrect password


****************************************
Comment:  Request state of SIM PIN2
****************************************


Subscr 1    Send:  AT+CPIN2?
Subscr 1    Receive: AT+CPIN2?
Subscr 1    Receive: +CPIN2: SIM PUK2
Subscr 1    Receive:
Subscr 1    Receive: OK


****************************************
Comment:  Request PIN counter
****************************************


Subscr 1    Send:  AT^SPIC
Subscr 1    Receive: AT^SPIC
Subscr 1    Receive: ^SPIC: 10
Subscr 1    Receive:
Subscr 1    Receive: OK
```

****
Comment: Entering wrong PUK2
****

Subscr 1   Send: AT+CPIN2=1234567,1234
Subscr 1   Receive: AT+CPIN2=1234567,1234
Subscr 1   Receive: +CME ERROR: incorrect password

****
Comment: Request state of SIM PIN2
****

Subscr 1   Send: AT+CPIN2?
Subscr 1   Receive: AT+CPIN2?
Subscr 1   Receive: +CPIN2: SIM PUK2
Subscr 1   Receive:
Subscr 1   Receive: OK

****
Comment: Request PIN counter
****

Subscr 1   Send: AT^SPIC
Subscr 1   Receive: AT^SPIC
Subscr 1   Receive: ^SPIC: 10
Subscr 1   Receive:
Subscr 1   Receive: OK

****
Comment: Entering wrong PUK2
****

Subscr 1   Send: ATD**052*12345678*1234*1234#;
Subscr 1   Receive: ATD**052*12345678*1234*1234#;
Subscr 1   Receive:
Subscr 1   Receive: +CME ERROR: incorrect password

****
Comment: Request state of SIM PIN2
****

Subscr 1   Send: AT+CPIN2?
Subscr 1   Receive: AT+CPIN2?
Subscr 1   Receive: +CPIN2: SIM PUK2
Subscr 1   Receive:
Subscr 1   Receive: OK

****
Comment: Request PIN counter
****

Subscr 1   Send: AT^SPIC
Subscr 1   Receive: AT^SPIC
Subscr 1   Receive: ^SPIC: 9
Subscr 1   Receive:
Subscr 1   Receive: OK

```
****************************************
Comment: Entering wrong PUK2
****************************************


Subscr 1    Send:  ATD**052*12345678*1234*1234#;
Subscr 1  Receive:  ATD**052*12345678*1234*1234#;
Subscr 1  Receive:
Subscr 1  Receive:  +CME ERROR: incorrect password


****************************************
Comment:  Request state of SIM PIN2
****************************************


Subscr 1    Send:  AT+CPIN2?
Subscr 1  Receive:  AT+CPIN2?
Subscr 1  Receive:  +CPIN2: SIM PUK2
Subscr 1  Receive:
Subscr 1  Receive:  OK


****************************************
Comment:  Request PIN counter
****************************************


Subscr 1    Send:  AT^SPIC
Subscr 1  Receive:  AT^SPIC
Subscr 1  Receive:  ^SPIC: 8
Subscr 1  Receive:
Subscr 1  Receive:  OK


****************************************
Comment:  Entering correct PIN
****************************************


Subscr 1    Send:  ATD**052*87654321*1234*1234#;
Subscr 1  Receive:  ATD**052*87654321*1234*1234#;
Subscr 1  Receive:
Subscr 1  Receive:  OK


****************************************
Comment:  Request state of SIM PIN2
****************************************


Subscr 1    Send:  AT+CPIN2?
Subscr 1  Receive:  AT+CPIN2?
Subscr 1  Receive:  +CPIN2: SIM PIN2
Subscr 1  Receive:
Subscr 1  Receive:  OK
```

2.5.7 CME ERROR handling

2.5.7.1 Description

This chapter describes CME ERRORS that may be encountered while entering a PIN.

2.5.7.2 Used AT commands

Not applicable.

2.5.7.3 Flow Chart
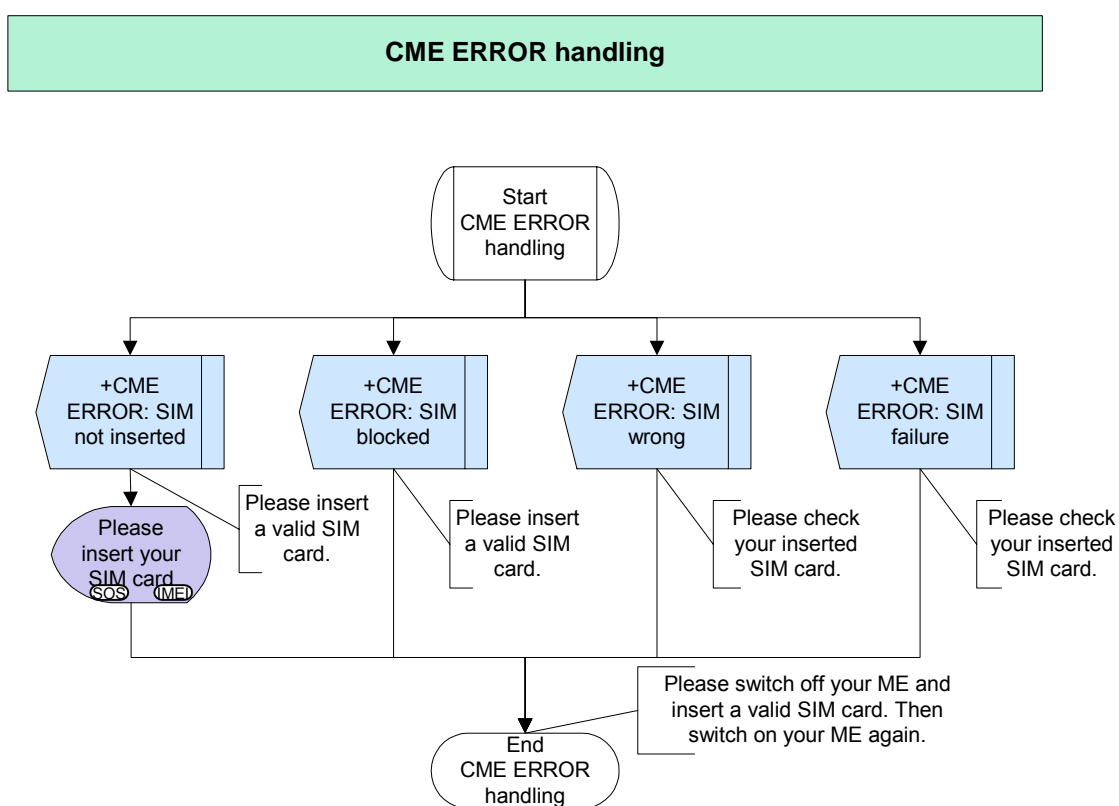
Figure 26: CME ERROR handling

2.5.7.4 Hints

Not applicable.

2.5.7.5 Example

Not applicable.

2.6 Monitoring

There are two approaches to set up an application for permanent monitoring:

- One approach is polling, where the application keeps sending the same AT command at regular intervals. Throughout this document this method is referred to as cyclic monitoring. Typical examples are provided in chapter 2.6.2.
  Polling is easy to implement, but may have disadvantages: The application consumes power when polling (the faster the polling rate the higher is the overall power consumption of the application). Checks are done when nothing happens. The information is not up to date, particularly, if refreshed at the beginning of a long polling cycle.
- The other way is an event-driven or alert-driven notification based on Unsolicited Result Codes (URCs) and referred to as event monitoring. In this case, the ME will send a message to the application whenever a status change occurs. The advantage over polling is significantly lower power consumption. Therefore, if possible, priority should be given to event monitoring. Typical examples are provided in chapter 2.6.3.
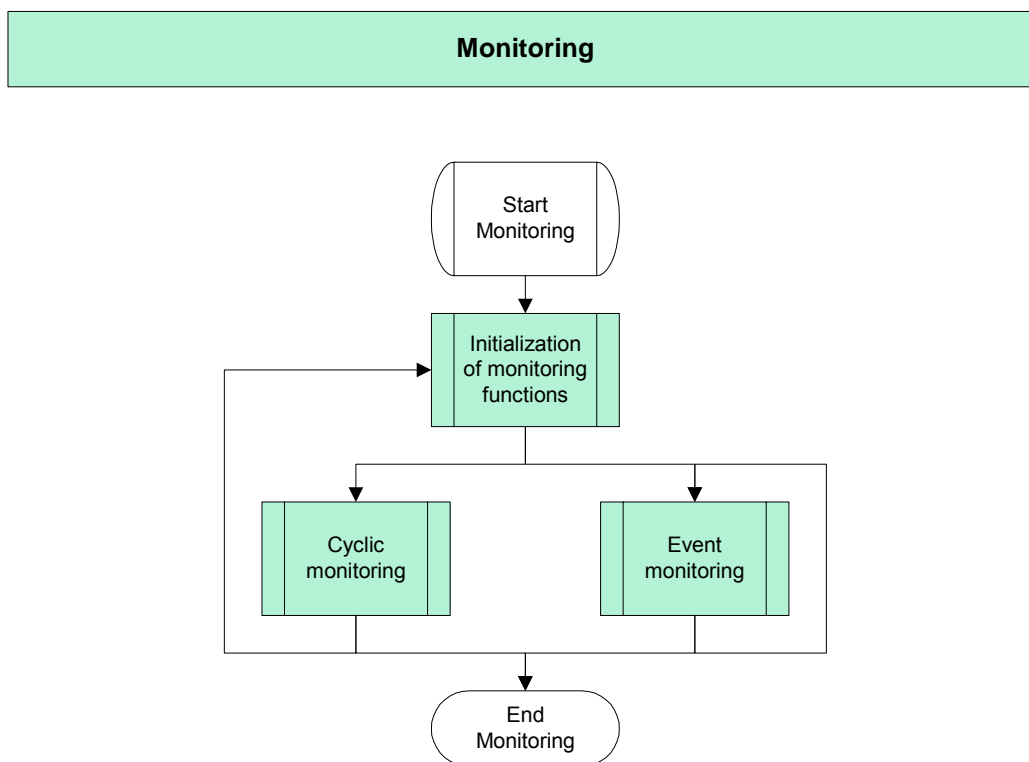
Figure 27: Monitoring

2.6.1   Initialization of monitor functions

2.6.1.1   Description

This chapter describes initial settings you can make to monitor a variety of functions related to the ME and to the network. Not all of them will be needed for every application, but you may consider to include those which are appropriate.

For example, the ME can be configured to generate URCs, whenever the status of the network registration changes, the SIM card is inserted or removed, or the signal quality varies.

2.6.1.2   Used AT commands

AT+CREG	-	Network registration
AT^SCKS	-	Set SIM connection presentation mode
AT+CIND	-	Indicator control
AT+CMER	-	Mobile equipment event reporting
AT^SCTM	-	Set critical operating temperature presentation mode
AT^SBC	-	Battery charging / discharging and charge control

For further details about the commands see [2].

2.6.1.3 Flow chart

Initialization of monitor functions

Start Initialization of monitor functions

Request network registration state.

Request SIM state.

Request status of ME indicators.

Request temperature level.

Request battery charge level.

AT+CREG?	AT^SCKS?	AT+CIND?	AT^SCTM?	AT^SBC?

Response (examples)

+CREG: 1,1 OK	^SCKS: 0,1 OK	+CIND: 5,99,1,0,0,0,0 ,0 OK	^SCTM: 0,0 OK	^SBC: 0,0,16 OK

Enable URC to report signal quality. Signal quality is only available during a call.

Enable an URC to report under-voltage. (example)

Enable URC to report state of networkregistration including location information.

Enable URC to report SIM state changes.

Enable presentation of Temperature URCs.

AT+CREG=2	AT^SCKS=1	AT+CIND=0, 1	AT^SCTM=1	AT^SBC=16

OK	OK	OK	OK	OK

		AT+CMER=3 ,0,0,2		

```
+CIEV: message,1
+CIEV: battchg,5
+CIEV: signal,99
+CIEV: service,1
+CIEV: sounder,0
+CIEV: call,0
+CIEV: roam,0
+CIEV: smsfull,0
```

If network registration state is changed , URC will be displayed.

If SIM card is inserted or removed, URC will be displayed.

If signal quality changes, URC will be displayed.

If temperature reaches critical level, URC will be sent. m= temperature level.

If voltage is close to the critical limit , URC will be displayed

+CREG: 1,"0145","291 A"	^SCKS: n	+CIEV: signal, 99	^SCTM_A: m ^SCTM_B: m	^SBC: Undervoltage

End Initialization of monitor functions

Figure 28: Initialization of monitoring functions

2.6.1.4 Hints

Not applicable.

2.6.1.5 Example

****

Comment: Initialization of monitor functions
****

****

Comment: Request network registration state.
****

Subscr 1   Send: AT+CREG=?
Subscr 1   Receive: AT+CREG=?
Subscr 1   Receive: +CREG: (0-2)
Subscr 1   Receive:
Subscr 1   Receive: OK

****

Comment: Enable network registration URC.
****

Subscr 1   Send: AT+CREG=2
Subscr 1   Receive: AT+CREG=2
Subscr 1   Receive: OK

****

Comment: Request SIM card and chip card holder status.
****

Subscr 1   Send: AT^SCKS?
Subscr 1   Receive: AT^SCKS?
Subscr 1   Receive: ^SCKS: 0,1
Subscr 1   Receive:
Subscr 1   Receive: OK

****

Comment: Enable URC to report changes of SIM card and chip card holder status.
****

Subscr 1   Send: AT^SCKS=1
Subscr 1   Receive: AT^SCKS=1
Subscr 1   Receive: OK

****

Comment: Request status of ME indicators.
****

Subscr 1   Send: AT+CIND?
Subscr 1   Receive: AT+CIND?
Subscr 1   Receive: +CIND: 5,99,1,0,1,0,0,0
Subscr 1   Receive:
Subscr 1   Receive: OK

****

Comment: Enable URC to report signal quality.
****

Subscr 1   Send: AT+CIND=0,1
Subscr 1   Receive: AT+CIND=0,1
Subscr 1   Receive: OK

****

Comment: Enable URC for event reporting.

```
**************************************

Subscr 1    Send:  AT+CMER=3,0,0,2
Subscr 1  Receive: AT+CMER=3,0,0,2
Subscr 1  Receive: OK
Subscr 1  Receive:
Subscr 1  Receive: +CIEV: signal,99
Subscr 1  Receive:
Subscr 1  Receive: +CIEV: service,1
Subscr 1  Receive:
Subscr 1  Receive: +CIEV: sounder,0
Subscr 1  Receive:
Subscr 1  Receive: +CIEV: message,1
Subscr 1  Receive:
Subscr 1  Receive: +CIEV: call,0
Subscr 1  Receive:
Subscr 1  Receive: +CIEV: roam,0
Subscr 1  Receive:
Subscr 1  Receive: +CIEV: smsfull,0
Subscr 1  Receive:
```

```
**************************************
```
Comment: Request temperature level.
```
**************************************
```

```
Subscr 1    Send:  AT^SCTM?
Subscr 1  Receive: AT^SCTM?
Subscr 1  Receive: ^SCTM: 0,0
Subscr 1  Receive:
Subscr 1  Receive: OK
```

```
**************************************
```
Comment: Enable URC to report critical temperature.
```
**************************************
```

```
Subscr 1    Send:  AT^SCTM=1
Subscr 1  Receive: AT^SCTM=1
Subscr 1  Receive: OK
```

```
**************************************
```
Comment: Request battery charge level and current consumption.[1]
```
**************************************
```

```
Subscr 1    Send:  AT^SBC?
Subscr 1  Receive: AT^SBC?
Subscr 1  Receive: ^SBC: 0,0,15
Subscr 1  Receive:
Subscr 1  Receive: OK
```

```
**************************************
```
Comment: Enable URC to report undervoltage.[2]
```
**************************************
```
```
Subscr 1    Send:  AT^SBC=1
Subscr 1  Receive: AT^SBC=1
Subscr 1  Receive: OK
```

[1]   The parameters indicated by the read command AT^SBC? depend on the product type. For details please refer to [1] and [2].
[2]   The methods to enable / disable the presentation mode of undervoltage or overvoltage conditions vary with the product type. To make sure please refer to [1] and [2].

2.6.2 Cyclic monitoring

2.6.2.1 Description

This chapter describes cyclic monitoring implemented in the application (polling). To do so, set up your application to send the read form of an AT command at a given polling rate.

Remember that in terms of power consumption event-driven notification may be more efficient than the cyclic approach. For example, to check the network registration activate the URCs "+CREG: <stat>" or "+CREG: <stat>[, <lac>,<ci>]" rather than sending the AT+CREG? read command in a polling scheme. Also, the signal quality can be polled with AT+CSQ?, but it can be better monitored by activating the event indicator <rssi> provided by AT+CIND. Compare chapter 2.6.3.

The battery charge and/or the current consumption can be polled using the AT^SBC? read command as shown in chapter 2.6.2.4. The URC function provided by AT^SBC applies only to undervoltage conditions and, depending on the module type, overvoltage conditions. See examples in chapter 2.6.1.5.

2.6.2.2 Used AT commands

AT+CREG   -   Network registration
AT+CSQ   -   Signal quality
AT+COPS   -   Operator selection
AT^SBC   -   Battery charging / discharging and charge control

For further details about the commands see [2].

2.6.2.3 Flow chart
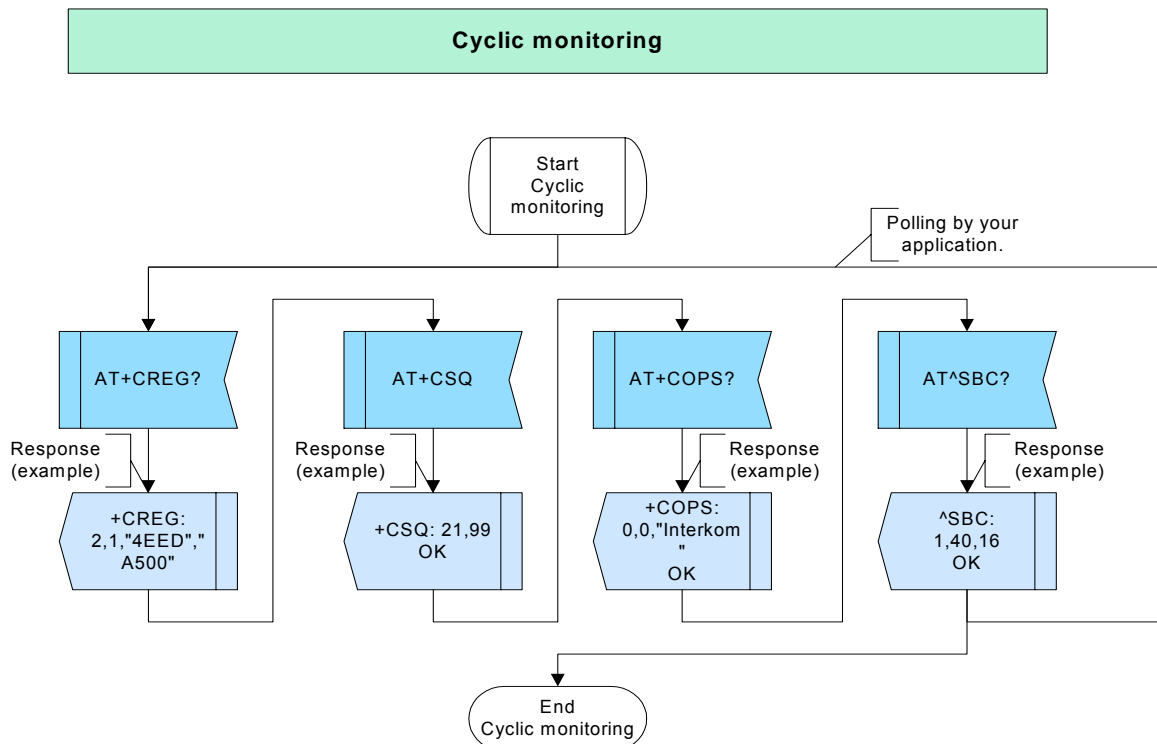
Figure 29: Cyclic monitoring

2.6.2.4   Hints

Not applicable.

2.6.2.5   Example

```
***************************************
Comment:  Cyclic monitoring
***************************************
***************************************
Comment:  Request network registration.
***************************************

Subscr 1     Send:  AT+CREG?
Subscr 1   Receive: AT+CREG?
Subscr 1   Receive: +CREG: 2,1,"4EED","A500"
Subscr 1   Receive:
Subscr 1   Receive: OK


***************************************
Comment:  Request signal quality.
***************************************

Subscr 1     Send:  AT+CSQ
Subscr 1   Receive: AT+CSQ
Subscr 1   Receive: +CSQ: 24,99
Subscr 1   Receive:
Subscr 1   Receive: OK


***************************************
Comment:  Request current operator.
***************************************

Subscr 1     Send:  AT+COPS?
Subscr 1   Receive: AT+COPS?
Subscr 1   Receive: +COPS: 0,2,"26207"
Subscr 1   Receive:
Subscr 1   Receive: OK


***************************************
Comment:  Request Battery charge and current consumption.[1]
***************************************

Subscr 1     Send:  AT^SBC?
Subscr 1   Receive: AT^SBC?
Subscr 1   Receive: ^SBC: 0,0,15
Subscr 1   Receive:
Subscr 1   Receive: OK
```

[1]   The parameters indicated by the read command AT^SBC? depend on the product type. For details please refer to [1] and [2].

2.6.3   Event monitoring

2.6.3.1   Description

This chapter describes solutions of event-driven or alert-driven notifications, generated in the form of URCs. Your application should be designed to react adequately when a URC is received. For example, it may be necessary to switch off parts of the application to save power or reduce load on the ME.

2.6.3.2   Used AT commands

Not applicable.

2.6.3.3   Flow chart
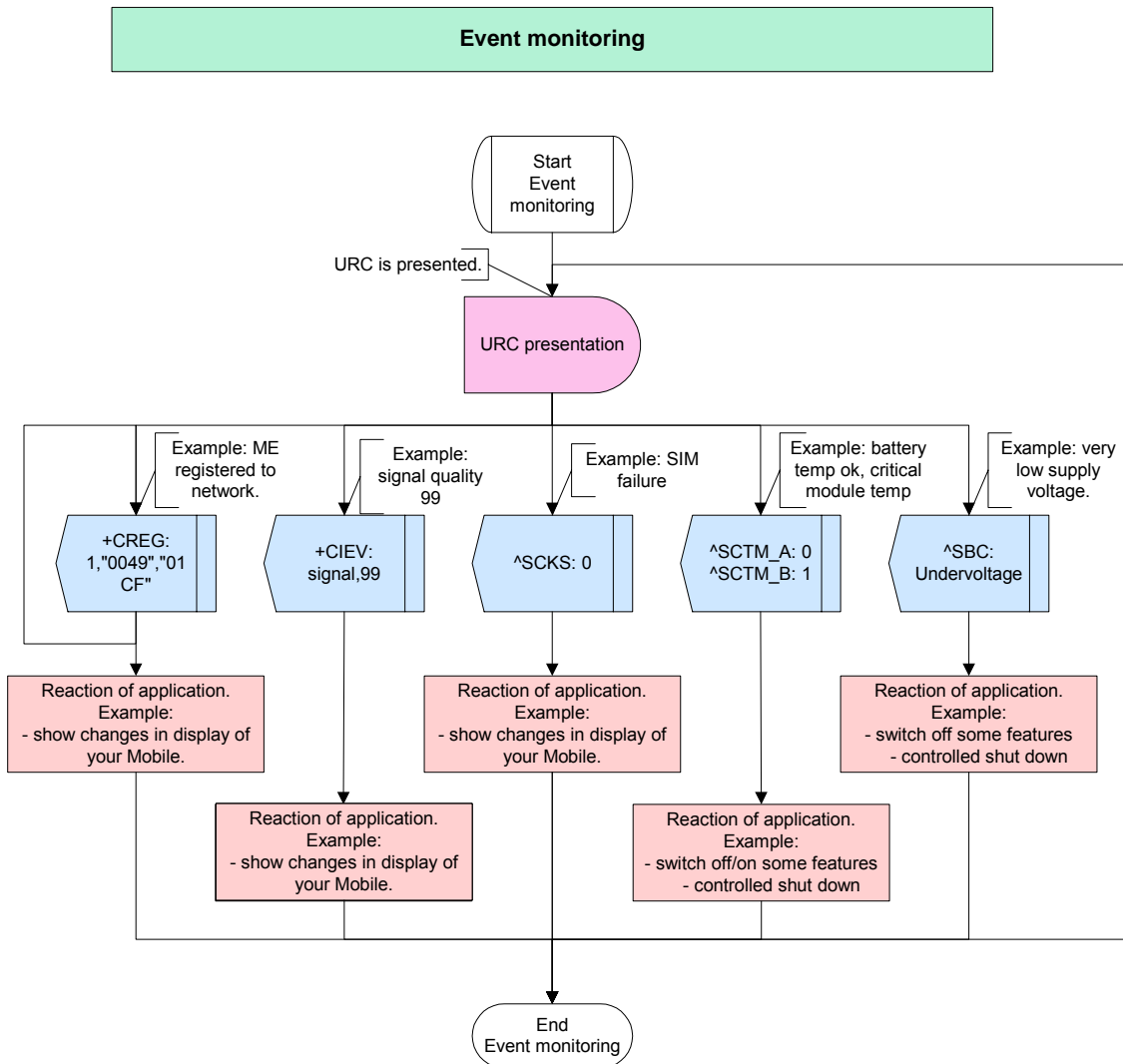
Figure 30: Event monitoring

2.6.3.4   Hints

Not applicable.

2.6.3.5   Example

Not applicable.

2.7 Supplementary services
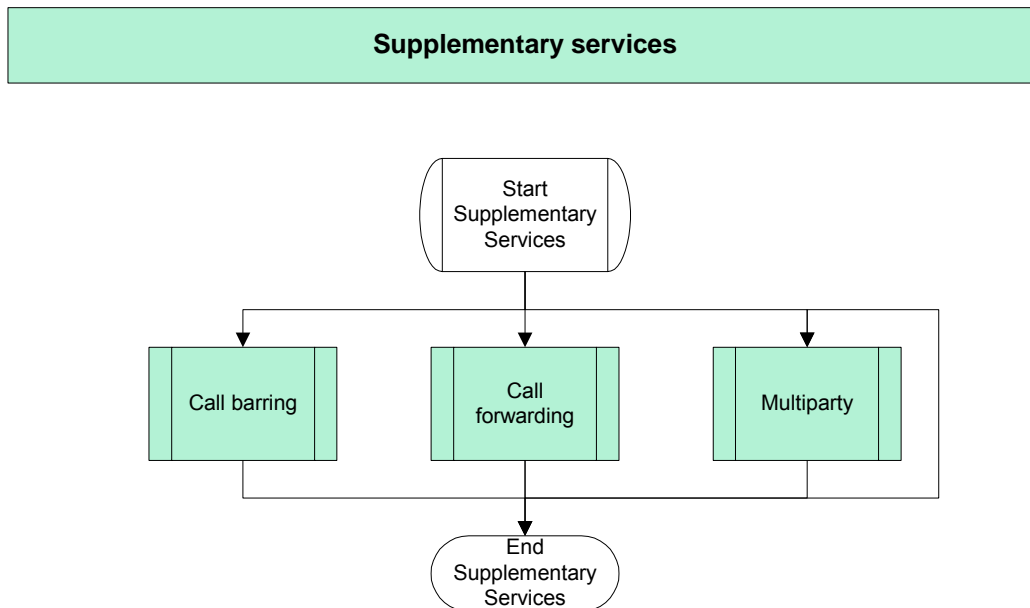
Figure 31: Supplementary services

2.7.1 Call barring – all outgoing calls

2.7.1.1 Description

This chapter describes the usage of the supplementary service *Call barring* for all outgoing calls. The availability of this service depends on the network provider. If available, it is protected by a password supplied by the network provider (net password).

Note: A similar scenario applies to all other Call barring options, e.g. AI (All incoming calls etc.). Therefore, no other flow charts or examples are listed.

2.7.1.2 Used AT commands

AT+CLCK	-	Facility lock
ATD*#33 #	-	Interrogate status of Call barring for all outgoing calls
ATD*33*PW*BS#	-	Activate Call barring for all outgoing calls
ATD#33*PW*BS#	-	Deactivate Call barring for all outgoing calls

For further details about the commands see [2].

2.7.1.3   Flow Chart
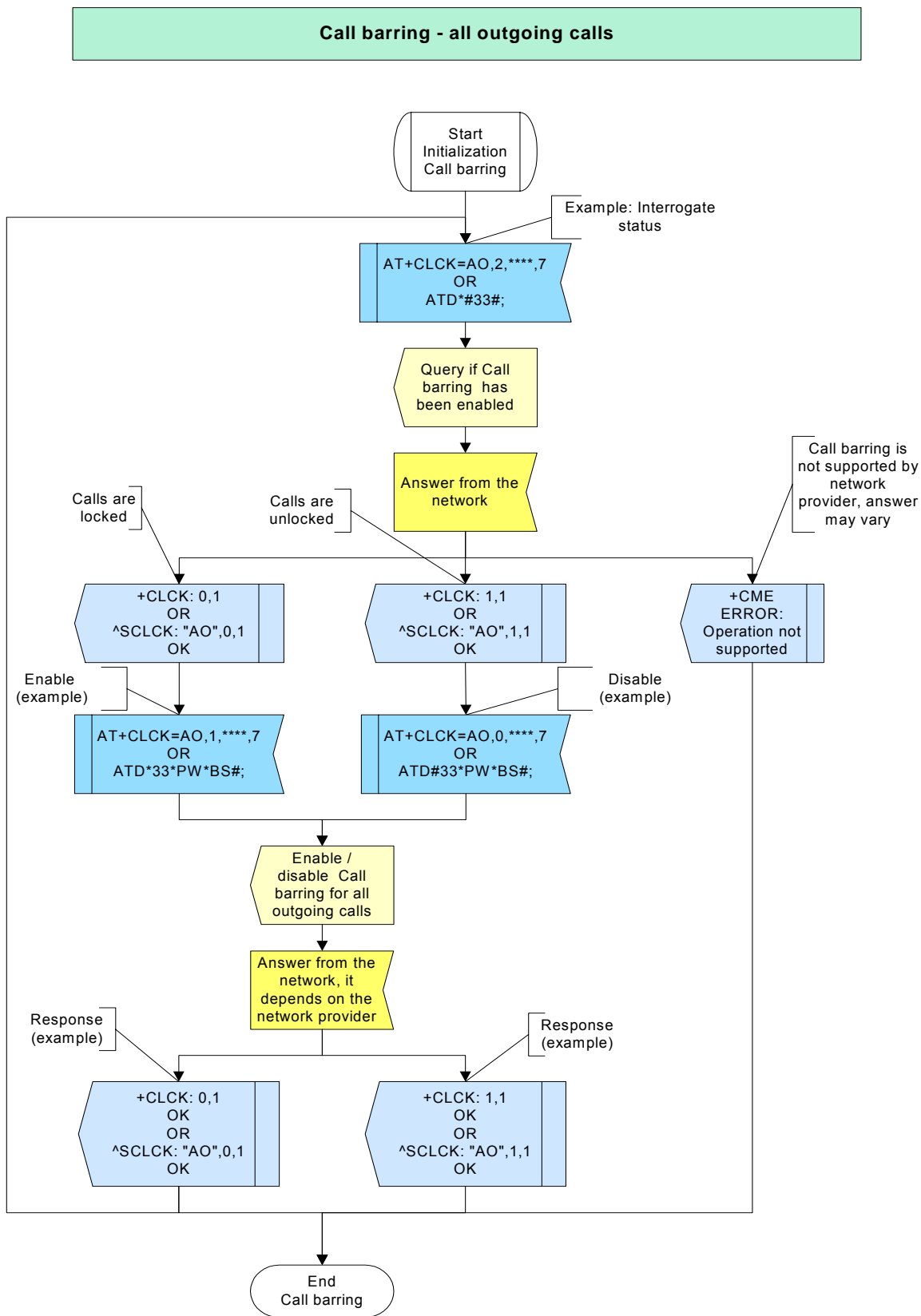
Figure 32: Call barring – all outgoing calls

2.7.1.4 Hints

- The net password is provisioned by the service provider or network operator.
- The number of parameters displayed in ^SCLCK output strings differs from the equivalent +CLCK output strings: The ^SCLCK string includes additionally the parameter <fac>.

GCF-CC note: *# sequences the user enters on the keypad shall be transmitted over the AT interface without any conversion. Also, GCF test cases require that *# sequences can be entered during a call.

2.7.1.5 Example

```
****************************************
Comment:  Call barring
****************************************
****************************************
Comment:  Check Call barring status for all outgoing calls
****************************************

Subscr 1     Send: AT+CLCK=AO,2,1234,7
Subscr 1   Receive: AT+CLCK=AO,2,1234,7
Subscr 1   Receive:
Subscr 1   Receive: +CLCK: 0,1
Subscr 1   Receive: +CLCK: 0,2
Subscr 1   Receive: +CLCK: 0,4
Subscr 1   Receive:
Subscr 1   Receive: OK


****************************************
Comment:  Activate Call barring for all outgoing (voice, data, fax) calls (class 7)
****************************************

Subscr 1     Send: AT+CLCK=AO,1,1234,7
Subscr 1   Receive: AT+CLCK=AO,1,1234,7
Subscr 1   Receive:
Subscr 1   Receive:
Subscr 1   Receive: OK


****************************************
Comment:  Interrogate status of Call barring for all outgoing calls with *# code
****************************************

Subscr 1     Send: ATD*#33#;
Subscr 1   Receive: ATD*#33#;
Subscr 1   Receive:
Subscr 1   Receive: ^SCLCK: "AO",1,1
Subscr 1   Receive: ^SCLCK: "AO",1,8
Subscr 1   Receive: ^SCLCK: "AO",1,4
Subscr 1   Receive: ^SCLCK: "AO",1,2
Subscr 1   Receive: OK


****************************************
Comment:  Disable Call Barring for all outgoing (voice, data, fax) calls
****************************************

Subscr 1     Send: AT+CLCK=AO,0,1234,7
Subscr 1   Receive: AT+CLCK=AO,0,1234,7
Subscr 1   Receive:
Subscr 1   Receive:
Subscr 1   Receive: OK
```

```
**************************************
Comment:  Activate Call barring for all outgoing (voice, sms, fax) calls with *# code
**************************************

Subscr 1     Send: ATD*33*1234*10#;
Subscr 1   Receive: ATD*33*1234*10#;
Subscr 1   Receive:
Subscr 1   Receive: ^SCLCK: "AO",1,1
Subscr 1   Receive: ^SCLCK: "AO",1,8
Subscr 1   Receive: ^SCLCK: "AO",1,4
Subscr 1   Receive: OK


**************************************
Comment:  Interrogate status of Call barring for all outgoing calls with *# code
**************************************

Subscr 1     Send: ATD*#33#;
Subscr 1   Receive: ATD*#33#;
Subscr 1   Receive:
Subscr 1   Receive: ^SCLCK: "AO",1,1
Subscr 1   Receive: ^SCLCK: "AO",1,8
Subscr 1   Receive: ^SCLCK: "AO",1,4
Subscr 1   Receive: ^SCLCK: "AO",0,2
Subscr 1   Receive: OK


**************************************
Comment:  Disable Call Barring for all outgoing (voice, sms, fax) calls with *# code (class 10)
**************************************

Subscr 1     Send: ATD#33*1234*10#;
Subscr 1   Receive: ATD#33*1234*10#;
Subscr 1   Receive:
Subscr 1   Receive: ^SCLCK: "AO",0,1
Subscr 1   Receive: ^SCLCK: "AO",0,8
Subscr 1   Receive: ^SCLCK: "AO",0,4
Subscr 1   Receive: ^SCLCK: "AO",0,2
Subscr 1   Receive: OK
```

2.7.2 Call forwarding unconditional for voice calls

2.7.2.1 Description

This chapter will discuss the usage of the supplementary service *Call Forwarding*. It describes all the steps required to activate Call forwarding unconditional (CFU) for voice. After the activation of CFU for the specified class (here: voice calls), all calls of that class are forwarded to the specified phone number. Depending on the service provider or tariff package, CF services may need to be subscribed to. If the client attempts to activate a non-provisioned or a non-subscribed option, the response varies with the network provider, but regardless of the response, the setting does not take effect.

Note: All other CF scenarios are similar to this one. Therefore, CF for other classes is not considered.

2.7.2.2 Used AT commands

AT+CCFC	-	Call forwarding number and conditions control
ATD*#21#;	-	Interrogate status of Call forwarding unconditional
ATD*21*DN*BS#;	-	Activate Call forwarding unconditional
ATD#21#;	-	Deactivate Call forwarding unconditional
ATD**21*DN*BS#;	-	Register and activate Call forwarding unconditional
ATD##21#;	-	Erase and deactivate Call forwarding unconditional

For further details about the commands see [2].

2.7.2.3 Flow chart
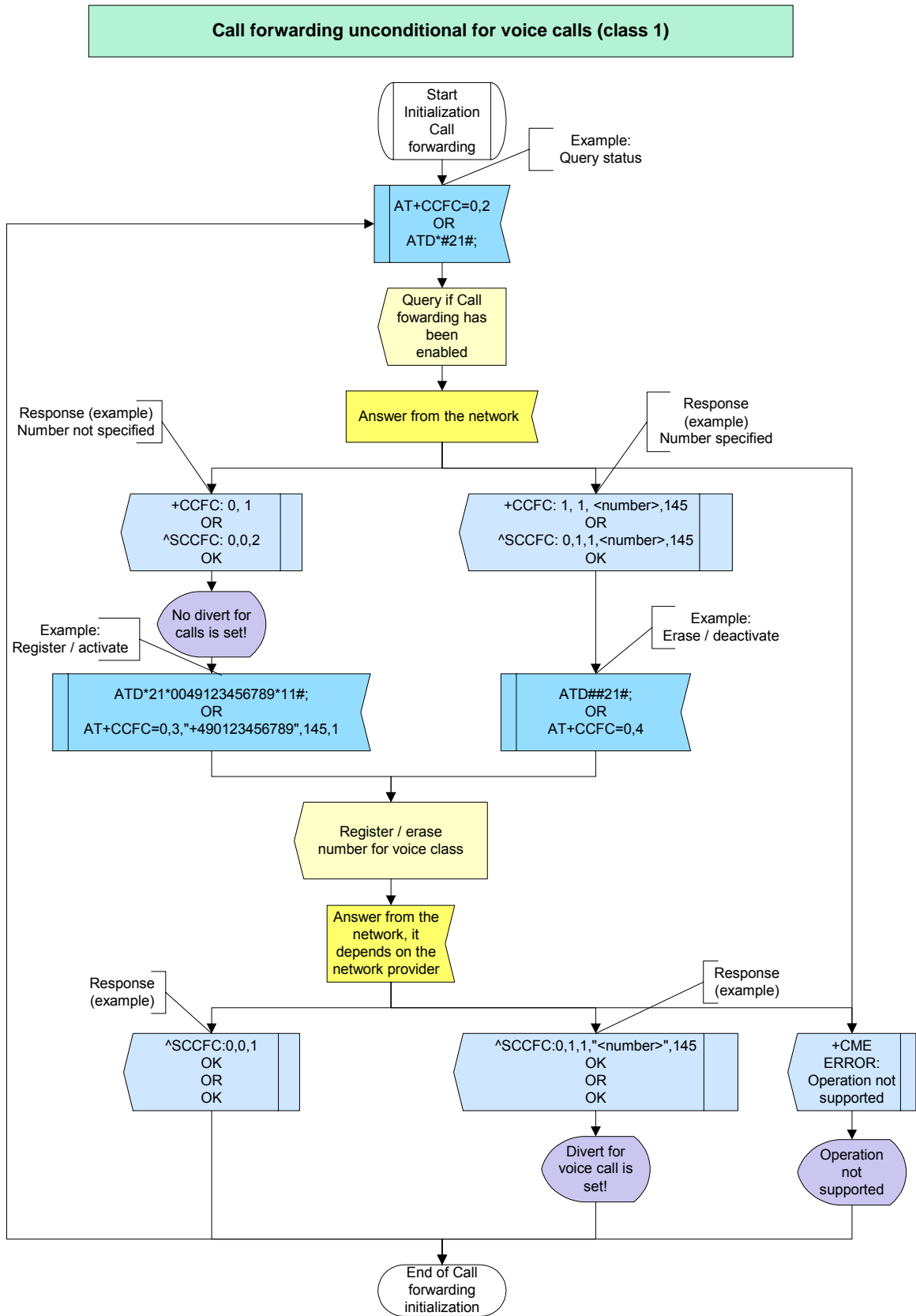
Figure 33: Call forwarding unconditional for voice call (class 1)

2.7.2.4 Hints

- Querying the status of ⟨**reas**⟩ 4 (all Call forwarding) and 5 (all Conditional Call forwarding) with AT+CCFC will result in an error ("CME error: Operation not supported"). As an alternative, you may use the ATD command followed by *'# codes to check the status of these two reasons.
- Some networks may choose to have certain Call forwarding conditions permanently enabled (e.g. forwarding to a mailbox if the mobile is not reachable). In this case, deactivation of Call forwarding for these conditions will not be successful, even if the CCFC request is answered with response "OK".
- The number of parameters displayed in the ^SCCFC output strings differs from the equivalent +CCFC output strings: In contrast to the +CCFC string, ^SCCFC also includes the parameter ⟨reason⟩.

GCF-CC note: *# sequences the user enters on the keypad shall be transmitted over the AT interface without any conversion. Also, GCF test cases require that *# sequences can be entered during a call.

2.7.2.5 Example

```
****************************************
Comment:  Call forwarding
****************************************
****************************************
Comment:  Request the state of Call forwarding unconditional.
****************************************

Subscr 1     Send: AT+CCFC=0,2
Subscr 1     Send:
Subscr 1   Receive: AT+CCFC=0,2
Subscr 1   Receive:
Subscr 1   Receive: +CCFC: 0,1
Subscr 1   Receive: +CCFC: 0,2
Subscr 1   Receive: +CCFC: 0,4
Subscr 1   Receive:
Subscr 1   Receive: OK


****************************************
Comment:  Register a number for class 1.
****************************************

Subscr 1     Send: AT+CCFC=0,3,"+490123456789",145,1
Subscr 1     Send:
Subscr 1   Receive: AT+CCFC=0,3,"+490123456789",145,1
Subscr 1   Receive:
Subscr 1   Receive:
Subscr 1   Receive: OK


****************************************
Comment:  Interrogate the state of Call forwarding unconditional with *# code.
****************************************

Subscr 1     Send: ATD*#21#;
Subscr 1     Send:
Subscr 1   Receive: ATD*#21#;
Subscr 1   Receive:
Subscr 1   Receive: ^SCCFC: 0,1,1,"+490123456789",145
Subscr 1   Receive: ^SCCFC: 0,0,8
Subscr 1   Receive: ^SCCFC: 0,0,4
Subscr 1   Receive: ^SCCFC: 0,0,2
Subscr 1   Receive: OK
```

****
Comment: Erase and deactivate Call forwarding unconditional.
****

Subscr 1   Send: AT+CCFC=0,4
Subscr 1   Send:
Subscr 1   Receive: AT+CCFC=0,4
Subscr 1   Receive:
Subscr 1   Receive:
Subscr 1   Receive: OK

****
Comment: Activate a number for class 1 with *# code.
****

Subscr 1   Send: ATD*21*0049123456789*11#;
Subscr 1   Send:
Subscr 1   Receive: ATD*21*0049123456789*11#;
Subscr 1   Receive:
Subscr 1   Receive: ^SCCFC: 0,1,1,"+49123456789",145
Subscr 1   Receive: OK

****
Comment: Interrogate the state of Call forwarding unconditional with *# code.
****

Subscr 1   Send: ATD*#21#;
Subscr 1   Send:
Subscr 1   Receive: ATD*#21#;
Subscr 1   Receive:
Subscr 1   Receive: ^SCCFC: 0,1,1,"+49123456789",145
Subscr 1   Receive: ^SCCFC: 0,0,8
Subscr 1   Receive: ^SCCFC: 0,0,4
Subscr 1   Receive: ^SCCFC: 0,0,2
Subscr 1   Receive: OK

****
Comment: Erase and deactivate Call forwarding unconditional with *# code.
****

Subscr 1   Send: ATD##21#;
Subscr 1   Send:
Subscr 1   Receive: ATD##21#;
Subscr 1   Receive:
Subscr 1   Receive: ^SCCFC: 0,0,1
Subscr 1   Receive: ^SCCFC: 0,0,8
Subscr 1   Receive: ^SCCFC: 0,0,4
Subscr 1   Receive: ^SCCFC: 0,0,2
Subscr 1   Receive: OK

2.7.3 Multiparty
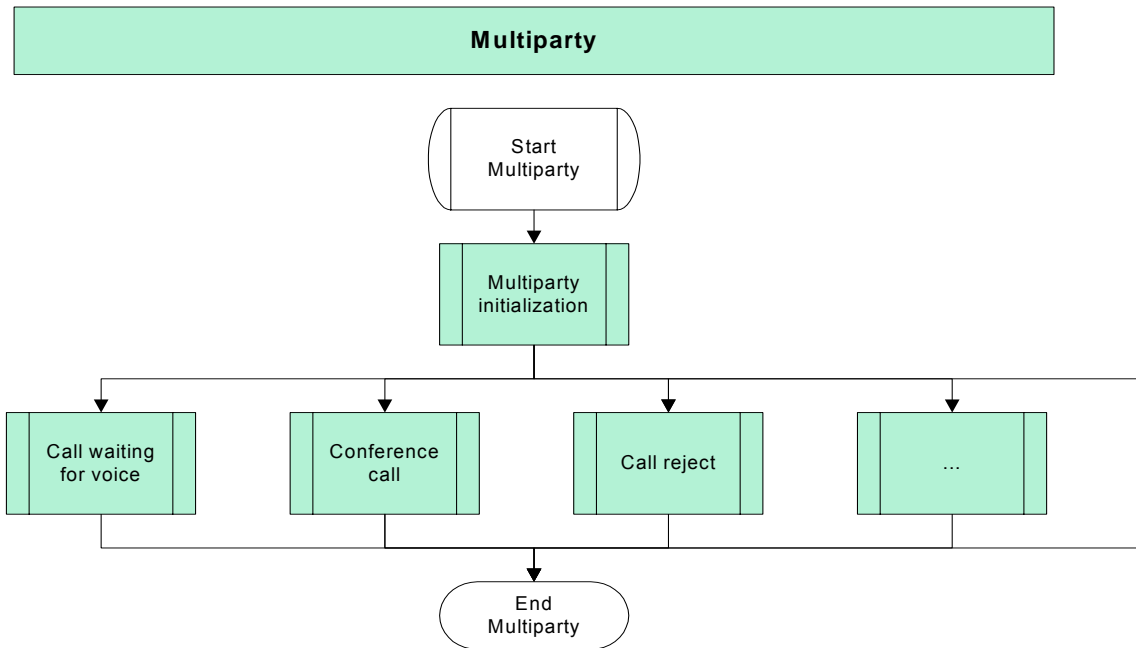
Figure 34: Multiparty

2.7.3.1 Multiparty initialization

2.7.3.1.1 Description

This chapter describes all the steps required to initialize the supplementary service *Multiparty* call waiting, call hold.
This can be done in two steps:

- First, activate the presentation of the URC that indicates a waiting caller to the called party. This URC takes the form "+CCWA: <number>,<type>,<class>,,<CLI validity>" or "^SCWA". For further detail please refer to [2]. Please note that "^SCWA" is not considered in the following examples.
  The activation of the URC only has effect on the module and does not involve any network related activities. Therefore the response from the module will be returned immediately. The setting will not be stored when powering off the module.
- Activate Call waiting (Flow chart and example only show the scenario for voice). This action has effect on the network because the settings will be stored in the network. Therefore the module response will take a longer time and the setting will still be present after power off and restart of the module.

It is recommended to save this initialization and only deactivate it when you are sure that the indication of waiting calls is not needed any longer.

2.7.3.1.2 Used AT commands

AT+CCWA	-	Call waiting
ATD*#43#;	-	Querying status of call waiting
ATD*43*BS#;	-	Activate call waiting
ATD#43#	-	Deactivate call waiting

For further details about the commands see [2].

2.7.3.1.3 Flow chart
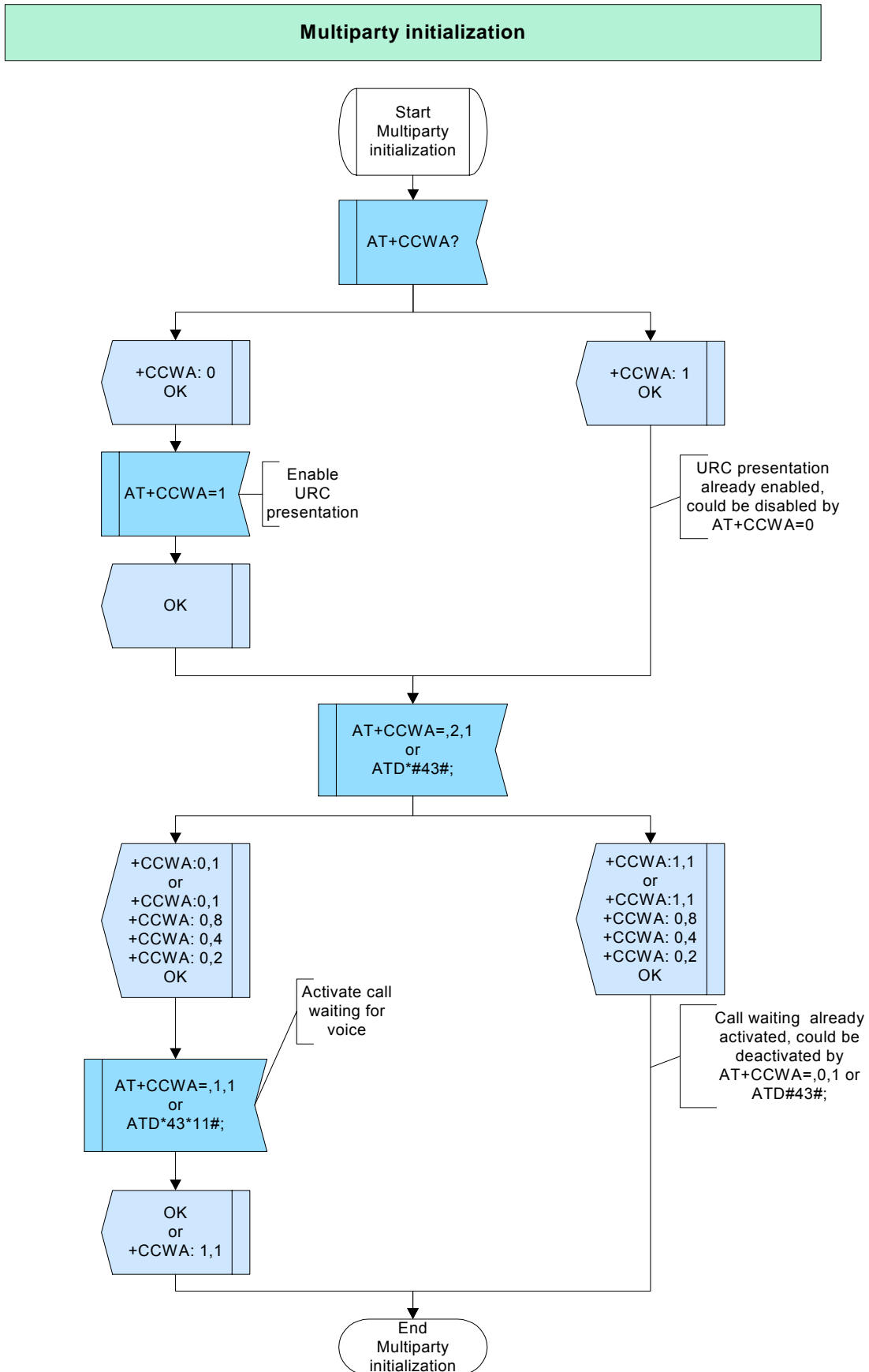
Figure 35: Multiparty initialization

2.7.3.1.4   Hints

- The URC presentation mode will not be retained when the module is powered down. After restart, the default setting AT+CCWA=0 will be restored. The activation of Call waiting itself will be stored on network side and therefore, is not affected when you shut down the module.

GCF-CC note: *# sequences the user enters on the keypad shall be transmitted over the AT interface without any conversion. Also, GCF test cases require that *# sequences can be entered during a call.

2.7.3.1.5   Example

Example 1:

```
***************************************
Comment:  Initalization multiparty
***************************************
***************************************
Comment:  Status query for display of URC. Note that URC presentation will be disabled after reboot
of the module.
***************************************

Subscr 2     Send: AT+CCWA?
Subscr 2   Receive: AT+CCWA?
Subscr 2   Receive: +CCWA: 0
Subscr 2   Receive:
Subscr 2   Receive: OK

***************************************
Comment:  Display of URC disabled, next step: enable display for URC.
***************************************

Subscr 2     Send: AT+CCWA=1
Subscr 2   Receive: AT+CCWA=1
Subscr 2   Receive: OK

***************************************
Comment:  Status query for CCWA, Subscriber2.
***************************************

Subscr 2     Send: AT+CCWA=,2,1
Subscr 2   Receive: AT+CCWA=,2,1
Subscr 2   Receive:
Subscr 2   Receive: +CCWA: 0,1
Subscr 2   Receive:
Subscr 2   Receive: OK

***************************************
Comment:  CCWA during voice calls disabled, next step: enable CCWA for voice only.
***************************************

Subscr 2     Send: AT+CCWA=,1,1
Subscr 2   Receive: AT+CCWA=,1,1
Subscr 2   Receive:
Subscr 2   Receive: OK
```

```
*************************************
Comment:  Status query for enabled value.
*************************************


Subscr 2    Send: AT+CCWA=1,2,1
Subscr 2  Receive: AT+CCWA=1,2,1
Subscr 2  Receive:
Subscr 2  Receive: +CCWA: 1,1
Subscr 2  Receive:
Subscr 2  Receive: OK
```

Example 2:

```
*************************************
Comment:  Initalization multiparty
*************************************
*************************************
Comment:  Alternative option using *# sequence.
Comment:  Status query for display of URC. Note that URC presentation will be disabled after reboot
of the module.
*************************************


Subscr 2    Send: AT+CCWA?
Subscr 2  Receive: AT+CCWA?
Subscr 2  Receive: +CCWA: 0
Subscr 2  Receive:
Subscr 2  Receive: OK


*************************************
Comment:  Display of URC disabled, next step: enable display of URC.
*************************************


Subscr 2    Send: AT+CCWA=1
Subscr 2  Receive: AT+CCWA=1
Subscr 2  Receive: OK


*************************************
Comment:  Status query for CCWA, Subscriber2.
*************************************


Subscr 2    Send: ATD*#43#;
Subscr 2  Receive: ATD*#43#;
Subscr 2  Receive:
Subscr 2  Receive: +CCWA: 0,1
Subscr 2  Receive: +CCWA: 0,8
Subscr 2  Receive: +CCWA: 0,4
Subscr 2  Receive: +CCWA: 0,2
Subscr 2  Receive: OK


*************************************
Comment:  CCWA during voice calls disabled, next step: enable CCWA for voice only.
*************************************


Subscr 2    Send: ATD*43*11#;
Subscr 2  Receive: ATD*43*11#;
Subscr 2  Receive:
Subscr 2  Receive: +CCWA: 1,1
Subscr 2  Receive: OK
*************************************
Comment:  Status query for enabled value.
```

****

```
Subscr 2     Send: ATD*#43#;
Subscr 2   Receive: ATD*#43#;
Subscr 2   Receive: +CCWA: 1,1
Subscr 2   Receive: +CCWA: 0,8
Subscr 2   Receive: +CCWA: 0,4
Subscr 2   Receive: +CCWA: 0,2
Subscr 2   Receive: OK
```

2.7.3.2   Multiparty – call waiting during voice calls

2.7.3.2.1   Description

This chapter describes all the steps needed to use the Multiparty supplementary services call waiting and call hold for voice calls.

At least three subscribers are involved. Two subscribers are connected and a third subscriber is calling subscriber 2. This waiting call is accepted while subscriber 1 is on hold. Then, the active call is terminated and the held call will be activated automatically. Generally, a call "on hold" doesn't have a voice connection to the connected party.

2.7.3.2.2   Used AT commands

ATA	-	Answer a call
ATD	-	Mobile originated call to dial a number
ATH		Disconnect existing connection
AT+CHLD	-	Call hold and multiparty
AT+CLCC	-	Returns a list of current calls

For further details about the commands see [2].

2.7.3.2.3 Flowchart
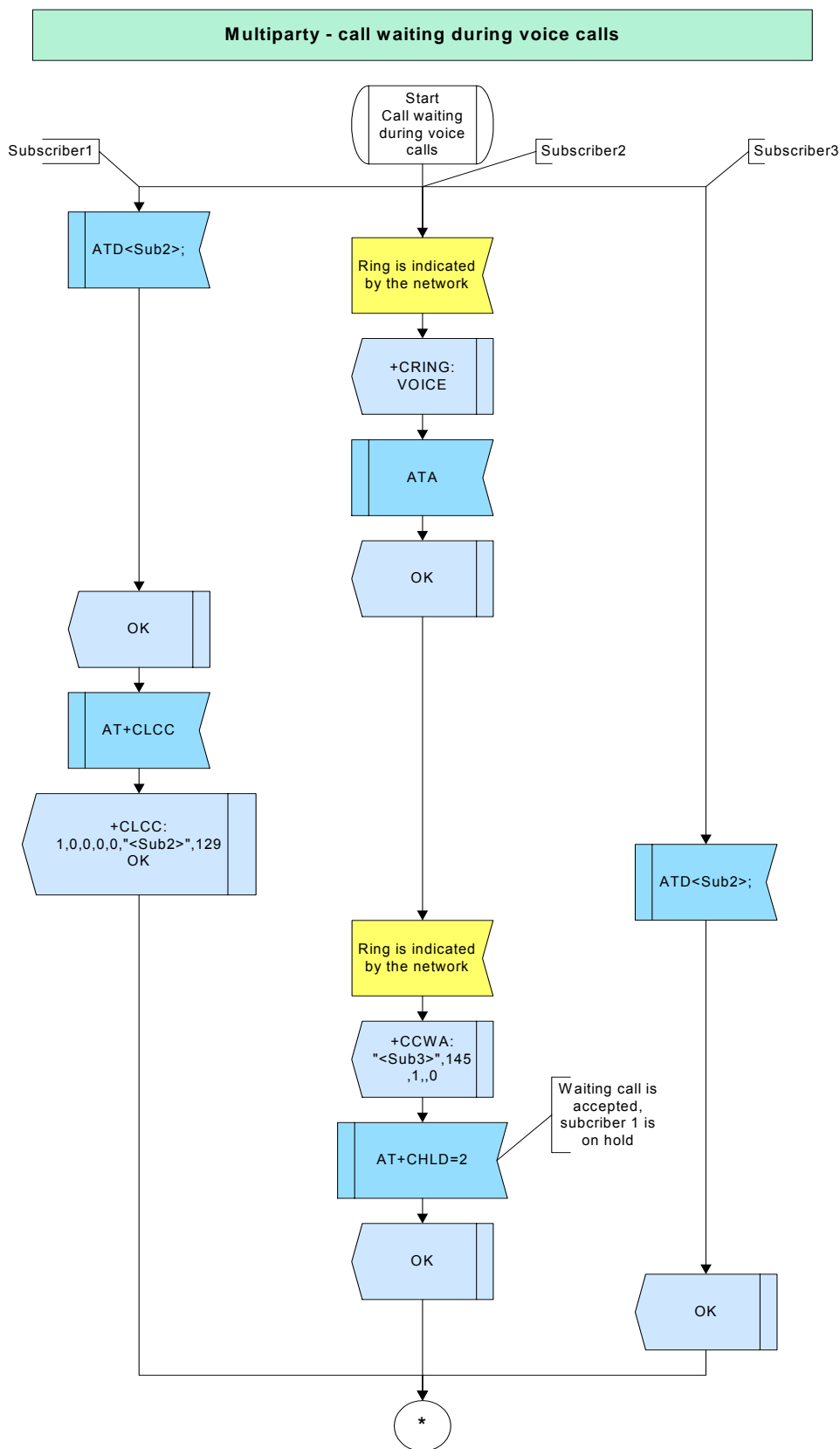
Figure 36: Multiparty - call waiting during voice calls - part 1
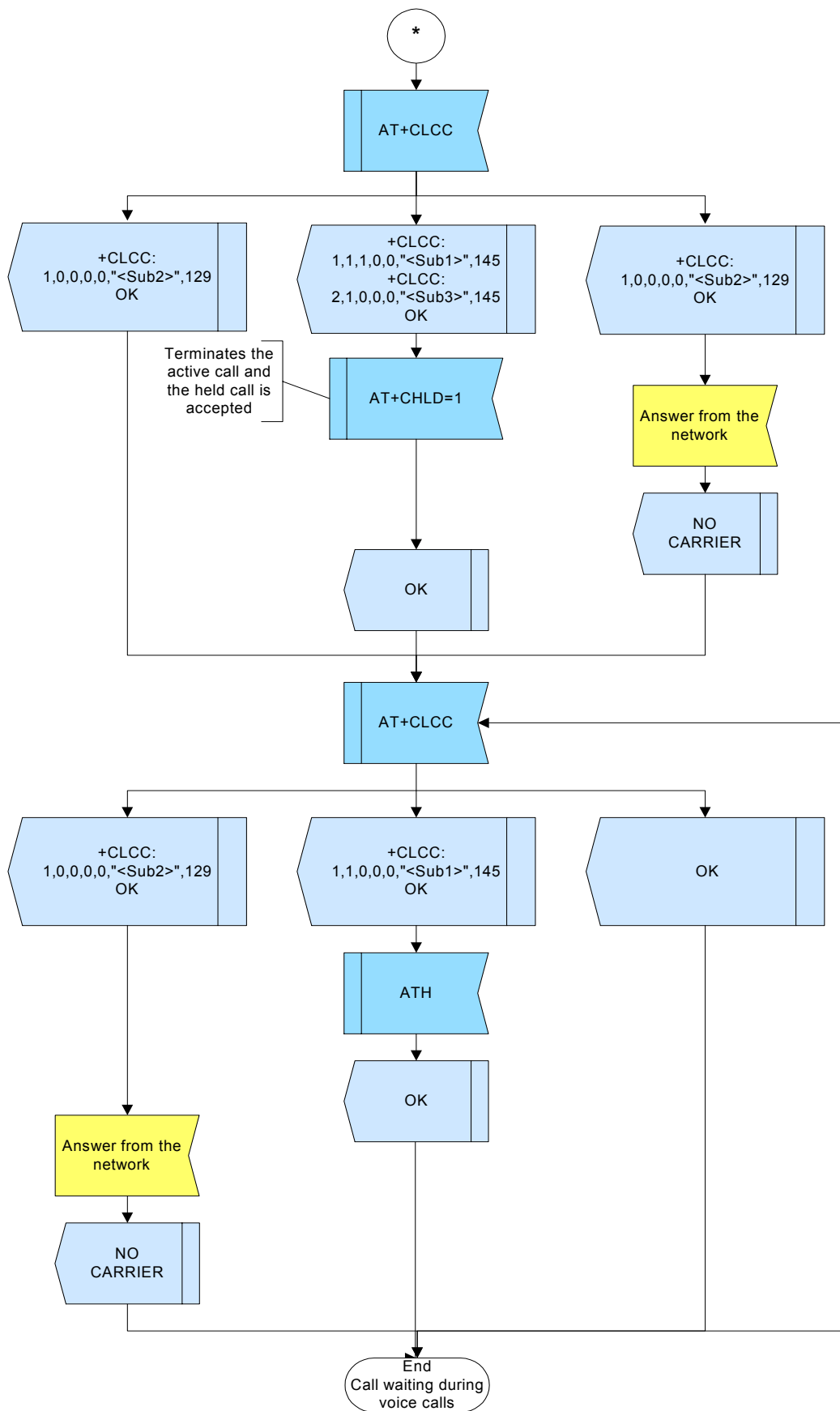
Figure 37: Multiparty - call waiting during voice calls- part 2

2.7.3.2.4   Hints

- Only a voice call can be put on hold in order to accept a waiting voice, data or fax call. In case of a data call you can only terminate this data call and accept the waiting call.
- A data or fax call cannot be put on hold.

GCF-CC note: *# sequences the user enters on the keypad shall be transmitted over the AT interface without any conversion. Also, GCF test cases require that *# sequences can be entered during a call.

2.7.3.2.5   Example

```
****************************************
Comment:  Multiparty Call waiting during voice calls
****************************************
****************************************
Comment:  Establish voice call Sub1-->Sub2
****************************************


Subscr 1     Send: atd<Sub2>;

****************************************
Comment:  Sub2: waiting for CRING
****************************************


Subscr 1   Receive: atd<Sub2>;
Subscr 2   Receive:
Subscr 2   Receive: +CRING: VOICE

****************************************
Comment:  Sub2: accept waiting call of Sub1
****************************************


Subscr 2     Send: ATA
Subscr 2   Receive: ATA
Subscr 2   Receive: OK
Subscr 1   Receive:
Subscr 1   Receive: OK

****************************************
Comment:  Request list of current calls
****************************************


Subscr 1     Send: at+clcc
Subscr 1   Receive: at+clcc
Subscr 1   Receive: +CLCC: 1,0,0,0,0,"<Sub2>",129
Subscr 1   Receive:
Subscr 1   Receive: OK

****************************************
Comment:  2nd call Sub3-->Sub2
****************************************


Subscr 3     Send: atd<Sub2>;
Subscr 3   Receive: atd<Sub2>;
Subscr 2   Receive:
Subscr 2   Receive: +CCWA: "<Sub3>",145,1,,0
****************************************
Comment:  2nd call accepted by Sub2, Sub1 on hold, Sub2 connected with Sub3
```

****

Subscr 2   Send: at+chld=2
Subscr 2   Receive: at+chld=2
Subscr 2   Receive:
Subscr 2   Receive: OK
Subscr 3   Receive:
Subscr 3   Receive: OK

****
Comment: Request list of current calls
****

Subscr 1   Send: at+clcc
Subscr 1   Receive: at+clcc
Subscr 1   Receive: +CLCC: 1,0,0,0,0,"<Sub2>",129
Subscr 1   Receive:
Subscr 1   Receive: OK
Subscr 2   Send: at+clcc
Subscr 2   Receive: at+clcc
Subscr 2   Receive: +CLCC: 1,1,1,0,0,"<Sub1>",145
Subscr 2   Receive: +CLCC: 2,1,0,0,0,"<Sub3>",145
Subscr 2   Receive:
Subscr 2   Receive: OK
Subscr 3   Send: at+clcc
Subscr 3   Receive: at+clcc
Subscr 3   Receive: +CLCC: 1,0,0,0,0,"<Sub2>",129
Subscr 3   Receive:
Subscr 3   Receive: OK

****
Comment: Sub2 disconnects active connection to Sub3, connection to Sub1 re-activated
****

Subscr 2   Send: at+chld=1
Subscr 3   Receive:
Subscr 3   Receive: NO CARRIER
Subscr 2   Receive: at+chld=1
Subscr 2   Receive:
Subscr 2   Receive: OK

****
Comment: Request list of current calls
****

Subscr 1   Send: at+clcc
Subscr 1   Receive: at+clcc
Subscr 1   Receive: +CLCC: 1,0,0,0,0,"<Sub2>",129
Subscr 1   Receive:
Subscr 1   Receive: OK
Subscr 2   Send: at+clcc
Subscr 2   Receive: at+clcc
Subscr 2   Receive: +CLCC: 1,1,0,0,0,"<Sub1>",145
Subscr 2   Receive:
Subscr 2   Receive: OK
Subscr 3   Send: at+clcc
Subscr 3   Receive: at+clcc
Subscr 3   Receive: OK

****

Comment: Sub2 disconnects the last active connection to Sub1
****

Subscr 2   Send: ATH
Subscr 2   Receive: ATH
Subscr 2   Receive: OK
Subscr 1   Receive:
Subscr 1   Receive: NO CARRIER

****
Comment: Request list of current calls
****

Subscr 1   Send: at+clcc
Subscr 1   Receive: at+clcc
Subscr 1   Receive: OK
Subscr 2   Send: at+clcc
Subscr 2   Receive: at+clcc
Subscr 2   Receive: OK
Subscr 3   Send: at+clcc
Subscr 3   Receive: at+clcc
Subscr 3   Receive: OK

2.7.3.3   Multiparty – conference call

2.7.3.3.1   Description

This chapter describes all the steps needed to use the Multiparty supplementary services call waiting and call hold for a conference call.

At least three subscribers are involved. At first two subscribers (1 and 2) are connected.
There are two ways to establish a conference call:

- Subscriber 2 puts subscriber 1 on hold while he is establishing an additional call. Afterwards the held call will be connected to the active call in order to establish a conference call.
- If during an active call an additional call comes in, the active call has to be put on hold, the waiting call is accepted and afterwards the held call has to be added to the active call.

2.7.3.3.2   Used AT commands

ATA   -   Answer a call
ATD   -   Mobile originated call to dial a number
AT+CHLD   -   Call hold and multiparty
AT+CLCC   -   Returns a list of current calls

For further details about the commands see [2].

2.7.3.3.3 Flow chart
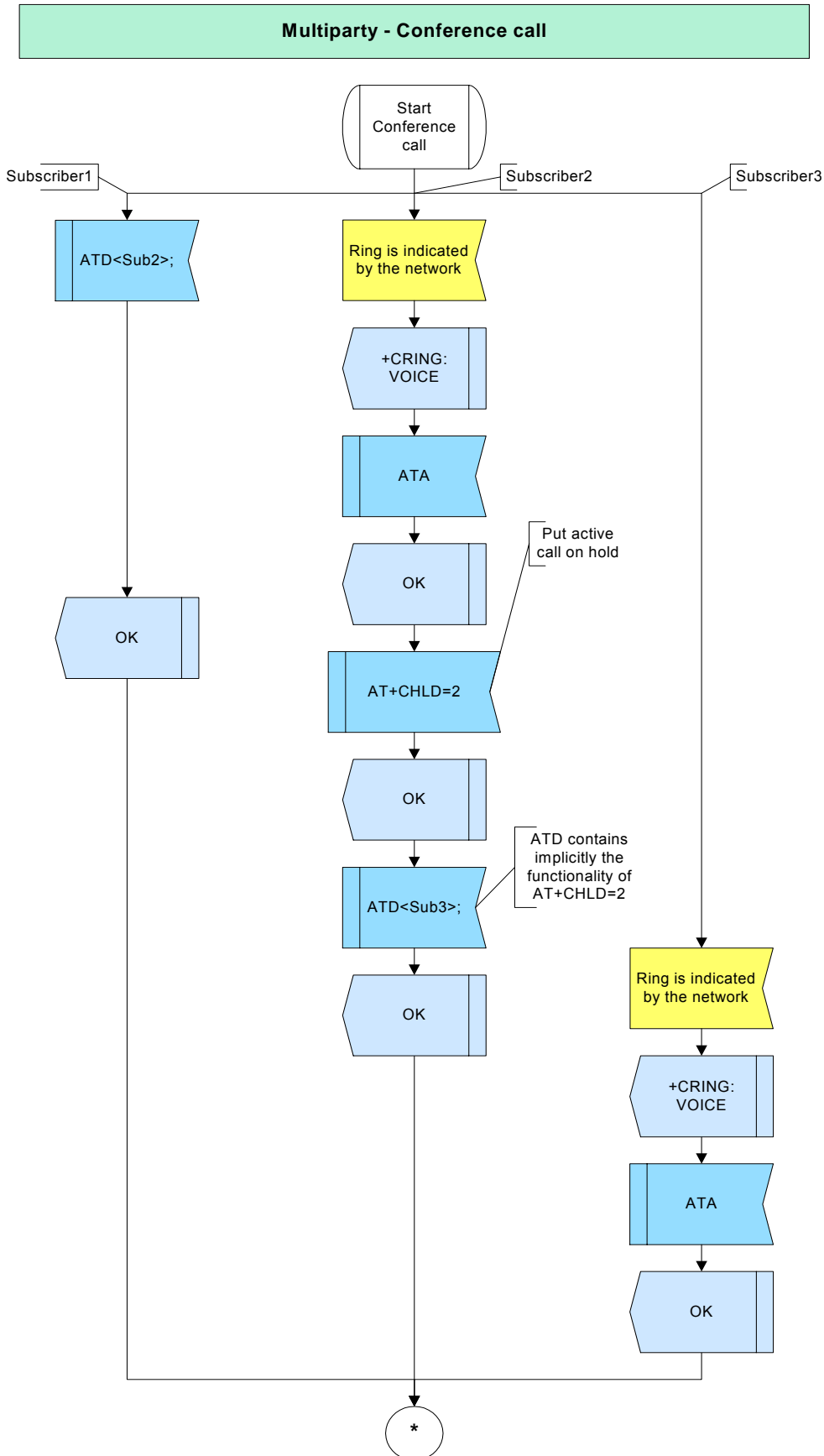
Figure 38: Multiparty - conference call - part 1

```
                        ( * )
                          │
                    ┌───────────┐
                    │ AT+CLCC   │
                    └───────────┘
          ┌───────────────┼───────────────┐
  ┌─────────────┐  ┌─────────────┐  ┌─────────────┐
  │ +CLCC:      │  │ +CLCC:      │  │ +CLCC:      │
  │1,0,0,0,0,   │  │1,1,1,0,0,   │  │1,1,0,0,0,   │
  │"<Sub2>",129 │  │"<Sub1>",145 │  │"<Sub2>",145 │
  │ OK          │  │ +CLCC:      │  │ OK          │
  │             │  │2,0,0,0,0,   │  │             │
  │             │  │"<Sub3>",129 │  │             │
  │             │  │ OK          │  │             │
  └─────────────┘  └─────────────┘  └─────────────┘
```

Add held call to the active call → AT+CHLD=3

OK

AT+CLCC

| +CLCC: 1,0,0,0,0,"<Sub2>",129 OK | +CLCC: 1,1,0,0,1,"<Sub1>",145 +CLCC: 2,0,0,0,1,"<Sub3>",129 OK | +CLCC: 1,1,0,0,0,"<Sub2>",145 OK |

Terminate 2nd active call (Sub2-Sub) → AT+CHLD=12

Answer from the network

OK

NO CARRIER

(**)
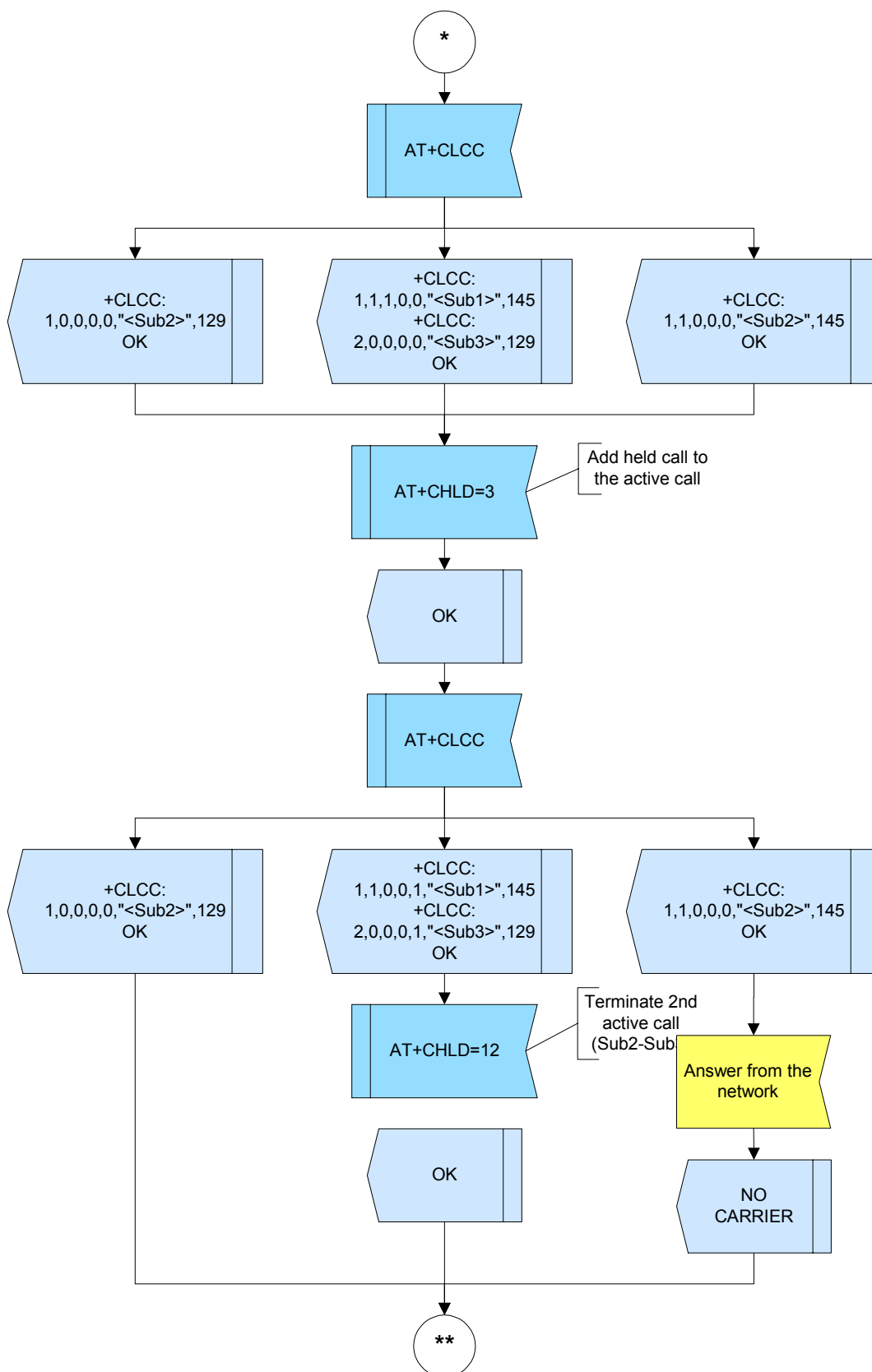
Figure 39: Multiparty - conference call - part 2
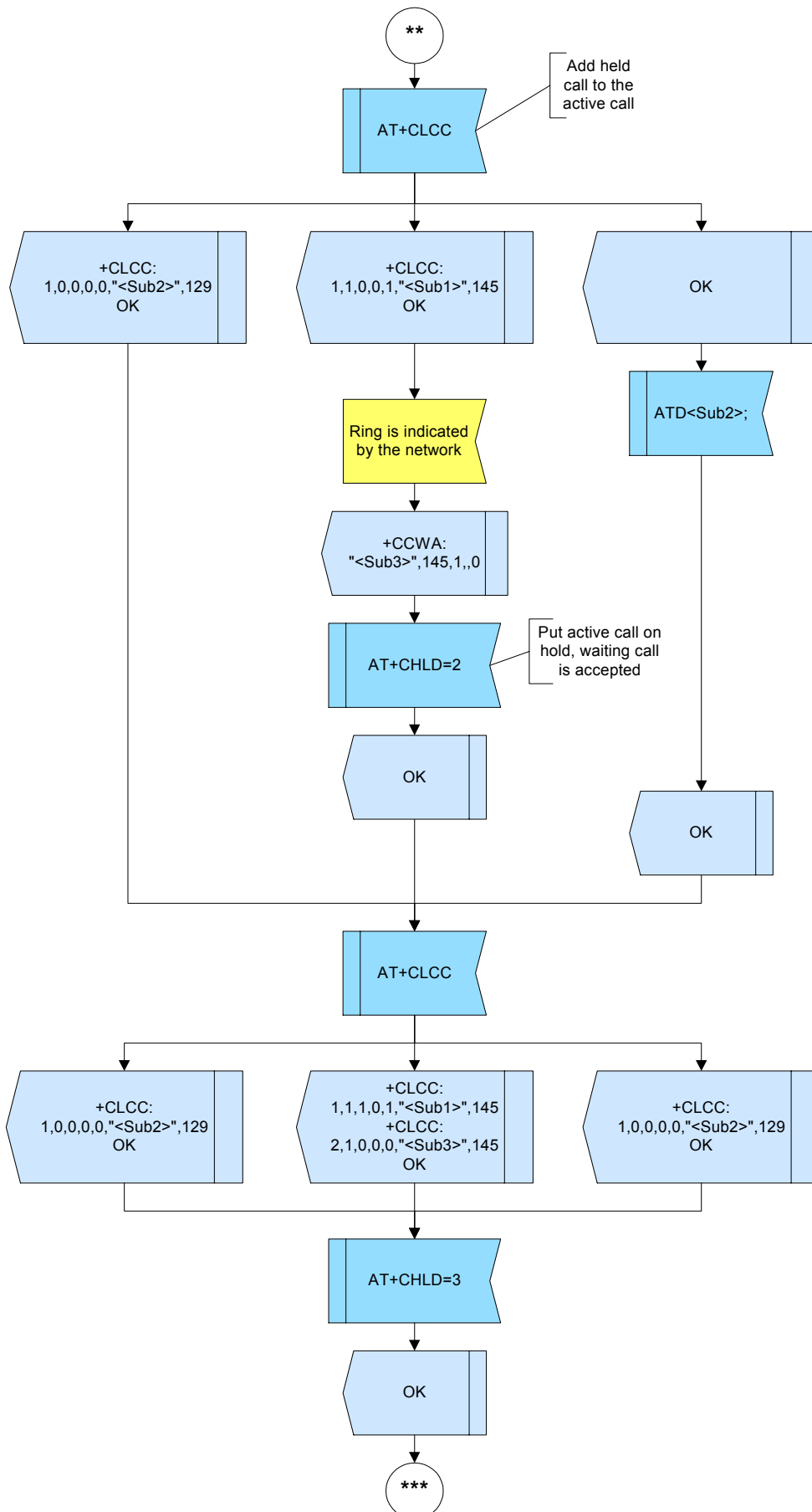
Figure 40: Multiparty - conference call - part 3

***

AT+CLCC

Subscriber1

Subscriber2

Subscriber3

+CLCC:
1,0,0,0,0,"<Sub2>",129
OK

+CLCC:
1,1,0,0,1,"<Sub1>",145
+CLCC:
2,1,0,0,1,"<Sub3>",145
OK

+CLCC:
1,0,0,0,0,"<Sub2>",129
OK

AT+CHLD=1

Terminate
all active
calls

OK

Answer from the
network

Answer from the
network

Answer from the
network

NO
CARRIER

NO
CARRIER

NO
CARRIER

AT+CLCC

Subscriber
1-3

OK

End
Conference call
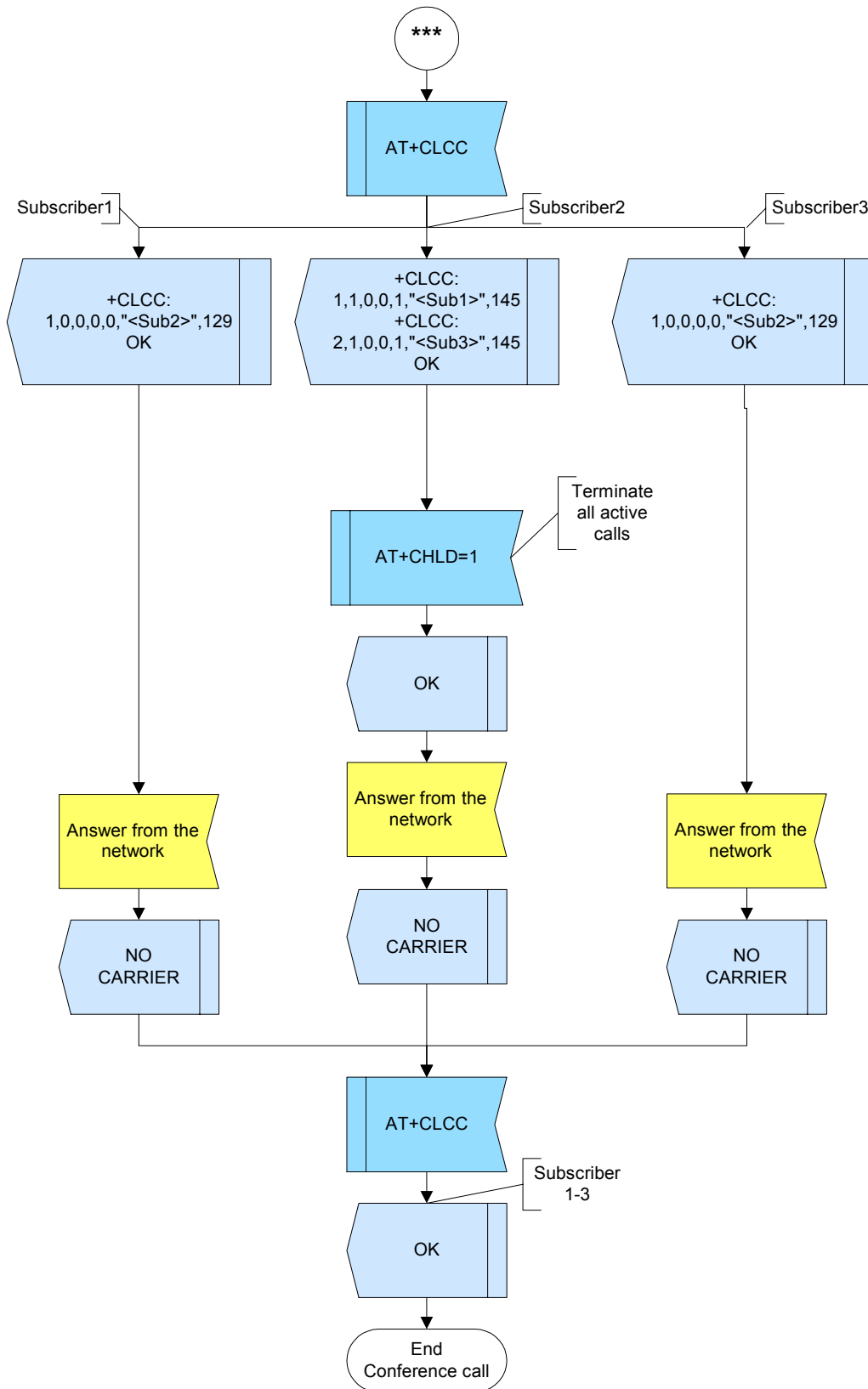
Figure 41- Multiparty - conference call - part 4

2.7.3.3.4 Hints

• When a subscriber disconnects from a 3-party conference call, the related entry is cleared from the list of current calls provided with AT+CLCC. Yet, the multiparty parameter <mpty> of the other two subscribers will not be updated in the list. This means, although the status of the call has changed to a simple 2-party call, the value of <mpty> remains 1 (multiparty) instead of being reset to 0 (no multiparty).

• If you try to add a party to a conference call, and the call is answered by the mailbox, you are advised to disconnect the call with AT+CHLD=1X. Otherwise, in extreme cases, the conference call might be recorded until the mailbox automatically disconnects the call.

GCF-CC note: *# sequences the user enters on the keypad shall be transmitted over the AT interface without any conversion. Also, GCF test cases require that *# sequences can be entered during a call.

2.7.3.3.5 Example

```
****************************************
Comment:  Multiparty conference call
****************************************

****************************************
Comment:  Establish voice call Sub1-->Sub2
****************************************


Subscr 1     Send: ATD<Sub2>;


****************************************
Comment:  Sub2: waiting for CRING
****************************************


Subscr 1   Receive: ATD<Sub2>;
Subscr 2   Receive:
Subscr 2   Receive: +CRING: VOICE


****************************************
Comment:  Sub2: accept waiting call of Sub1
****************************************


Subscr 2     Send: ATA
Subscr 2   Receive: ATA
Subscr 2   Receive: OK
Subscr 1   Receive:
Subscr 1   Receive: OK


****************************************
Comment:  Put active call on hold
****************************************


Subscr 2     Send: AT+CHLD=2
Subscr 2   Receive: AT+CHLD=2
Subscr 2   Receive: OK


****************************************
Comment: Establish voice call Sub2-->Sub3
****************************************


Subscr 2     Send: ATD<Sub3>;
```

```
***************************************
Comment:  Sub3: waiting for CRING
***************************************
```

Subscr 2   Receive: ATD<Sub3>;
Subscr 2   Receive: OK
Subscr 3   Receive:
Subscr 3   Receive: +CRING: VOICE

```
***************************************
Comment:  Sub3: accept waiting call of Sub2
***************************************
```

Subscr 3   Send: ATA
Subscr 3   Receive: ATA
Subscr 3   Receive: OK

```
***************************************
Comment:  Request list of current calls
***************************************
```

Subscr 1   Send: AT+CLCC
Subscr 1   Receive: AT+CLCC
Subscr 1   Receive: +CLCC: 1,0,0,0,0,"<Sub2>",129
Subscr 1   Receive:
Subscr 1   Receive: OK
Subscr 2   Send: AT+CLCC
Subscr 2   Receive: AT+CLCC
Subscr 2   Receive: +CLCC: 1,1,1,0,0,"<Sub1>",145
Subscr 2   Receive: +CLCC: 2,0,0,0,0,"<Sub3>",129
Subscr 2   Receive:
Subscr 2   Receive: OK
Subscr 3   Send: AT+CLCC
Subscr 3   Receive: AT+CLCC
Subscr 3   Receive: +CLCC: 1,1,0,0,0,"<Sub2>",145
Subscr 3   Receive:
Subscr 3   Receive: OK

```
***************************************
Comment:  Add the held call to the active call
***************************************
```

Subscr 2   Send: AT+CHLD =3
Subscr 2   Receive: AT+CHLD=3
Subscr 2   Receive:
Subscr 2   Receive: OK

```
***************************************
Comment:  Request list of current calls
***************************************
```

Subscr 1   Send: AT+CLCC
Subscr 1   Receive: AT+CLCC
Subscr 1   Receive: +CLCC: 1,0,0,0,0,"<Sub2>",129
Subscr 1   Receive:
Subscr 1   Receive: OK
Subscr 2   Send: AT+CLCC
Subscr 2   Receive: AT+CLCC
Subscr 2   Receive: +CLCC: 1,1,0,0,1,"<Sub1>",145

Subscr 2   Receive: +CLCC: 2,0,0,0,1,"<Sub3>",129
Subscr 2   Receive:
Subscr 2   Receive: OK
Subscr 3   Send: AT+CLCC
Subscr 3   Receive: AT+CLCC
Subscr 3   Receive: +CLCC: 1,1,0,0,0,"<Sub2>",145
Subscr 3   Receive:
Subscr 3   Receive: OK

****
Comment: Terminate the active call no. 2 (Sub2 - Sub3)
****

Subscr 2   Send: AT+CHLD=12
Subscr 2   Receive: AT+CHLD=12
Subscr 2   Receive: OK
Subscr 3   Receive:
Subscr 3   Receive: NO CARRIER

****
Comment: Request list of current calls
****

Subscr 1   Send: AT+CLCC
Subscr 1   Receive: AT+CLCC
Subscr 1   Receive: +CLCC: 1,0,0,0,0,"<Sub2>",129
Subscr 1   Receive:
Subscr 1   Receive: OK
Subscr 2   Send: AT+CLCC
Subscr 2   Receive: AT+CLCC
Subscr 2   Receive: +CLCC: 1,1,0,0,1,"<Sub1>",145
Subscr 2   Receive:
Subscr 2   Receive: OK
Subscr 3   Send: AT+CLCC
Subscr 3   Receive: AT+CLCC
Subscr 3   Receive: OK

****
Comment: Incoming voice call Sub3-->Sub2
****

Subscr 3   Send: ATD<Sub2>;
Subscr 3   Receive: ATD<Sub2>;
Subscr 2   Receive:
Subscr 2   Receive: +CCWA: "<Sub3>",145,1,,0

****
Comment: 2nd call accepted by Sub2, Sub1 on hold, Sub2 connected with Sub3
****

Subscr 2   Send: AT+CHLD=2
Subscr 2   Receive: AT+CHLD=2
Subscr 2   Receive:
Subscr 2   Receive: OK
Subscr 3   Receive:
Subscr 3   Receive: OK

****
Comment: Request list of current calls
****

```
Subscr 1     Send: AT+CLCC
Subscr 1   Receive: AT+CLCC
Subscr 1   Receive: +CLCC: 1,0,0,0,0,"<Sub2>",129
Subscr 1   Receive:
Subscr 1   Receive: OK
Subscr 2     Send: AT+CLCC
Subscr 2   Receive: AT+CLCC
Subscr 2   Receive: +CLCC: 1,1,1,0,1,"<Sub1>",145
Subscr 2   Receive: +CLCC: 2,1,0,0,0,"<Sub3>",145
Subscr 2   Receive:
Subscr 2   Receive: OK
Subscr 3     Send: AT+CLCC
Subscr 3   Receive: AT+CLCC
Subscr 3   Receive: +CLCC: 1,0,0,0,0,"<Sub2>",129
Subscr 3   Receive:
Subscr 3   Receive: OK


**************************************
Comment:  Add the held call to the active call
**************************************


Subscr 2     Send: AT+CHLD=3
Subscr 2   Receive: AT+CHLD=3
Subscr 2   Receive:
Subscr 2   Receive: OK


**************************************
Comment:  Request list of current calls
**************************************


Subscr 1     Send: AT+CLCC
Subscr 1   Receive: AT+CLCC
Subscr 1   Receive: +CLCC: 1,0,0,0,0,"<Sub2>",129
Subscr 1   Receive:
Subscr 1   Receive: OK
Subscr 2     Send: AT+CLCC
Subscr 2   Receive: AT+CLCC
Subscr 2   Receive: +CLCC: 1,1,0,0,1,"<Sub1>",145
Subscr 2   Receive: +CLCC: 2,1,0,0,1,"<Sub3>",145
Subscr 2   Receive:
Subscr 2   Receive: OK
Subscr 3     Send: AT+CLCC
Subscr 3   Receive: AT+CLCC
Subscr 3   Receive: +CLCC: 1,0,0,0,0,"<Sub2>",129
Subscr 3   Receive:
Subscr 3   Receive: OK


**************************************
Comment:  Terminate all active calls
**************************************


Subscr 2     Send: AT+CHLD=1
Subscr 2   Receive: AT+CHLD=1
Subscr 2   Receive: OK
Subscr 2   Receive:
Subscr 2   Receive: NO CARRIER
Subscr 1   Receive:
Subscr 1   Receive: NO CARRIER
Subscr 3   Receive:
```

Subscr 3   Receive: NO CARRIER

****
Comment: Request list of current calls
****

Subscr 1   Send: AT+CLCC
Subscr 1   Receive: AT+CLCC
Subscr 1   Receive: OK
Subscr 2   Send: AT+CLCC
Subscr 2   Receive: AT+CLCC
Subscr 2   Receive: OK
Subscr 3   Send: AT+CLCC
Subscr 3   Receive: AT+CLCC
Subscr 3   Receive: OK

2.7.3.4 Multiparty - call reject

2.7.3.4.1 Description

This chapter describes all the steps needed to reject a waiting call within the Multiparty supplementary service call waiting and call hold. At least three subscribers are involved.

At first two subscribers are connected. Then, a third subscriber is calling subscriber 2.
There are two ways to reject a waiting call, Subscriber 2 can reject the waiting call with
- AT+CHLD=0 (Figure 42) or
- AT+CHLD=1x (Figure 43).

However, if subscriber 2 uses ATH the active call between subscriber 1 and 2 will be disconnected, and the waiting caller (subscriber 3) can be accepted with ATA or rejected with ATH (see normal call handling, example in Figure 50).

2.7.3.4.2 Used AT commands

ATA	-	Answer a call
ATD	-	Mobile originated call to dial a number
AT+CHLD	-	Call hold and multiparty
AT+CLCC	-	Returns a list of current calls

For further details about the commands see [2].

2.7.3.4.3 Flowchart
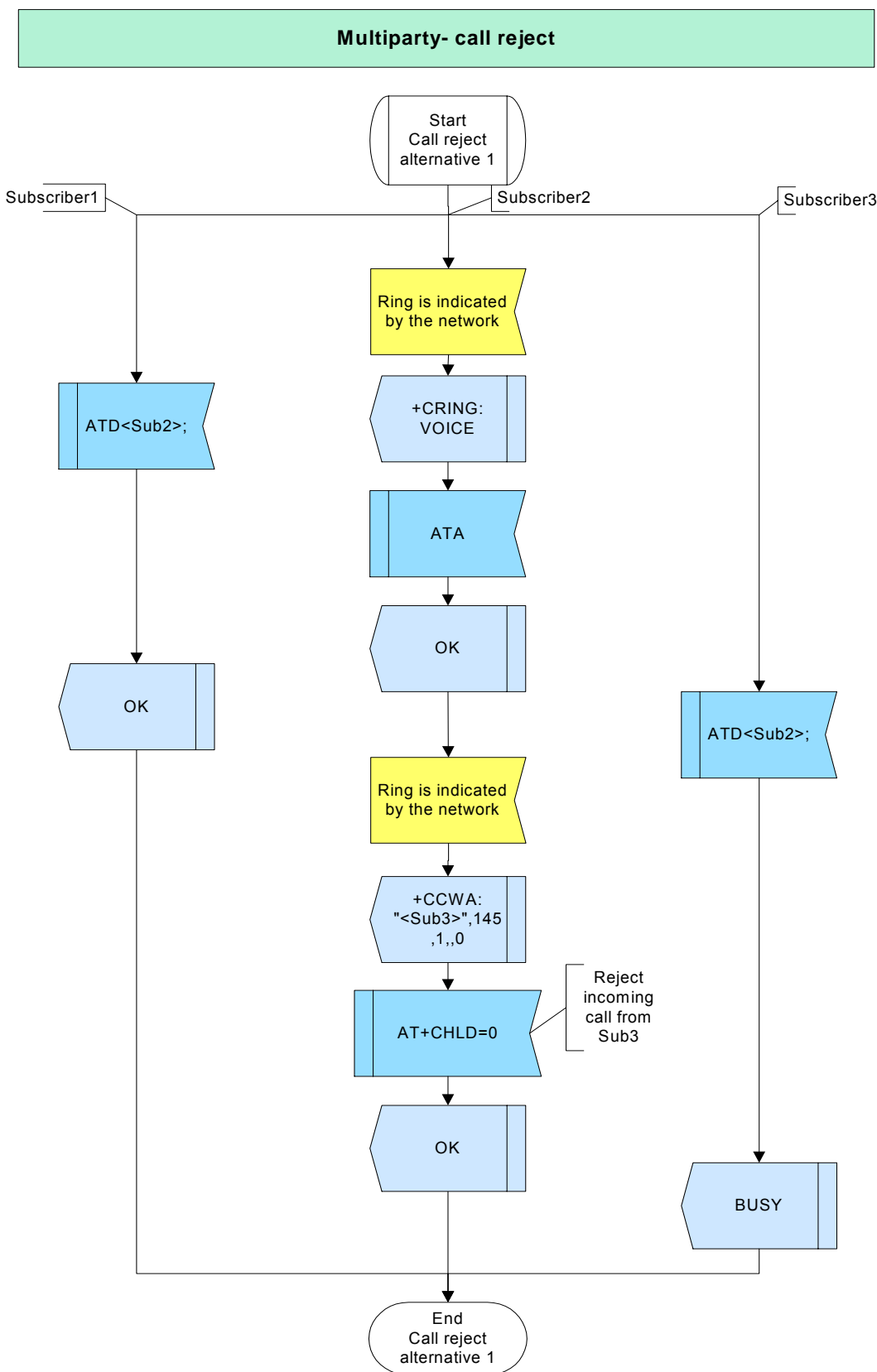
Figure 42: Multiparty - call reject - alternative 1

Start
Call reject
alternative 2

Subscriber1

Subscriber2

Subscriber3

ATD<Sub2>;

Ring is indicated
by the network

+CCWA:
"<Sub3>",145
,1,,0

AT+CLCC

+CLCC:
1,1,0,0,0,"<Sub1>",145
+CLCC:
2,1,5,0,0,"<Sub3>",145
OK

Sub1: active call, call index 1
Sub3: waiting call, call index 2

AT+CHLD=12

Terminate the waiting call with
index 2 in list of current calls

OK

NO
CARRIER

ATH

OK

Answer from the
network

NO
CARRIER

End
Call reject
alternative 2

Figure 43: Multiparty - call reject - alternative 2

2.7.3.4.4 Hints

GCF-CC note: *# sequences the user enters on the keypad shall be transmitted over the AT interface without any conversion. Also, GCF test cases require that *# sequences can be entered during a call.

2.7.3.4.5 Example

Example 1:

```
****************************************
Comment:      Multiparty - call reject- ATH
****************************************
****************************************
Comment:  Establish voice call Sub1-->Sub2
****************************************


Subscr 1     Send: ATD<Sub2>;

****************************************
Comment:  Sub2: waiting for CRING
****************************************


Subscr 1   Receive: ATD<Sub2>;
Subscr 2   Receive:
Subscr 2   Receive: +CRING: VOICE

****************************************
Comment:  Sub2: accept waiting call of Sub1
****************************************


Subscr 2     Send: ATA
Subscr 2   Receive: ATA
Subscr 2   Receive: OK
Subscr 1   Receive:
Subscr 1   Receive: OK

****************************************
Comment:  Establish voice call Sub3-->Sub2
****************************************


Subscr 3     Send: ATD<Sub2>;
Subscr 3   Receive: ATD<Sub2>;
Subscr 2   Receive:
Subscr 2   Receive: +CCWA: "<Sub3>",145,1,,0

****************************************
Comment:  Terminate the active call
****************************************


Subscr 2     Send: ATH
Subscr 2   Receive: ATH
Subscr 2   Receive: OK
Subscr 2   Receive:
Subscr 2   Receive: +CRING: VOICE
Subscr 1   Receive:
Subscr 1   Receive: NO CARRIER
```

```
**************************************
Comment:  Waiting call may be the last active call
Comment:  Reject the active call
**************************************
```

```
Subscr 2    Send: ATH
Subscr 2  Receive: ATH
Subscr 2  Receive: OK
Subscr 3  Receive:
Subscr 3  Receive: NO CARRIER
```

Example 2:

```
**************************************
Comment:        Multiparty - call reject- AT+CHLD=0
**************************************
**************************************
Comment:  Establish voice call Sub1-->Sub2
**************************************
Subscr 1    Send: ATD<Sub2>;
**************************************
Comment:  Sub2: waiting for CRING
**************************************
```

```
Subscr 1  Receive: ATD<Sub2>;
Subscr 2  Receive:
Subscr 2  Receive: +CRING: VOICE
```

```
**************************************
Comment:  Sub2: accept waiting call of Sub1
**************************************
```

```
Subscr 2    Send: ATA
Subscr 2  Receive: ATA
Subscr 2  Receive: OK
Subscr 1  Receive:
Subscr 1  Receive: OK
```

```
**************************************
Comment:  Establish voice call Sub3-->Sub2
**************************************
```

```
Subscr 3    Send: ATD<Sub2>;
Subscr 3  Receive: ATD<Sub2>;
Subscr 2  Receive:
Subscr 2  Receive: +CCWA: "<Sub3>",145,1,,0
**************************************
Comment:  Set UDUB=user determined user busy, i.e. reject a waiting call
**************************************
```

```
Subscr 2    Send: AT+CHLD=0
Subscr 2  Receive: AT+CHLD=0
Subscr 2  Receive: OK
Subscr 3  Receive:
Subscr 3  Receive: BUSY
```
Example 3:

```
**************************************
Comment:        Multiparty - call reject- AT+CHLD=12
```

```
**************************************
**************************************
Comment:  Establish voice call Sub3-->Sub2
**************************************


Subscr 3     Send: ATD<Sub2>;
Subscr 3   Receive: ATD<Sub2>;
Subscr 2   Receive:
Subscr 2   Receive: +CCWA: "<Sub3>",145,1,,0
Subscr 2     Send: AT+CLCC
Subscr 2   Receive: AT+CLCC
Subscr 2   Receive: +CLCC: 1,1,0,0,0,"<Sub1>",145
Subscr 2   Receive: +CLCC: 2,1,5,0,0,"<Sub3>",145
Subscr 2   Receive:
Subscr 2   Receive: OK


**************************************
Comment:  Terminate the call with index 2 (=waiting call)
**************************************


Subscr 2     Send: AT+CHLD=12
Subscr 2   Receive: AT+CHLD=12
Subscr 2   Receive: OK
Subscr 3   Receive:
Subscr 3   Receive: NO CARRIER


**************************************
Comment:  Disconnect the active call
**************************************


Subscr 2     Send: ATH
Subscr 2   Receive: ATH
Subscr 2   Receive: OK
Subscr 1   Receive:
Subscr 1   Receive: NO CARRIER
```

2.7.4   Calling line identification presentation (CLIP)

2.7.4.1   Description

The supplementary service CLIP permits the called subscriber to display the calling line identity (CLI) of the calling party when a call is received.

You can enable and disable the presentation of the CLI by using the command AT+CLIP. If CLIP is enabled, every RING will be followed by an unsolicited result code.

2.7.4.2   Used AT commands

AT+CLIP	-	Calling line identification presentation (CLIP)
ATD*#31#	-	Query status of Calling line identification restriction (CLIR)
ATD*31#	-	Deactivate CLIR= enable presentation
ATD#31#	-	Activate CLIR= disable presentation
ATD	-	Mobile originated call to dial number
ATA	-	Answer call
ATH	-	Disconnect existing connection

For further details about the commands see [2].

2.7.4.3 Flow Chart
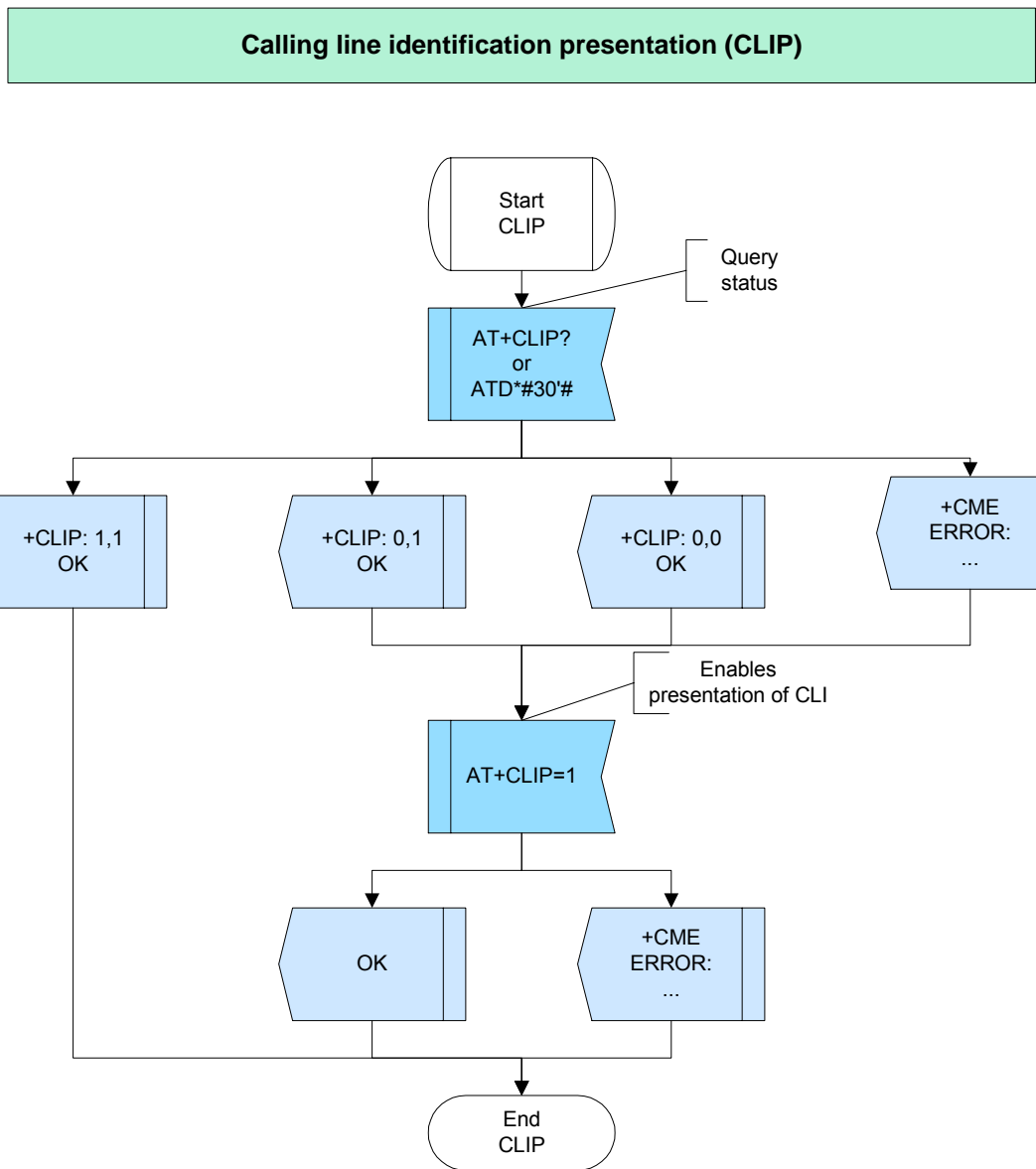
Figure 44: CLIP

2.7.4.4 Hints

GCF-CC note: *# sequences the user enters on the keypad shall be transmitted over the AT interface without any conversion. Also, GCF test cases require that *# sequences can be entered during a call.

2.7.4.5 Example

Example 1:

```
***************************************
Comment:  Enable calling line identification presentation (CLIP)
***************************************
***************************************
Comment:  Query CLIP status of the called subscriber
***************************************


Subscr 1     Send:  AT+CLIP?
Subscr 1   Receive:  AT+CLIP?
Subscr 1   Receive:
Subscr 1   Receive:  +CLIP: 1,1
Subscr 1   Receive:
Subscr 1   Receive:  OK


***************************************
Comment:  Set parameter to get the calling line identity
***************************************


Subscr 1     Send:  AT+CLIP=1
Subscr 1   Receive:  AT+CLIP=1
Subscr 1   Receive:  OK


***************************************
Comment:  Query the CLIR status of the calling subscriber
***************************************


Subscr 2     Send:  ATD*#31#;
Subscr 2   Receive:  ATD*#31#;
Subscr 2   Receive:
Subscr 2   Receive:  +CLIR: 0,4
Subscr 2   Receive:  OK


***************************************
Comment:  Enable presentation of own phone number to called party and display CLI
***************************************


Subscr 2     Send:  ATD*31#00441522400033;
Subscr 2   Receive:  ATD*31#00441522400033;
Subscr 1   Receive:
Subscr 1   Receive:  RING
Subscr 1   Receive:
Subscr 1   Receive:  +CLIP: "+441522400080",145,,,,0


***************************************
Comment:  Answer a call
***************************************


Subscr 1     Send:  ATA
Subscr 1   Receive:  ATA
Subscr 1   Receive:  OK



***************************************
```

Comment: Disconnect existing connection
****

Subscr 1   Send: ATH
Subscr 2   Receive:
Subscr 2   Receive: OK
Subscr 1   Receive: ATH
Subscr 1   Receive: OK
Subscr 2   Receive:
Subscr 2   Receive: NO CARRIER

Example 2:

****
Comment: Disable calling line identification presentation (CLIP)
****
****
Comment: Query the CLIP status of the called subscriber
****

Subscr 1   Send: AT+CLIP?
Subscr 1   Receive: AT+CLIP?
Subscr 1   Receive:
Subscr 1   Receive: +CLIP: 1,1
Subscr 1   Receive:
Subscr 1   Receive: OK

****
Comment: Set parameter to supress the calling line identity
****

Subscr 1   Send: AT+CLIP=0
Subscr 1   Receive: AT+CLIP=0
Subscr 1   Receive: OK

****
Comment: Enable presentation of own phone number to called party
****

Subscr 2   Send: ATD*31#00441522400033;
Subscr 2   Receive: ATD*31#00441522400033;
Subscr 1   Receive:
Subscr 1   Receive: RING

****
Comment: Answer a call
****

Subscr 1   Send: ATA
Subscr 1   Receive: ATA
Subscr 1   Receive: OK

```
***************************************
Comment:  Disconnect existing connection
***************************************

Subscr 1     Send:  ATH
Subscr 2  Receive:
Subscr 2  Receive:  OK
Subscr 1  Receive:  ATH
Subscr 1  Receive:  OK
Subscr 2  Receive:
Subscr 2  Receive:  NO CARRIER
```

2.7.5 Calling line identification restriction (CLIR)

2.7.5.1 Description

The supplementary service CLIR permits the calling subscriber to suppress the presentation of his or her own phone number to a called party, when the call is set up.

The command AT+CLIR is not supported in every module. Please refer to [2] for specifications.

The calling subscriber can handle CLIR call by call, using the ATD command and the *# sequence. The *# sequence enables or disables the presentation of the calling party's phone number for the next call.

Note that the CLIR function is also network dependent. When the query for the network status returns "+CLIR:0,4", the network supports CLIR. In any case the called subscriber must enable CLIP in order to display the calling party´s number.

2.7.5.2 Used AT commands

AT+CLIR   -   Calling line identification restriction (CLIR)
AT+CLIP   -   Calling line identification presentation (CLIP)
ATD*#31#   -   Query status of Calling line identification restriction (CLIR)
ATD*31#   -   Deactivate CLIR= enable presentation
ATD#31#   -   Activate CLIR= disable presentation
ATD   -   Mobile originated call to dial number
ATA   -   Answer call
ATH   -   Disconnect existing connection

For further details about the commands see [2].

2.7.5.3 Flow Chart

Calling line identification restriction (CLIR)

Start
CLIR

AT+CLIR?

ATD*#31#;

(Example)
presentation indicator
is used and CLIR
temporary mode
presentation is allowed

+CLIR: 0,4
OK

Deactivate
CLIR (enable
presentation)

CLIR
suppression
(not
incognito)

ATD*31#<Phonenumber>;

AT+CLIR=2

OK

+CME
ERROR:
...

AT+CLIR?

+CLIR: 2,4
OK

+CME
ERROR:
...

End
CLIR
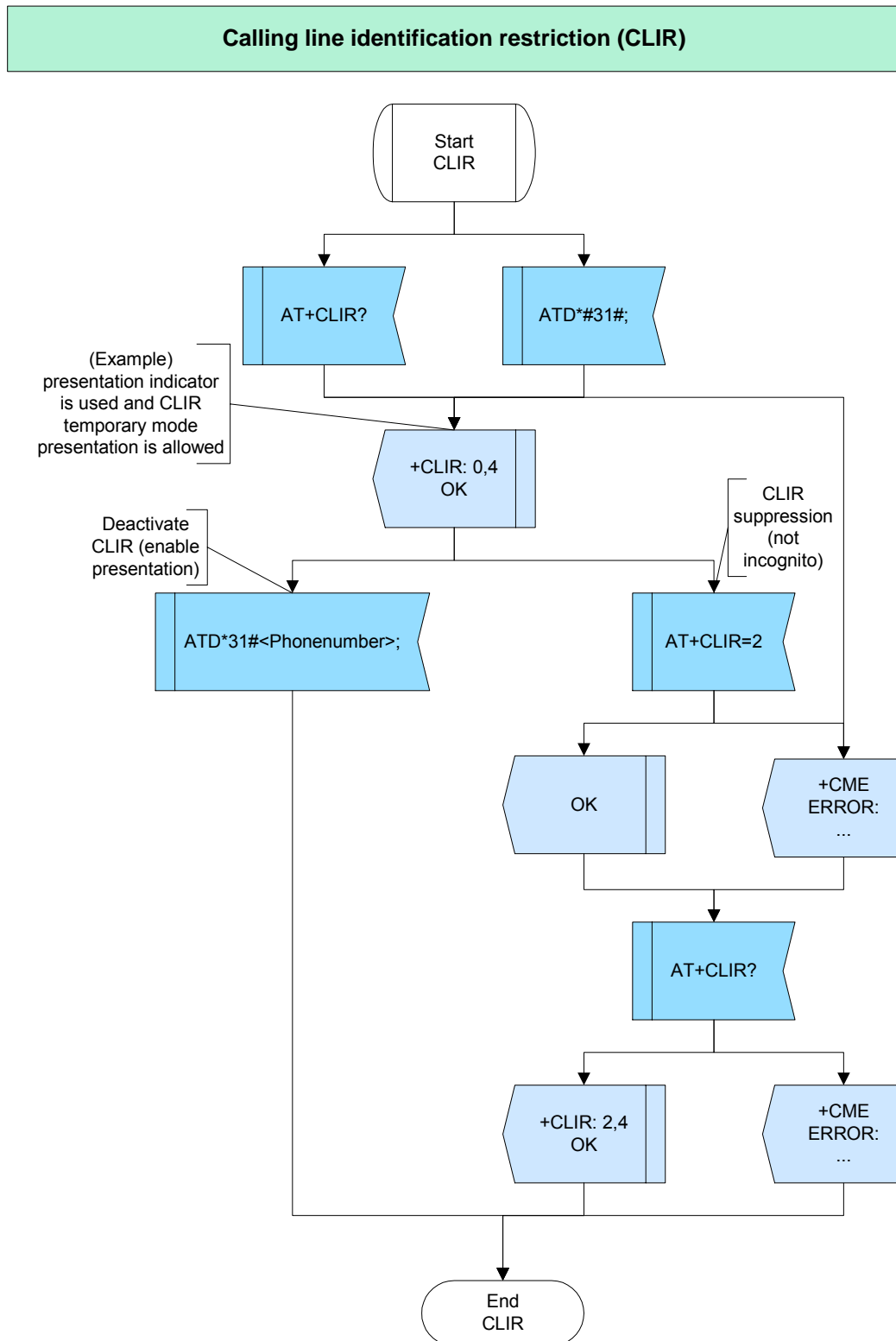
Figure 45: CLIR

2.7.5.4   Hints

- If you want to change the network status of the supplementary service CLIR you must contact your network provider.

GCF-CC note: *# sequences the user enters on the keypad shall be transmitted over the AT interface without any conversion. Also, GCF test cases require that *# sequences can be entered during a call.

2.7.5.5   Example

Example 1:

```
***************************************
Comment:  CLIR
***************************************
***************************************
Comment:  Enable the presentation of the CLI (CLIP - called subscriber)
***************************************

Subscr 2     Send:  AT+CLIP=1
Subscr 2   Receive: AT+CLIP=1
Subscr 2   Receive: OK

***************************************
Comment:  Query the CLIR status (calling subscriber)
***************************************

Subscr 1     Send:  AT+CLIR?
Subscr 1   Receive: AT+CLIR?
Subscr 1   Receive:
Subscr 1   Receive: +CLIR: 0,4
Subscr 1   Receive:
Subscr 1   Receive: OK

***************************************
Comment:  Set the CLIR status invocation (incognito)
***************************************

Subscr 1     Send:  AT+CLIR=1
Subscr 1   Receive: AT+CLIR=1
Subscr 1   Receive:
Subscr 1   Receive: OK

***************************************
Comment:  Call a phone number
***************************************

Subscr 1     Send:  ATD00441522400023;
Subscr 1   Receive: ATD00441522400023;
Subscr 2   Receive:
Subscr 2   Receive: RING
Subscr 2   Receive:
Subscr 2   Receive: +CLIP: "",128,,,,1

***************************************
Comment:  Answer a call
```

```
****************************************
```

Subscr 2   Send: ATA
Subscr 2   Receive: ATA
Subscr 2   Receive: OK

```
****************************************
```

Comment: Disconnect existing connection
```
****************************************
```

Subscr 2   Send: ATH
Subscr 2   Receive: ATH
Subscr 2   Receive: OK
Subscr 1   Receive:
Subscr 1   Receive: OK
Subscr 1   Receive:
Subscr 1   Receive: NO CARRIER

```
****************************************
```

Comment: Set the CLIR status invocation (not incognito)
```
****************************************
```

Subscr 1   Send: AT+CLIR=2
Subscr 1   Receive: AT+CLIR=2
Subscr 1   Receive:
Subscr 1   Receive: OK

```
****************************************
```

Comment: Call a phone number
```
****************************************
```

Subscr 1   Send: ATD00441522400023;
Subscr 1   Receive: ATD00441522400023;
Subscr 2   Receive:
Subscr 2   Receive: RING
Subscr 2   Receive:
Subscr 2   Receive: +CLIP: "+441522400033",145,,,,0

```
****************************************
```

Comment: Answer a call
```
****************************************
```

Subscr 2   Send: ATA
Subscr 2   Receive: ATA
Subscr 2   Receive: OK

```
****************************************
```

Comment: Disconnect exsisting connection
```
****************************************
```

Subscr 2   Send: ATH
Subscr 2   Receive: ATH
Subscr 2   Receive: OK
Subscr 1   Receive:
Subscr 1   Receive: OK
Subscr 1   Receive:
Subscr 1   Receive: NO CARRIER

Example 2:

```
**************************************
Comment: Setting CLIR with *# code when dialing
**************************************
**************************************
Comment: Query the CLIP status of the called subscriber
**************************************


Subscr 1     Send: AT+CLIP?
Subscr 1   Receive: AT+CLIP?
Subscr 1   Receive:
Subscr 1   Receive: +CLIP: 1,1
Subscr 1   Receive:
Subscr 1   Receive: OK


**************************************
Comment: Query the CLIR status of the calling subscriber
**************************************


Subscr 2     Send: ATD*#31#;
Subscr 2   Receive: ATD*#31#;
Subscr 2   Receive:
Subscr 2   Receive: +CLIR: 0,4
Subscr 2   Receive: OK


**************************************
Comment: Call a phone number
**************************************


Subscr 2     Send: ATD*31#00441522400033;
Subscr 2   Receive: ATD*31#00441522400033;
Subscr 1   Receive:
Subscr 1   Receive: RING
Subscr 1   Receive:
Subscr 1   Receive: +CLIP: "+441522400080",145,,,,0


**************************************
Comment: Answer a call
**************************************


Subscr 1     Send: ATA
Subscr 1   Receive: ATA
Subscr 1   Receive: OK


**************************************
Comment: Disconnect existing connection
**************************************


Subscr 1     Send: ATH
Subscr 2   Receive:
Subscr 2   Receive: OK
Subscr 1   Receive: ATH
Subscr 1   Receive: OK
Subscr 2   Receive:
Subscr 2   Receive: NO CARRIER
```

Example 3:

```
**************************************

Comment: Suppressing CLIR with *# code when dialing
```

```
****************************************
****************************************
Comment:  Query the CLIP status of the called subscriber
****************************************


Subscr 1     Send:  AT+CLIP?
Subscr 1   Receive:  AT+CLIP?
Subscr 1   Receive:
Subscr 1   Receive:  +CLIP: 1,1
Subscr 1   Receive:
Subscr 1   Receive:  OK


****************************************
Comment:  Query the CLIR status of the calling subscriber
****************************************


Subscr 2     Send:  ATD*#31#;
Subscr 2   Receive:  ATD*#31#;
Subscr 2   Receive:
Subscr 2   Receive:  +CLIR: 0,4
Subscr 2   Receive:  OK


****************************************
Comment:  Suppress presentation of own phone number to called party
****************************************


Subscr 2     Send:  ATD#31#00441522400033;
Subscr 2   Receive:  ATD#31#00441522400033;
Subscr 1   Receive:
Subscr 1   Receive:  RING
Subscr 1   Receive:
Subscr 1   Receive:  +CLIP: "",128,,,,1


****************************************
Comment:  Answer a call
****************************************


Subscr 1     Send:  ATA
Subscr 1   Receive:  ATA
Subscr 1   Receive:  OK


****************************************
Comment:  Disconnect existing connection
****************************************


Subscr 1     Send:  ATH
Subscr 2   Receive:
Subscr 2   Receive:  OK
Subscr 1   Receive:  ATH
Subscr 1   Receive:  OK
Subscr 2   Receive:
Subscr 2   Receive:  NO CARRIER
```

2.8　Voice call handling
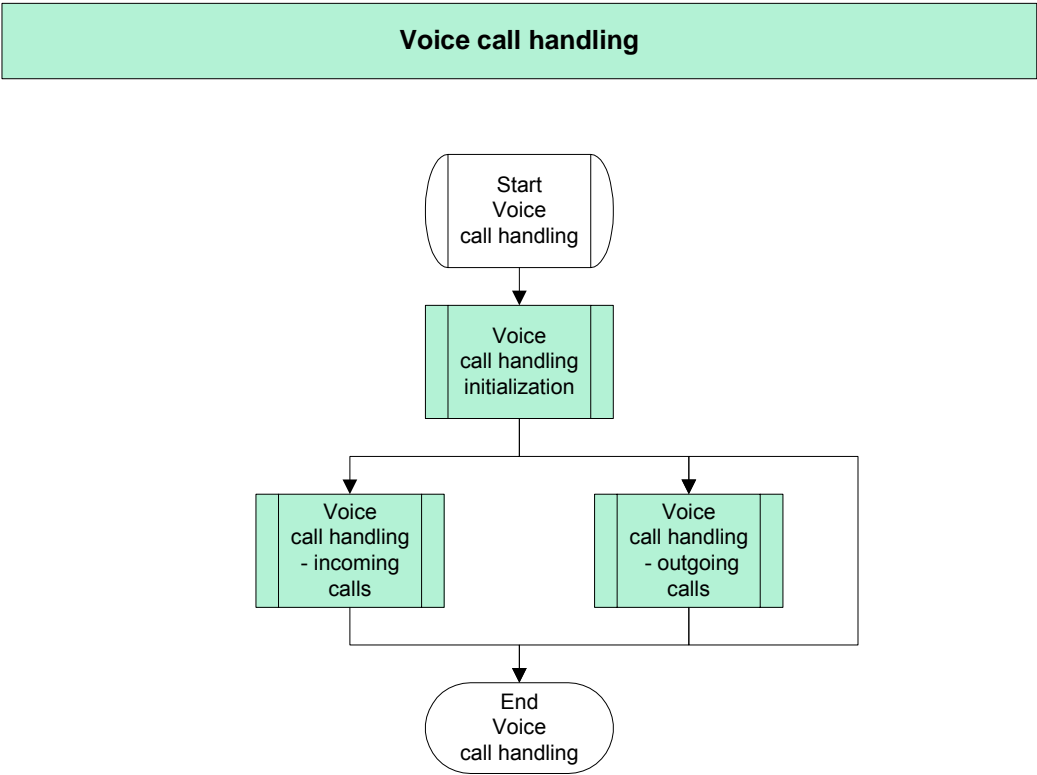
Figure 46: Voice call handling

2.8.1 Voice call handling initialization

2.8.1.1 Description

This chapter describes basic settings recommended to handle mobile originated and mobile terminated voice calls:

- The command AT+CSNS enables the ME to accept incoming calls when no bearer capability information is provided with the call. The setting must be set before the call is received. For voice calls the default setting AT+CSNS=0 can be kept.
- The AT^SM20 command specifies two call setup response modes, i.e. two different modes of responses returned when dialing voice call numbers with ATD:
  AT^SM20=1 (factory default) causes the ME to respond once the call setup is completed either successfully ("OK") or unsuccessfully ("NO CARRIER", "NO DIAL TONE", "BUSY").
  AT^SM20=0 causes the ME to return "OK" immediately after dialing was completed (i.e. before call setup terminates successfully or unsuccessfully).
- The ATX command specifies different result code formats and enables / disables the presentation of dial tones and busy signals during call setup. The setting can be stored to the user profile using AT&W.
- Use AT+CRC to enable or disable the extended format of result codes for incoming call indication. In the case of voice calls AT+CRC=1 can be used to replace the factory default result code "RING" with the extended format "+CRING VOICE".
- Depending on the type of Siemens module, autoanswer mode (ATS0≠000) is also supported for voice calls. If supported, this is explicitly stated in [2], chapter ATS0.

2.8.1.2 Used AT commands

AT+CSNS	-	Single numbering scheme
AT^SM20	-	Set M20 Compatibility
ATX	-	Set CONNECT result code format and call monitoring
AT&W	-	Store current configuration to user defined profile
ATS0	-	Set number of rings before automatically answering the call (not supported by all products)

For further details about the commands see [2].

2.8.1.3 Flow chart
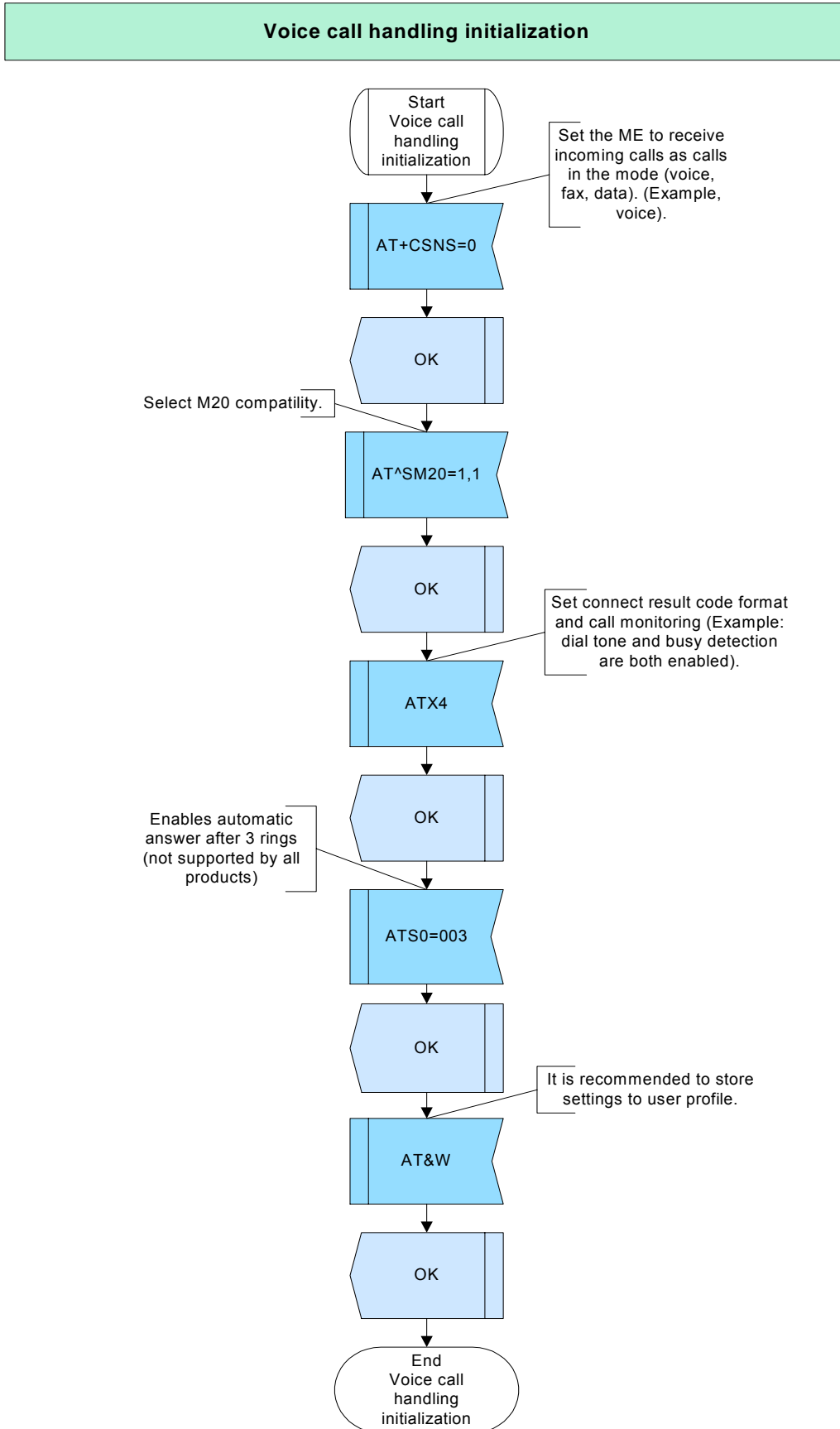
Figure 47: Voice call handling initialization

2.8.1.4   Hints

- Out of the AT commands listed in this chapter only ATX can be stored with AT&W.

2.8.1.5   Example

```
**************************************
Comment:  Voice call handling intialization
**************************************
**************************************
Comment:  Set single numbering scheme to receive all calls without bearer elements as voice calls.
**************************************


Subscr 1     Send: AT+CSNS=0
Subscr 1   Receive: AT+CSNS=0
Subscr 1   Receive: OK


**************************************
Comment:  Set compatibility to SM20.
**************************************


Subscr 1     Send: AT^SM20=1,1
Subscr 1   Receive: AT^SM20=1,1
Subscr 1   Receive: OK


**************************************
Comment:  Enable dial tone and busy detection.
**************************************


Subscr 1     Send: ATX4
Subscr 1   Receive: ATX4
Subscr 1   Receive: OK


**************************************
Comment:  Enable automatic answer after 3 rings (Autoanswer mode for voice calls is not supported
by all products)
**************************************


Subscr 1     Send: ATS0=003
Subscr 1   Receive: ATS0=003
Subscr 1   Receive: OK


**************************************
Comment:  Store settings to user profile.
**************************************


Subscr 1     Send: AT&W
Subscr 1   Receive: AT&W
Subscr 1   Receive: OK
```

2.8.2   Voice call handling – incoming calls

2.8.2.1   Description

This chapter describes all AT commands you need to handle an incoming voice call.

By default, an incoming call is indicated by the URC RING. With AT+CRC=1, the extended format of ring indication "+CRING: VOICE" can be enabled.

A mobile terminated call can be answered with ATA or rejected with ATH or AT+CHUP. To hang up an existing call you can also use ATH or AT+CHUP. The result code "NO CARRIER" indicates that an existing call was disconnected or hung up by the other party. To check the reason of call release you can use the command AT+CEER.

2.8.2.2   Used AT commands

ATA   -   Answer a call
ATH   -   Disconnect existing connection
AT+CHUP   -   Hang up call
AT+CEER   -   Extended error report

For further details about the commands see [2].

2.8.2.3 Flow chart

Voice call handling - incoming calls

Start
Voice call
handling -
incoming calls

Call is indicated
by the network

Incoming data call.

+CRING:
REL ASYNC

You will find an
explaination to handle
this URC in chapter
CSD.

Incoming voice call.

+CRING:
VOICE

Receiving other URCs is
possible. e.g. (+CLIP:
"+49171...)
(+CCWA:...)

Incoming FAX call.

+CRING:
FAX

You will further find an
explaination to handle
this URC in chapter
FAX.

Incoming GPRS call.

+CRING:
GPRS

You will further find an
explaination to handle
this URC in chapter
GPRS.

Answer call.

ATA

OK

Request error
reason.

AT+CEER

Response
(example)

+CEER: 8,16,0
OK

Hang up
connection.

ATH
or
AT+CHUP

OK

End
Voice call handling -
incoming calls

Figure 48: Voice call handling - incoming calls

2.8.2.4 Hints

Not applicable.

2.8.2.5 Example

Example 1:

```
**************************************
Comment:  Voice call handling - incoming call – reject
**************************************
**************************************
Comment:  Subscriber 2 makes a voice call to subscriber 1
**************************************

Subscr 2     Send: ATD2400058;
Subscr 2   Receive: ATD2400058;
Subscr 1   Receive:
Subscr 1   Receive: +CRING: VOICE

**************************************
Comment:  Subscriber 1 rejects the incoming voice call.
**************************************

Subscr 1     Send: AT+CHUP
Subscr 1   Receive: AT+CHUP
Subscr 1   Receive: OK
Subscr 2   Receive:
Subscr 2   Receive: NO CARRIER
```

Example 2:

```
**************************************
Comment:  Voice call handling - incoming call - answer call 1
**************************************
**************************************
Comment:  Subscriber 2 makes voice call to subscriber 1.
**************************************

Subscr 2     Send: ATD2400058;
Subscr 2   Receive: ATD2400058;
Subscr 1   Receive:
Subscr 1   Receive: +CRING: VOICE

**************************************
Comment:  Subscriber 1 answers the incoming voice call.
**************************************

Subscr 1     Send: ATA
Subscr 1   Receive: ATA
Subscr 1   Receive: OK
Subscr 2   Receive:
Subscr 2   Receive: OK
```

```
*****************************************
Comment:  Subscriber 2 hangs up the connection.
*****************************************

Subscr 2     Send: ATH
Subscr 2   Receive: ATH
Subscr 2   Receive: OK
Subscr 1   Receive:
Subscr 1   Receive: NO CARRIER


*****************************************
Comment:  Subscriber 1 requests the cause of call release, in this case reason for NO CARRIER.
*****************************************

Subscr 1     Send: AT+CEER
Subscr 1   Receive: AT+CEER
Subscr 1   Receive: +CEER: 8,16,0
Subscr 1   Receive:
Subscr 1   Receive: OK
```

Example 3:

```
*****************************************
Comment:  Voice call handling - incoming call - answer call 2
*****************************************
*****************************************
Comment:  Subscriber 2 makes voice call to subscriber 1.
*****************************************

Subscr 2     Send: ATD2400058;
Subscr 2   Receive: ATD2400058;
Subscr 1   Receive:
Subscr 1   Receive: +CRING: VOICE


*****************************************
Comment:  Subscriber 1 answers the incoming voice call.
*****************************************

Subscr 1     Send: ATA
Subscr 1   Receive: ATA
Subscr 1   Receive: OK
Subscr 2   Receive:
Subscr 2   Receive: OK


*****************************************
Comment:  Subscriber 1 hangs up the connection.
*****************************************

Subscr 1     Send: ATH
Subscr 1   Receive: ATH
Subscr 1   Receive: OK
Subscr 2   Receive:
Subscr 2   Receive: NO CARRIER
```

2.8.3   Voice call handling – outgoing calls

2.8.3.1   Description

To make a mobile originated voice call use the commands ATD, ATD>mem, ATD>n, ATD>str, ATDL or ATDI. Remember that for voice calls the semicolon ";" must be appended after the destination number. Otherwise the call would be interpreted as a CSD call.

When dialing with one of the ATD commands the following responses can be returned:
    OK
    NO CARRIER
    BUSY
    NO DIALTONE
    Call barred

To hang up a call the command ATH or AT+CHUP can be used either by the caller or by the called party. The result code "NO CARRIER" indicates that an existing call was disconnected or hung up by the other party.

No matter whether the call attempt was successful or not you can use the command AT+CEER to request the cause of call release.

2.8.3.2   Used AT commands

ATD   -   Mobile originated call to dial a number
AT+CEER   -   Extended error report
ATH   -   Disconnect existing connection
AT+CHUP   -   Hang up call

For further details about the commands see [2].

2.8.3.3 Flow chart

Voice call handling - outgoing calls

Start
Voice call
handling -
outgoing calls

Dial up for a voice
connection.

ATD+491234
56789;

OK

NO
CARRIER

NO
DIALTONE

BUSY

Connection

Hang up
connection.

ATH
or
AT+CHUP

OK

Request
error reason.

AT+CEER

Response
(example)

+CEER: 8,21,0
OK

End
Voice call handling -
outgoing calls
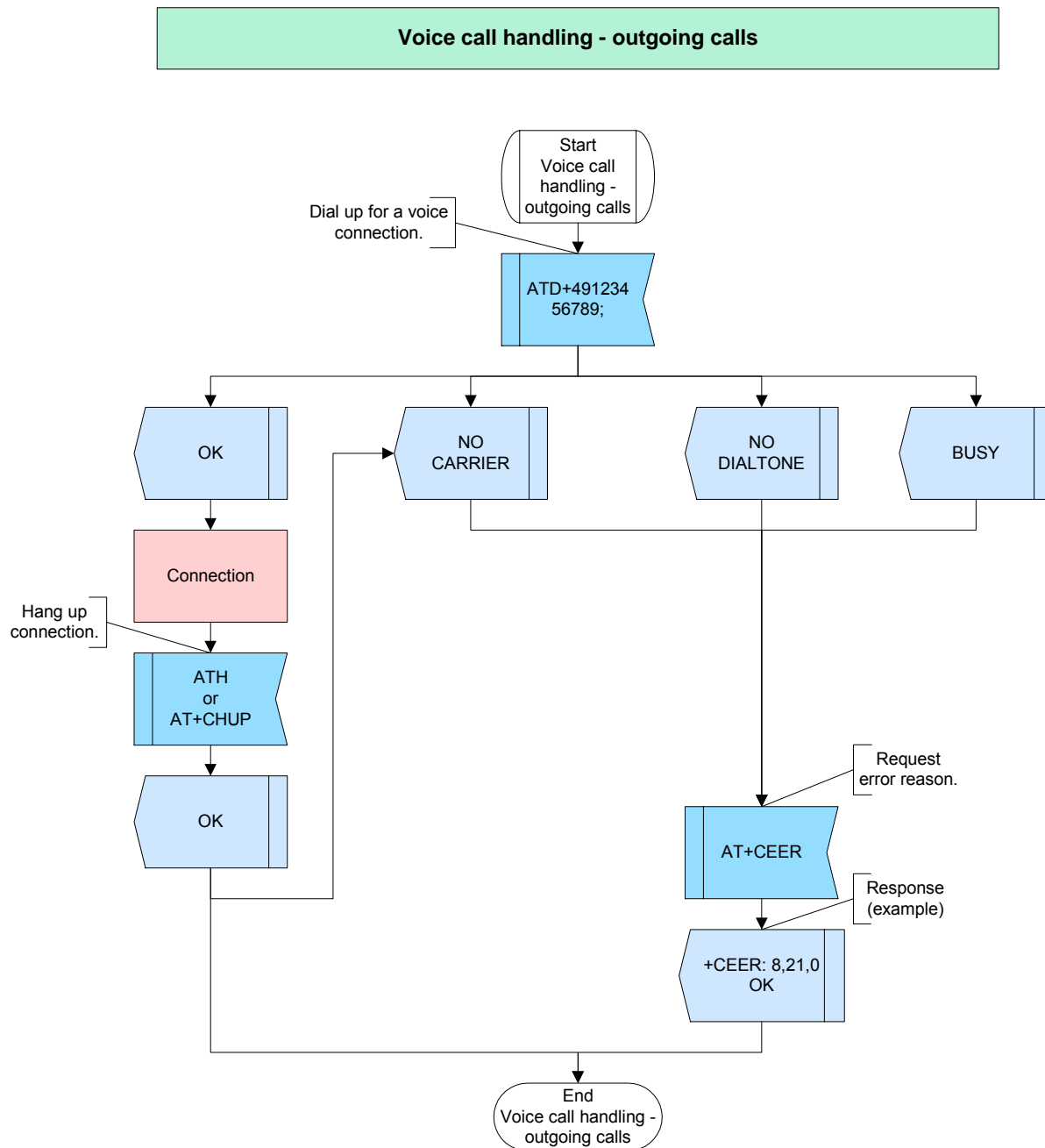
Figure 49: Voice call handling - outgoing calls

2.8.3.4 Hints

- If a maximum number of dial retries to the same destination fails in a row, the dialed number is blacklisted according to "GSM02.07 Annex A". In this case dialing will be denied until the number is cleared from the blacklist. Possible responses are "Call barred" for voice call numbers, and "NO CARRIER" for fax or data numbers. For further details refer to the description of ATD in [2].
- The minimum time between call attempts is described in [11], may differ depending on the used provider.

2.8.3.5 Example

Example 1:

```
****************************************
Comment:  Voice call handling - outgoing call 1
****************************************
****************************************
Comment:  Subscriber 1 makes voice call to subscriber 2.
****************************************

Subscr 1    Send: ATD2400058;
Subscr 1   Receive: ATD2400058;
Subscr 2   Receive:
Subscr 2   Receive: +CRING: VOICE

****************************************
Comment:  Subscriber 2 rejects the incoming voice call.
****************************************

Subscr 2    Send: ATH
Subscr 2   Receive: ATH
Subscr 2   Receive: OK
Subscr 1   Receive:
Subscr 1   Receive: NO CARRIER

****************************************
Comment:  Subscriber 1 requests the cause of call release, in this case reason for NO CARRIER.
****************************************

Subscr 1    Send: AT+CEER
Subscr 1   Receive: AT+CEER
Subscr 1   Receive: +CEER: 8,21,0
Subscr 1   Receive:
Subscr 1   Receive: OK
```

Example 2:

```
****************************************
Comment:  Voice call handling - outgoing call 2
****************************************
****************************************
Comment:  Subscriber 1 makes voice call to subscriber 2.
****************************************

Subscr 1    Send: ATD2400058;
Subscr 1   Receive: ATD2400058;
Subscr 2   Receive:
```

Subscr 2   Receive: +CRING: VOICE

****
Comment: Subscriber 2 answers the incoming voice call.
****

Subscr 2   Send: ATA
Subscr 2   Receive: ATA
Subscr 2   Receive: OK
Subscr 1   Receive:
Subscr 1   Receive: OK

****
Comment: Subscriber 1 hangs up the call.
****

Subscr 1   Send: ATH
Subscr 1   Receive: ATH
Subscr 1   Receive: OK
Subscr 2   Receive:
Subscr 2   Receive: NO CARRIER

2.8.4 Further scenarios of outgoing voice calls

2.8.4.1 Description

The following scenario of outgoing voice calls considers all AT commands used by the calling party and the called party and, in addition, describes the handling of a waiting call.

When a third subscriber calls one of the other two (while the called subscriber has not enabled Call waiting) the call from the third subscriber is not signaled to the called subscriber.

2.8.4.2 Used AT commands

ATD	-	Mobile originated call to dial a number
ATH	-	Disconnect existing connection
ATA	-	Answer a call

For further details about the commands see [2].

2.8.4.3 Flow chart
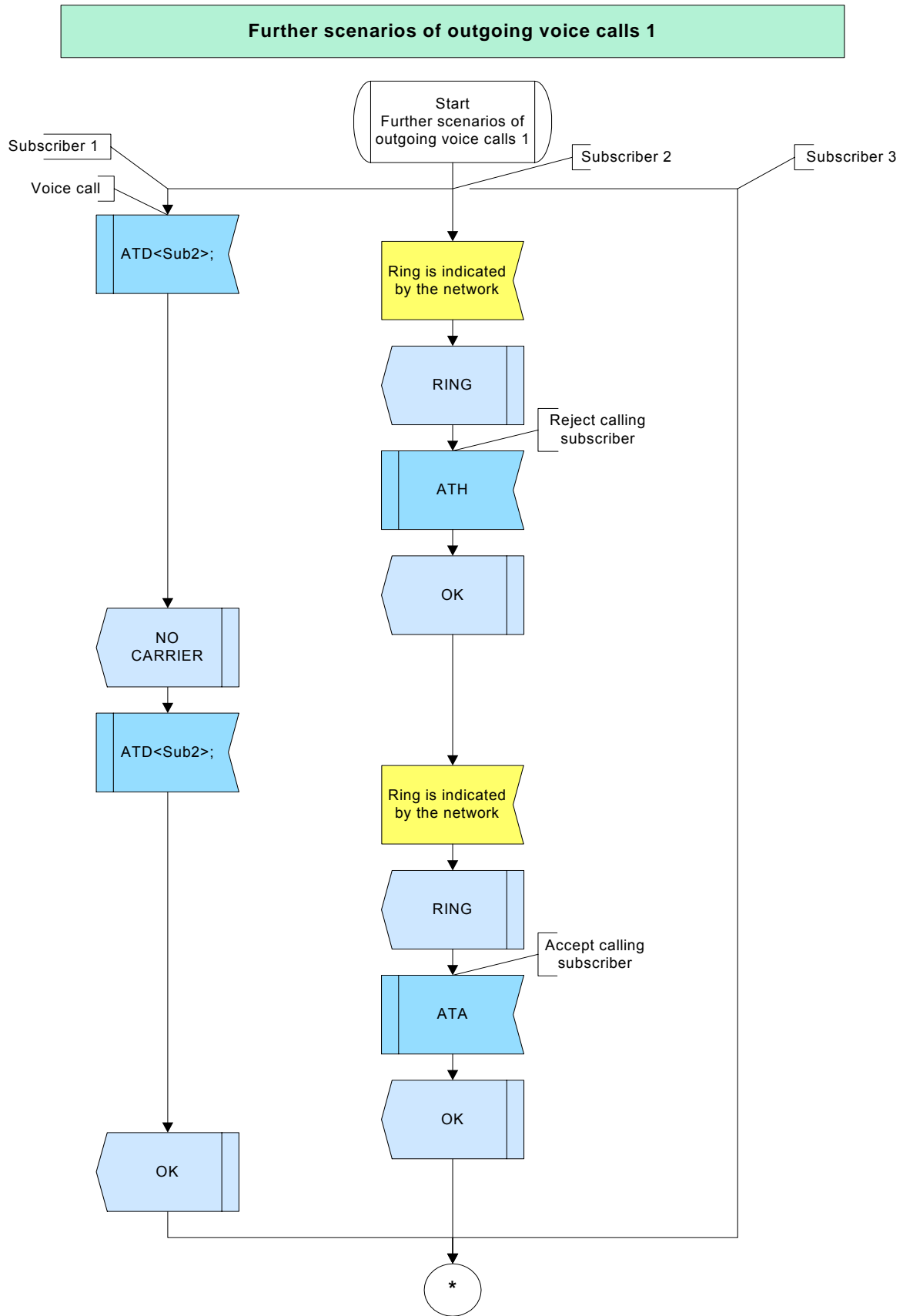
Figure 50: Further scenarios of outgoing calls 1- part 1
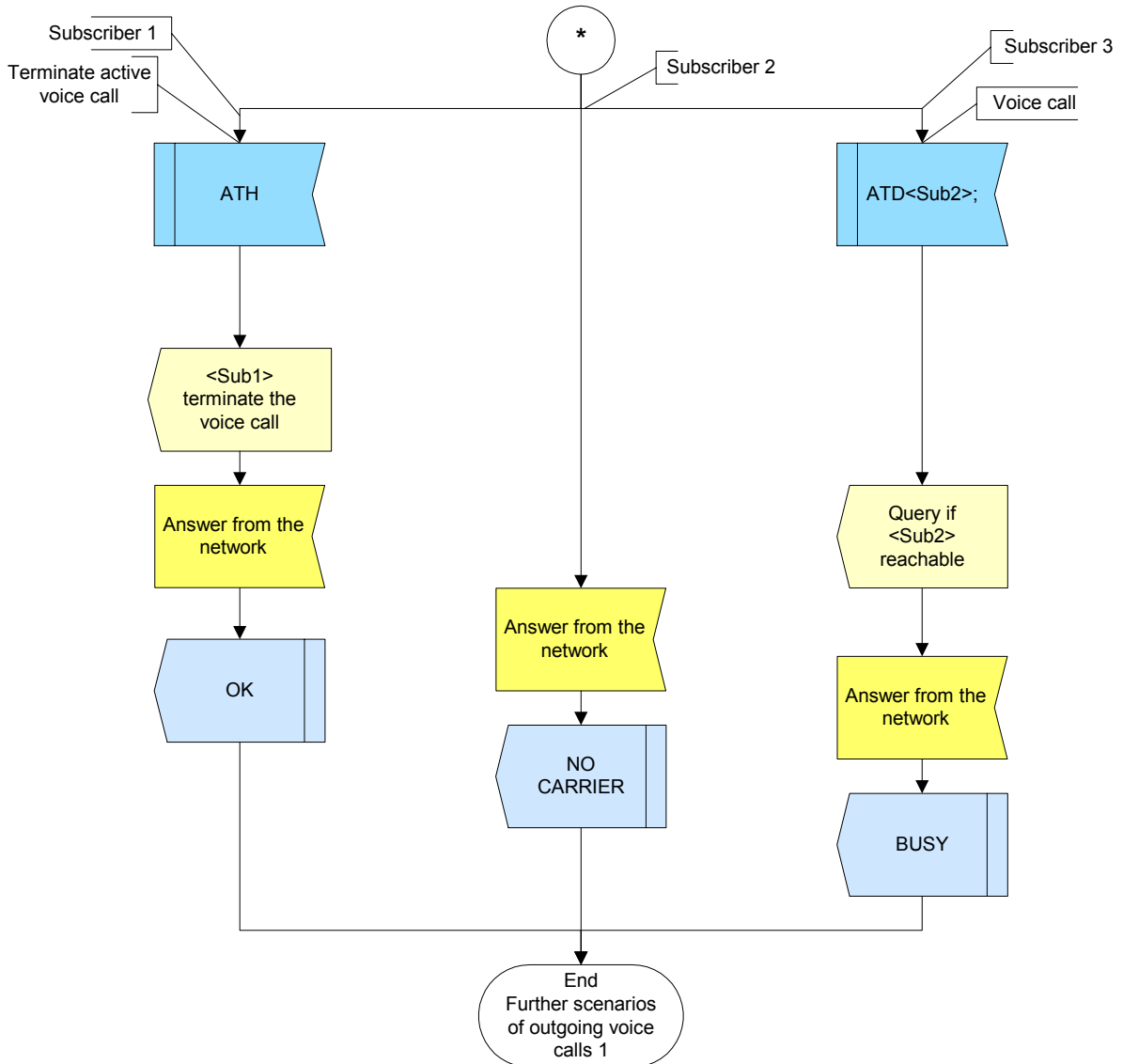
Figure 51: Further scenarios of outgoing voice calls 1- part 2

2.8.4.4   Hints

Not applicable.

2.8.4.5   Example

```
**************************************
Comment: Call handling
**************************************
**************************************
Comment: Establish voice call Sub1-->Sub2
**************************************

Subscr 1      Send: ATD<Sub2>;

**************************************
Comment: Sub2: Waiting for RING
**************************************
```

Subscr 1 Receive: ATD<Sub2>;
Subscr 2 Receive:
Subscr 2 Receive: RING

****
Comment: Sub2: Reject waiting call of Sub1
****

Subscr 2   Send: ATH
Subscr 2 Receive: ATH
Subscr 2 Receive: OK
Subscr 1 Receive:
Subscr 1 Receive: NO CARRIER

****
Comment: Establish voice call Sub1-->Sub2
****

Subscr 1   Send: ATD<Sub2>;

****
Comment: Sub2: Waiting for RING
****

Subscr 1 Receive: ATD<Sub2>;
Subscr 1 Receive: OK
Subscr 2 Receive:
Subscr 2 Receive: RING

****
Comment: Sub2: Accept waiting call of Sub1
****

Subscr 2   Send: ATA
Subscr 2 Receive: ATA
Subscr 2 Receive: OK

****
Comment: Establish voice call Sub3-->Sub2 without enabled call waiting
****

Subscr 3   Send: ATD<Sub2>;
Subscr 3 Receive: ATD<Sub2>;
Subscr 3 Receive:
Subscr 3 Receive: BUSY

****
Comment: Disconnect the active call
****

Subscr 1   Send: ATH
Subscr 1 Receive: ATH
Subscr 1 Receive: OK
Subscr 2 Receive:
Subscr 2 Receive: NO CARRIER

2.9   CSD
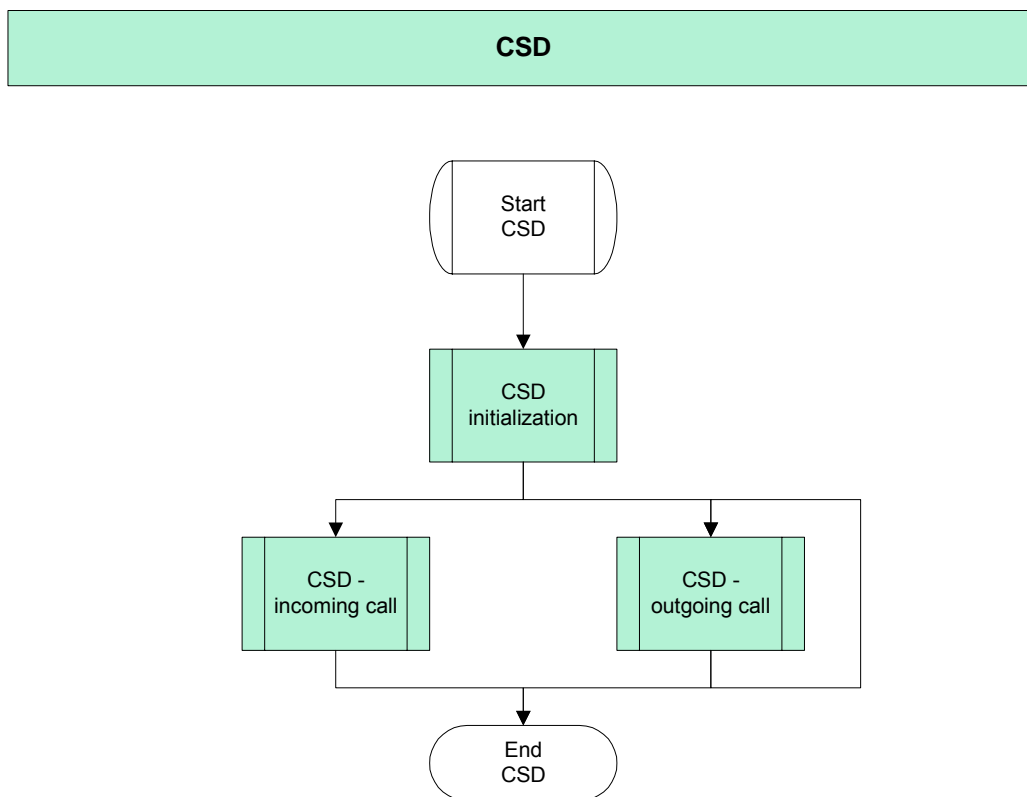
Figure 52: CSD

2.9.1   CSD initialization

2.9.1.1   Description

This chapter describes the basic settings recommended for handling CSD calls. Before making a CSD call be sure that flow control is enabled as described in chapter 2.2.2. All other settings listed below are optional:

- AT+CSNS=4 enables calls received without bearer capability element to be accepted as data call. By default, incoming calls without bearer capability element are assumed to be voice, except for fax calls with fclass 1 or 2. These are assumend as fax calls.
- ATX determines whether the ME detects the presence of dial tone and busy signal. If ATX>0 the CONNECT result code will include the transmission speed.
- Using the ATS0 command you can specify the number of rings before the ME automatically answers incoming data calls.
  Note that all types of Siemens modules support autoanswer mode at least for data and fax calls. Autoanswer ability for other services is module specific, such as autoanswering voice calls or network initiated requests for GPRS PDP context activation. For details see [2].
- Using the ATS7 command you can specify the number of seconds the ME will wait for the completion of call setup when answering or originating a call.
- Using ATS10 you can set the time the ME remains connected after having indicated the absence of the data carrier.
- ATS18 enables extended call release reports indicated every time a fax or data call is released or fails to be established. This is useful especially for MT single numbering scheme calls or calls received from analog devices.

- With AT+CBST you can select the bearer service and the data rate to be used when data calls are originated. The default mode "non-transparent" cannot be changed. For incoming calls the settings of AT+CBST are not relevant.
- Use AT+CRC to enable or disable the extended format of result codes for incoming call indication. In the case of CSD calls AT+CRC=1 can be used to replace the factory default result code "RING" with the extended format "+CRING REL ASYNC" or "+CRING FAX".
- Use AT+CR to enable or disable an intermediate result code to report information about the connection when a call is being answered. In a data connection this is the result code "+CR: REL ASYNC" which is presented before the CONNECT result code.
- If you need to change radio link protocol parameters use AT+CRLP.
- Except for AT+CSNS and AT+CRLP all above settings can be stored to the user profile with AT&W.
- You can select ATV0 to set the short format (numeric code) or ATV1 to set the long format (verbose code) of result codes. In case of using the command without parameter the value will be set to 0. A list of numeric and verbose result codes can be found in [2], chapter ATV.
- Some products support the command ATV\0 to choose whether or not the CONNECT result code shall include the RLP trailer. See example in chapter 2.9.1.5. See ATV command in [2] to make sure if the command is supported.
- If supported by your product use the AT^SCFG command to make settings for the indication of URCs via the RING line when a call is received during data mode. See [2] to make sure if the command is supported.

2.9.1.2 Used AT commands

AT\Qn	-	Flow control
AT+CSNS	-	Single Numbering Scheme
ATX	-	Set CONNECT result code format and call monitoring
ATS0	-	Set number of rings before automatically answering the call
ATS7	-	Set number of seconds to wait for connection completion
ATS10	-	Set disconnect delay after indicating the absence of data carrier
ATS18	-	Extended error report
AT+CBST	-	Select bearer service type
AT+CR	-	Service reporting control
AT+CRLP	-	Select radio link protocol param. for orig. non-transparent data call
AT&W	-	Store current configuration to user defined profile
ATV	-	Set result code format mode
AT\V	-	Set CONNECT result code format (not supported by all products)
AT^SCFG	-	Extended configuration setting (not supported by all products)

For further details about the commands see [2].

2.9.1.3 Flow chart

CSD initialization

Start
CSD
initialization

Enable flow
control.

AT\Q3

OK

Optional
part

Request Single
Numbering Scheme.

AT+CSNS?

Configure handling of
calls received without
bearer capability.
Example: Data

AT+CSNS=4

+CSNS: 0
OK

OK

Set CONNECT
result code format
and call
monitoring.
Example: Dial tone
and busy detection
are both enabled.

ATX4

OK

Enable autoanswer
mode. Example:
answering after 3 rings.

ATS0=3

OK

Set number of seconds to wait for
completion of connection setup.
Example: If no carrier is found within
60s, the ME will hang up.

ATS7=60

OK

*

Figure 53: CSD initialization - part 1
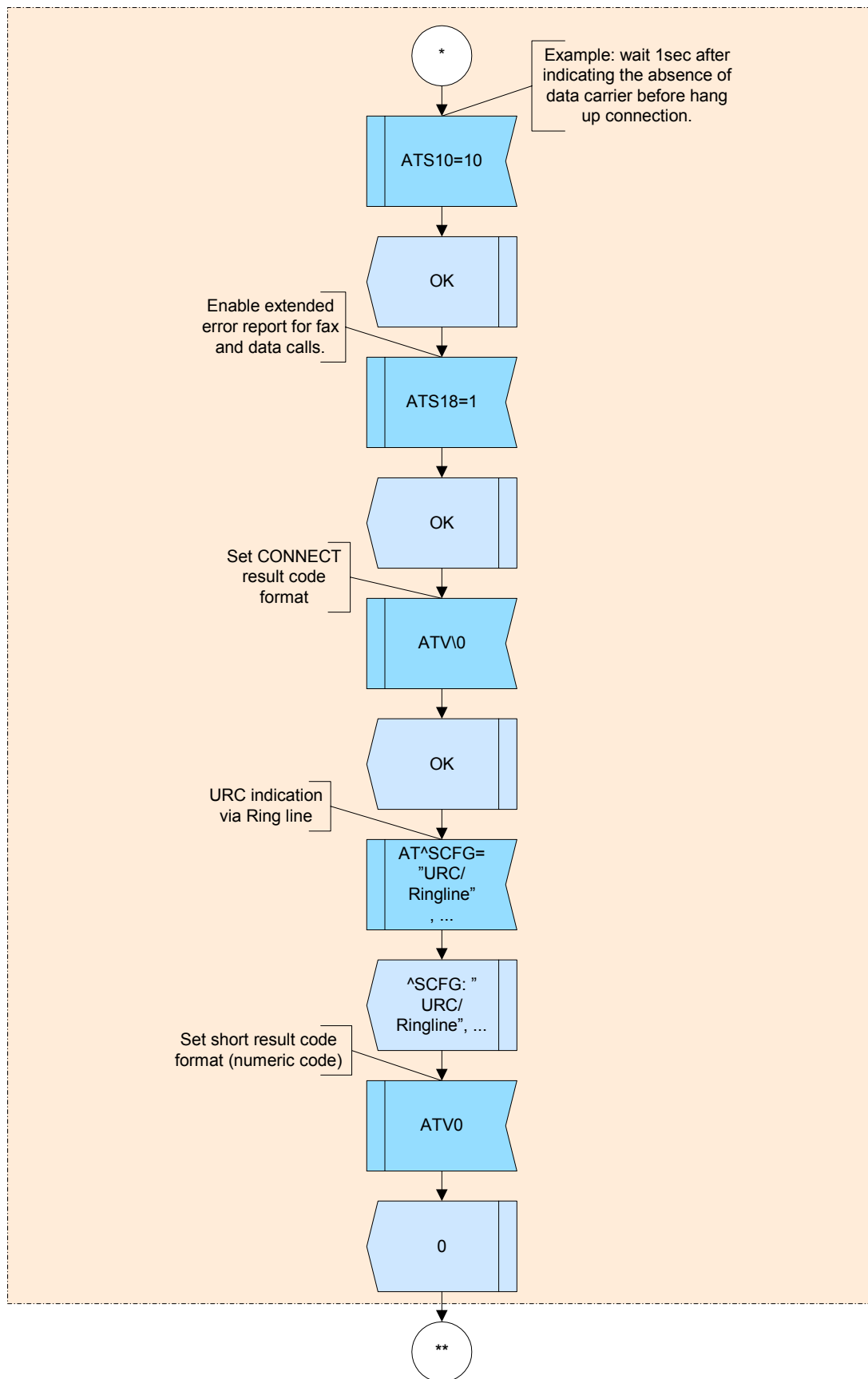
Figure 54: CSD initialization - part 2
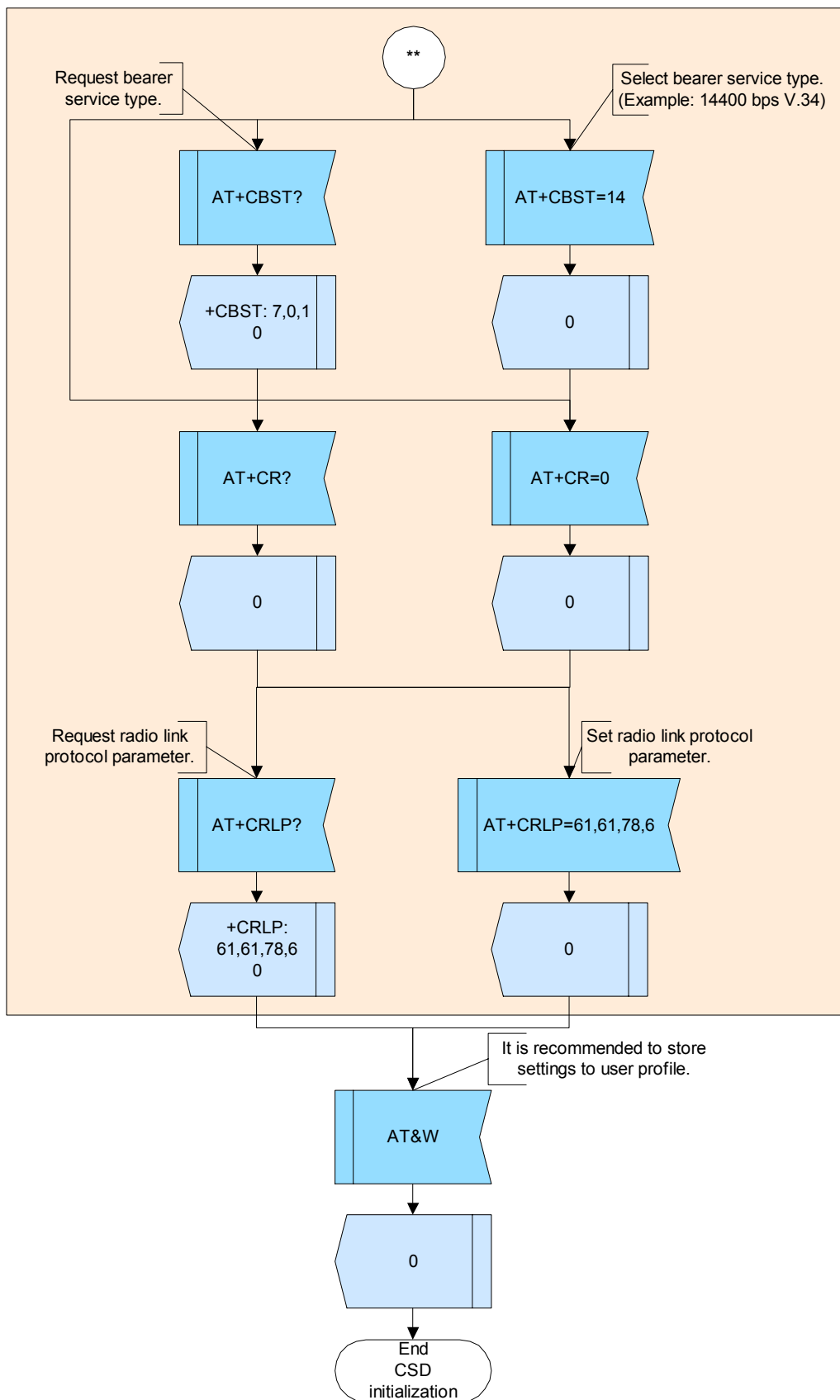
Figure 55: CSD initialization - part 3

2.9.1.4   Hints

- Data capabilities can be used only if activated on the SIM card. To take advantage of voice, data and fax a separate phone number must be available for each service.
- Not all network providers support all data rates. So you may need to ask your provider to find out what services are available.
- Generally, only AT+CBST=0 (auto bauding) and AT+CBST = 7 (9600 bps, [V.110]) are supported and provide reliable performance. All other settings can be tried, but depending on the network problems may be encountered.

2.9.1.5   Example

```
****************************************
Comment:  CSD initialization
****************************************
****************************************
Comment:  Enable hardware flow control.
****************************************

Subscr 2     Send: AT\Q3
Subscr 2   Receive: AT\Q3
Subscr 2   Receive: OK


****************************************
Comment:  Set single numbering scheme to receive all calls without bearer elements as CSD call.
****************************************

Subscr 2     Send: AT+CSNS=4
Subscr 2   Receive: AT+CSNS=4
Subscr 2   Receive: OK


****************************************
Comment:  Enable dial tone and busy detection.
****************************************

Subscr 2     Send: ATX4
Subscr 2   Receive: ATX4
Subscr 2   Receive: OK


****************************************
Comment:  Enable automatic answer mode: answer after 3 rings.
****************************************

Subscr 2     Send: ATS0=3
Subscr 2   Receive: ATS0=3
Subscr 2   Receive: OK


****************************************
Comment:  Set number of seconds to wait for connection completion to 60sec.
****************************************

Subscr 2     Send: ATS7=60
Subscr 2   Receive: ATS7=60
Subscr 2   Receive: OK


****************************************
Comment:  Set waiting time after absence of data carrier before disconnect ME to 1 sec.
****************************************
Subscr 2     Send: ATS10=10
Subscr 2   Receive: ATS10=10
```

Subscr 2   Receive: OK

****
Comment: Enable extended error report for CSD and FAX calls.
****

Subscr 2   Send: ATS18=1
Subscr 2   Receive: ATS18=1
Subscr 2   Receive: OK

****
Comment: URC indication in data mode via RING line (not supported by all products)
****

Subscr 1   Send: AT^SCFG="URC/Datamode/Ringline","on"
Subscr 1   Receive: AT^SCFG="URC/Datamode/Ringline","on"
Subscr 1   Receive: ^SCFG: "URC/Datamode/Ringline","on"
Subscr 1   Receive:
Subscr 1   Receive: OK

****
Comment: Set short result code format. Note that due to this setting the response OK will be replaced with the numeric code 0. See command ATV in [2] for a list of numeric and verbose result codes.
****

Subscr 2   Send: ATV0
Subscr 2   Receive: ATV0
0
****
Comment: Select data rate to be used for mobile originated CSD calls (9600 bps V.32).
****

Subscr 2   Send: AT+CBST=7
Subscr 2   Receive: AT+CBST=7
0
****
Comment: Disable service reporting control.
****

Subscr 2   Send: AT+CR=0
Subscr 2   Receive: AT+CR=0
0
****
Comment: Set radio link protocol parameter.
****

Subscr 2   Send: AT+CRLP=61,61,78,6
Subscr 2   Receive: AT+CRLP=61,61,78,6
0
****
Comment: Store settings to user profile.
****
Subscr 2   Send: AT&W
Subscr 2   Receive: AT&W
0

2.9.2   CSD call handling – general instructions

Basically, the steps to make voice or a data call are quite similar. The most significant difference is that during a voice call the module is always in command mode, but in a data connection it may either be in command mode (used to send AT commands) or in data mode (used to transfer data).

Once a data connection is established, the ME first enters the data mode (online mode). With the escape sequence +++ you can switch from data to command mode without dropping the line. The command ATO returns from command to data mode.

The escape sequence must be preceded and followed by a pause of at least 1000 ms. The +++ characters must be entered in quick succession, all within 1000 ms.

To end a call, the caller or the called party may use the commands ATH or AT+CHUP. The response to ATH and AT+CHUP is "OK" while the remote party is given "NO CARRIER".

To verify the reason of call release, the command ATS18 can be used.

2.9.3 CSD call handling – incoming calls

2.9.3.1 Description

This chapter describes the handling of incoming CSD calls.

Depending on the basic initialization, an incoming CSD call is indicated either by the URC "RING" (if AT+CRC=0) or the extended URC format "+CRING: REL ASYNC" (if AT+CRC=1).

An incoming data call can be accepted by entering the command ATA or by using the autoanswer mode if enabled with ATS0≠000. Depending on the module's basic initialization, connection setup is indicated by the result code "CONNECT" (if ATX0) or "CONNECT <text>" (if ATX>0), where <text> gives the transmission speed, for example "CONNECT 9600/RLP". In addidition, the CONNECT result code may be preceded by the intermediate result code "+CR: REL ASYNC" if the ME is initialized with AT+CR=1.

In example 3, subscriber 1 has initialized the ME with ATV\0 to suppress the RLP trailer in CONNECT result codes. Note, that some products do not support this command. Subscriber 2 uses the full result code format including text and RLP trailer.

2.9.3.2 Used AT commands

ATA	-	Answer a call
+++	-	Switch from data mode to command mode
ATO	-	Switch from command mode to data mode / PPP online mode
		(PPP online mode applies to GPRS connction only)
ATH	-	Disconnect existing connection
AT+CHUP	-	Hang up call

For further details about the commands see [2].

2.9.3.3 Flow chart
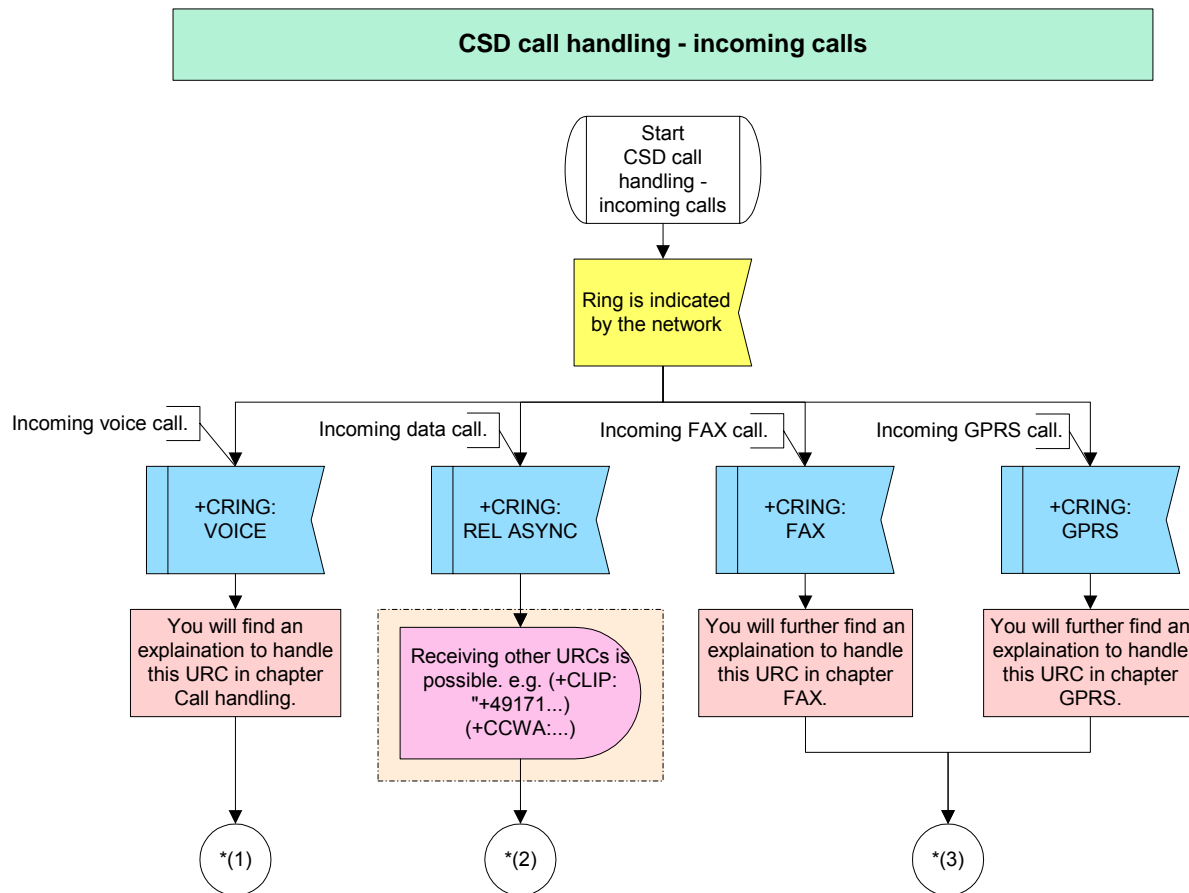
Figure 56: CSD call handling - incoming calls – part 1
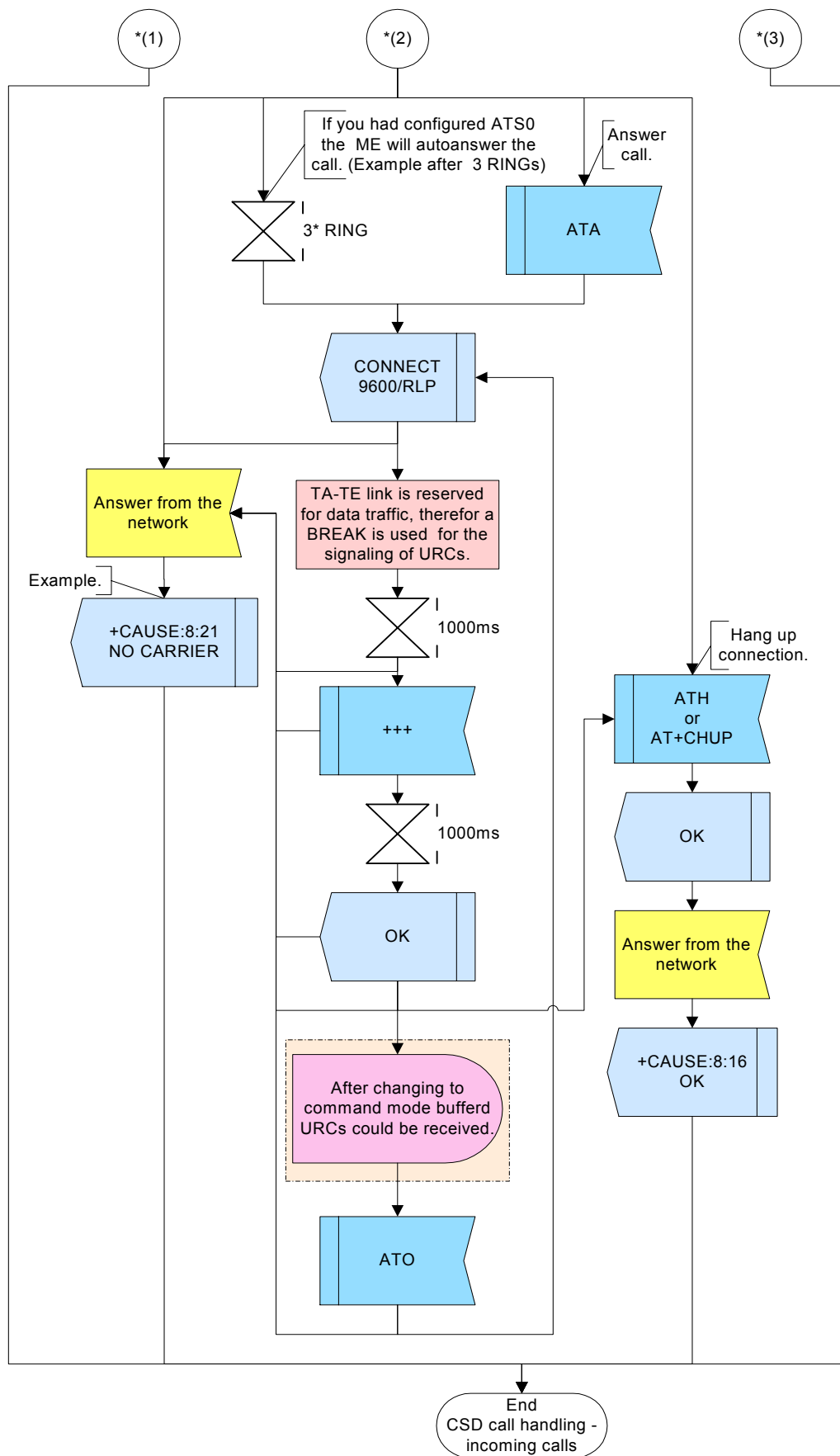
Figure 57: CSD call handling - incoming calls – part 2

2.9.3.4 Hints

Not applicable.

2.9.3.5 Example

Example 1:

```
****************************************
Comment:  CSD call handling - incoming call – reject
****************************************
****************************************
Comment:  Subscriber 2 makes CSD call to subscriber 1.
****************************************

Subscr 2     Send: ATD2400022
Subscr 2   Receive: ATD2400022
Subscr 1   Receive:
Subscr 1   Receive: +CRING: REL ASYNC

****************************************
Comment:  Subscriber 1 rejects the incoming CSD call.
****************************************

Subscr 1     Send: ATH
Subscr 1   Receive: ATH
Subscr 1   Receive: OK
Subscr 2   Receive:
Subscr 2   Receive: +Cause: 8:21
Subscr 2   Receive: NO CARRIER
```

Example 2:

```
****************************************
Comment:  CSD call handling - incoming call: Answer CSD call manually.
****************************************
****************************************
Comment:  Subscriber 2 makes CSD call to subscriber 1.
****************************************

Subscr 2     Send: ATD2400022
Subscr 2   Receive: ATD2400022
Subscr 1   Receive:
Subscr 1   Receive: +CRING: REL ASYNC

****************************************
Comment:  Subscriber 1 answers the incoming CSD call.
****************************************

Subscr 1     Send: ATA
Subscr 1   Receive: ATA
Subscr 1   Receive:
Subscr 1   Receive: CONNECT 9600/RLP
Subscr 2   Receive:
Subscr 2   Receive: CONNECT 9600/RLP
```

****
Comment: Subscriber 2 changes from online mode to command mode.
****

Subscr 2   Send: +++
Subscr 1   Receive: +++
Subscr 2   Receive:
Subscr 2   Receive: OK

****
Comment: Subscriber 2 hangs up the CSD call.
****

Subscr 2   Send: ATH
Subscr 2   Receive: ATH
Subscr 2   Receive: OK
Subscr 1   Receive:
Subscr 1   Receive: +CAUSE: 8:16
Subscr 1   Receive: NO CARRIER

Example 3:

****
Comment: CSD call handling - incoming call: Answer CSD call automatically.
****
****
Comment: Subscriber 2 makes CSD call to subscriber 1.
****

Subscr 2   Send: ATD00441522400080
Subscr 2   Receive: ATD00441522400080

****
Comment: Subscriber 1 answers the incoming CSD call after 3 rings automatically.
****
Subscr 1   Receive:
Subscr 1   Receive: +CRING: REL ASYNC
Subscr 1   Receive:
Subscr 1   Receive: +CRING: REL ASYNC
Subscr 1   Receive:
Subscr 1   Receive: +CRING: REL ASYNC
Subscr 2   Receive:
Subscr 2   Receive: CONNECT 9600/RLP
Subscr 1   Receive:
Subscr 1   Receive: CONNECT 9600

****
Comment: Subscriber 1 changes from online mode to command mode.
****

Subscr 1   Send: +++
Subscr 2   Receive: +++
Subscr 1   Receive:
Subscr 1   Receive: OK

****
Comment: Subscriber 1 changes back to online mode.
****

Subscr 1   Send: ATO

Subscr 1   Receive: ATO
Subscr 1   Receive: CONNECT 9600

****

Comment: Subscriber 1 change again to command mode.
****

Subscr 1   Send: +++
Subscr 2   Receive: +++
Subscr 1   Receive:
Subscr 1   Receive: OK

****

Comment: Subscriber 1 hangs up the CSD call.
****

Subscr 1   Send: ATH
Subscr 1   Receive: ATH
Subscr 1   Receive: OK
Subscr 2   Receive:
Subscr 2   Receive: +CAUSE: 8:16
Subscr 2   Receive: NO CARRIER

2.9.4   CSD call handling – outgoing CSD calls

2.9.4.1   Description

This chapter describes the handling of outgoing CSD calls. To dial out you may use the commands ATD, ATDI and ATDL. Do not attach a semicolon ";" at the end of the dial string.
Dialing from the phonebooks is not supported for data connections.

When dialing a data call number, the following responses can be returned:
        CONNECT (if ATX0) or CONNECT <text> (if ATX>0)
        NO CARRIER
        BUSY
        NO DIALTONE

The response is given when the connection has been set up successfully ("CONNECT"), or when it fails ("NO CARRIER", "BUSY", "NO DIALTONE"). The settings of AT^SM20 do not apply to data calls.

If the module is initialized with AT+CR=1, the additional intermediate result "+CR: REL ASYNC" appears before the CONNECT result code.

When the TA-TE link is reserved, i.e. when the module is in data mode, any URCs, for example an incoming SMS, will be indicated by a BREAK only. The URC itself will be transmitted as soon as the TA-TE link is free again. This means, the URC will be output either when the user switches from data to command mode with +++, or when the line is dropped.

2.9.4.2   Used AT commands

ATD	-	Mobile originated call to dial a number
+++	-	Switch from data mode to command mode
ATO	-	Switch from command mode to data mode / PPP online mode
ATH	-	Disconnect existing connection
AT+CHUP	-	Hang up call

For further details about the commands see [2].

2.9.4.3   Flow chart
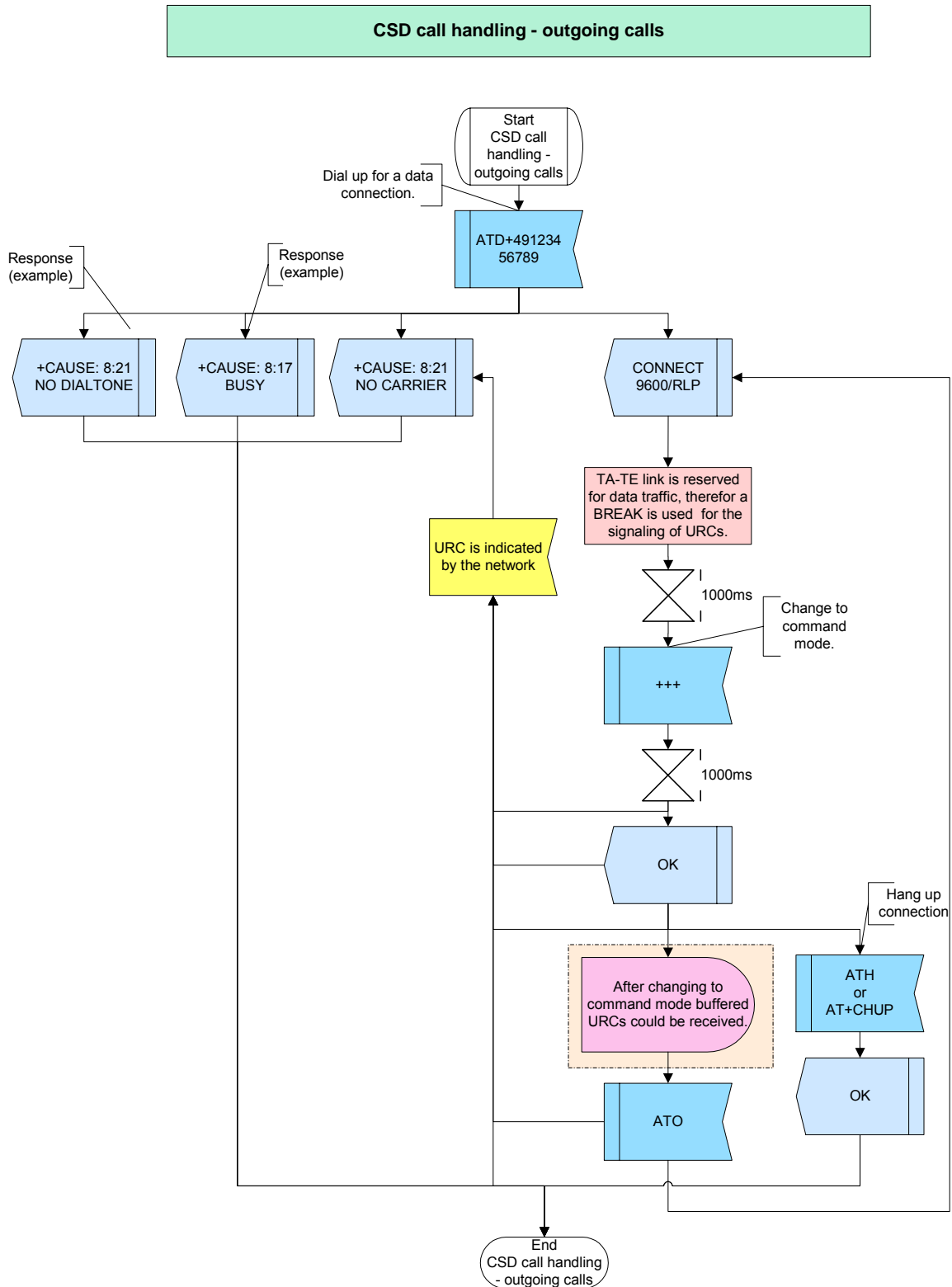
Figure 58: CSD call handling - outgoing calls

2.9.4.4   Hints

Not applicable.

2.9.4.5   Example

Example 1:

```
***************************************
Comment:  CSD call handling - outgoing calls 1
***************************************
***************************************
Comment:  Subscriber 1 makes a CSD call to subscriber 2.
***************************************


Subscr 1    Send: ATD2400022
Subscr 1   Receive: ATD2400022
Subscr 2   Receive:
Subscr 2   Receive: +CRING: REL ASYNC


***************************************
Comment:  Subscriber 2 rejects the incoming call.
***************************************


Subscr 2    Send: ATH
Subscr 2   Receive: ATH
Subscr 2   Receive: OK
Subscr 1   Receive:
Subscr 1   Receive: +CAUSE: 8:21
Subscr 1   Receive: NO CARRIER
```

Example 2:

```
***************************************
Comment:  CSD call handling - outgoing calls 2
***************************************
***************************************
Comment:  Subscriber 1 makes a CSD call to subscriber 2.
***************************************


Subscr 1    Send: ATD2400022
Subscr 1   Receive: ATD2400022
Subscr 2   Receive:
Subscr 2   Receive: +CRING: REL ASYNC


***************************************
Comment:  Subscriber 2 answers the incoming call.
***************************************


Subscr 2    Send: ATA
Subscr 2   Receive: ATA
Subscr 2   Receive:
Subscr 2   Receive: CONNECT 9600/RLP
Subscr 1   Receive:
Subscr 1   Receive: CONNECT 9600/RLP


***************************************
Comment:  Subscriber 1 changes to command mode.
***************************************
Subscr 1    Send: +++
Subscr 1   Receive:
Subscr 1   Receive: OK
Subscr 2   Receive: +++
```

****
Comment: Subscriber 1 hangs up connection.
****

Subscr 1   Send: ATH
Subscr 1   Receive: ATH
Subscr 1   Receive: OK
Subscr 2   Receive:
Subscr 2   Receive: +CAUSE: 8:16
Subscr 2   Receive: NO CARRIER

2.9.5   Further scenarios for outgoing CSD calls

2.9.5.1   Description

The following scenario considers all AT commands used by the two remote parties involved in the data connection and, in addition, describes the handling of further waiting voice and data calls.

When a third subscriber calls one of the other two (while the called subscriber has not enabled Call waiting) the call from the third subscriber is not signaled to the called subscriber.

2.9.5.2   Used AT commands

ATD	-	Mobile originated call to dial a number
ATH	-	Disconnect existing connection
ATA	-	Answer a call
+++	-	Switch from data mode to command mode
ATO	-	Switch from command mode to data mode / PPP online mode

For further details about the commands see [2].

2.9.5.3 Flow chart
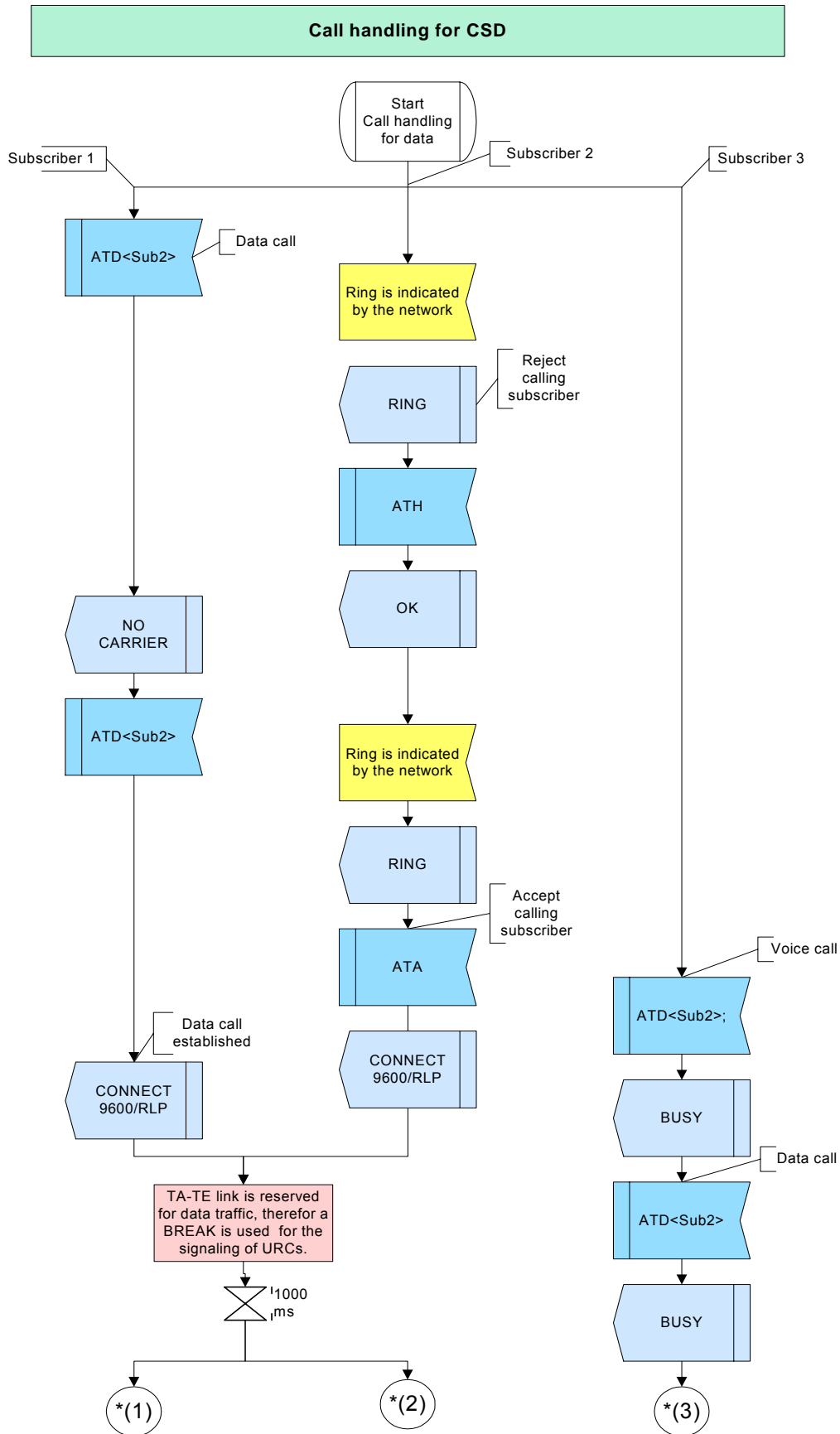
Figure 59: Call handling for CSD – part 1
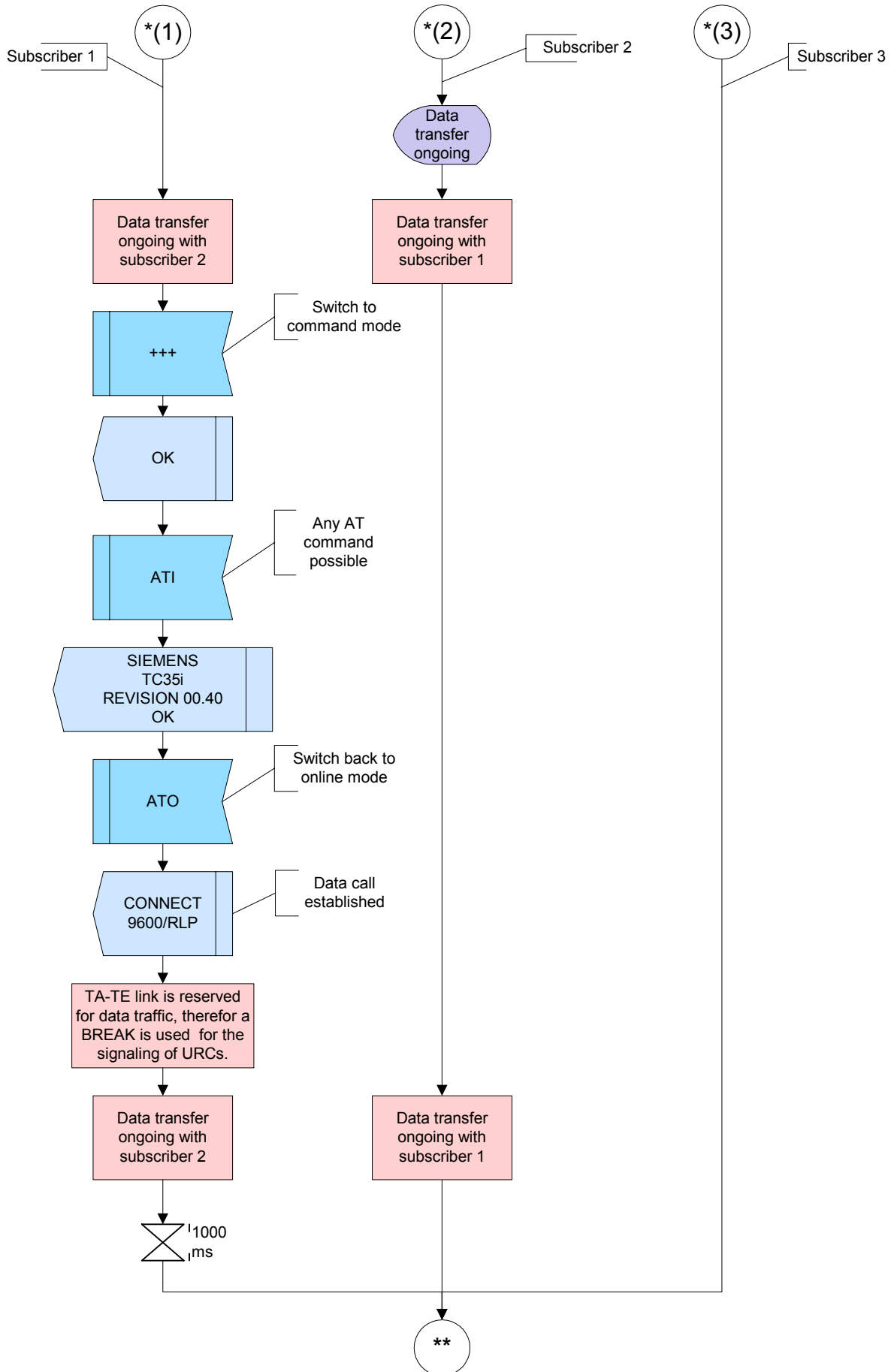
Figure 60: Call handling for CSD - part 2
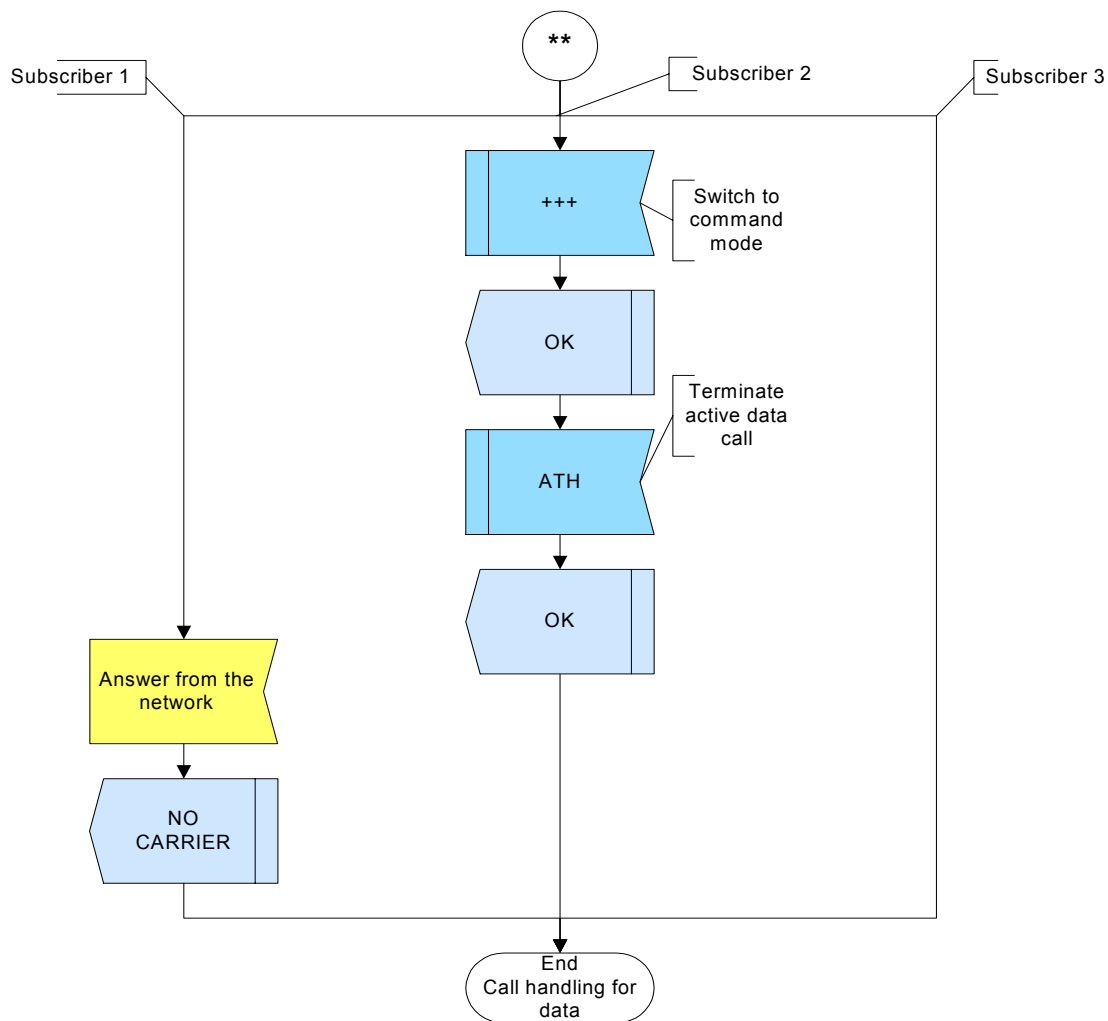
Figure 61: Call handling for CSD - part 3

2.9.5.4 Hints

Not applicable.

2.9.5.5 Example

```
***************************************
Comment:  Call handling
***************************************
***************************************
Comment:  Establish data call Sub1-->Sub2
***************************************
Subscr 1      Send:  ATD<Sub2>

***************************************
Comment:  Sub2: Waiting for RING
***************************************
Subscr 1   Receive:  ATD<Sub2>
Subscr 2   Receive:
Subscr 2   Receive:  RING
***************************************
Comment:  Sub2: Reject waiting call of Sub1
***************************************
```

```
Subscr 2    Send:  ATH
Subscr 2  Receive: ATH
Subscr 2  Receive: OK
Subscr 1  Receive:
Subscr 1  Receive: NO CARRIER
```

```
****************************************
Comment:  Establish data call Sub1-->Sub2
****************************************
```

```
Subscr 1    Send:  ATD<Sub2>
```

```
****************************************
Comment:  Sub2: Waiting for RING
****************************************
```

```
Subscr 1  Receive: ATD<Sub2>
Subscr 2  Receive:
Subscr 2  Receive: RING
```

```
****************************************
Comment:  Sub2: Accept waiting call of Sub1
****************************************
```

```
Subscr 2    Send:  ATA
Subscr 2  Receive: ATA
Subscr 2  Receive:
Subscr 2  Receive: CONNECT 9600/RLP
Subscr 1  Receive:
Subscr 1  Receive: CONNECT 9600/RLP
```

```
****************************************
Comment:  Try to establish voice call Sub3-->Sub2 without enabled call waiting
****************************************
```

```
Subscr 3    Send:  ATD<Sub2>;
Subscr 3  Receive: ATD<Sub2>;
Subscr 3  Receive:
Subscr 3  Receive: BUSY
```

```
****************************************
Comment:  Try to establish data call Sub3-->Sub2 without enabled call waiting
****************************************
```

```
Subscr 3    Send:  ATD<Sub2>
Subscr 3  Receive: ATD<Sub2>
Subscr 3  Receive:
Subscr 3  Receive: BUSY
```

```
****************************************
Comment:  Sub1&2: Send data
****************************************
```

```
Subscr 1    Send:  hello from subscriber1;
Subscr 2  Receive: hello from subscriber1;
Subscr 2    Send:  hello from subscriber2;
Subscr 1  Receive: hello from subscriber2;
****************************************
Comment:  Switch back to command mode (Sub1)
```

```
***************************************


Subscr 1    Send: +++
Subscr 1  Receive:
Subscr 1  Receive: OK
Subscr 2  Receive: +++


***************************************
Comment:  Any AT-command
***************************************


Subscr 1    Send: ATI
Subscr 1  Receive: ATI
Subscr 1  Receive: SIEMENS
Subscr 1  Receive: TC35i
Subscr 1  Receive: REVISION 02.07
Subscr 1  Receive:
Subscr 1  Receive: OK


***************************************
Comment:  Switch back to online mode (Sub1)
***************************************


Subscr 1    Send: ATO
Subscr 1  Receive: ATO
Subscr 1  Receive: CONNECT 9600/RLP


***************************************
Comment:  Sub1&2: send data
***************************************


Subscr 1    Send: hello again from subscriber1;
Subscr 2  Receive: hello again from subscriber1;
Subscr 2    Send: hello again from subscriber2;
Subscr 1  Receive: hello again from subscriber2;


***************************************
Comment:  Switch back to command mode (Sub2)
***************************************


Subscr 2    Send: +++
Subscr 1  Receive: +++
Subscr 2  Receive:
Subscr 2  Receive: OK


***************************************
Comment:  Disconnect the active call
***************************************


Subscr 2    Send: ATH
Subscr 2  Receive: ATH
Subscr 2  Receive: OK
Subscr 1  Receive:
Subscr 1  Receive: NO CARRIER
```

2.10 GPRS
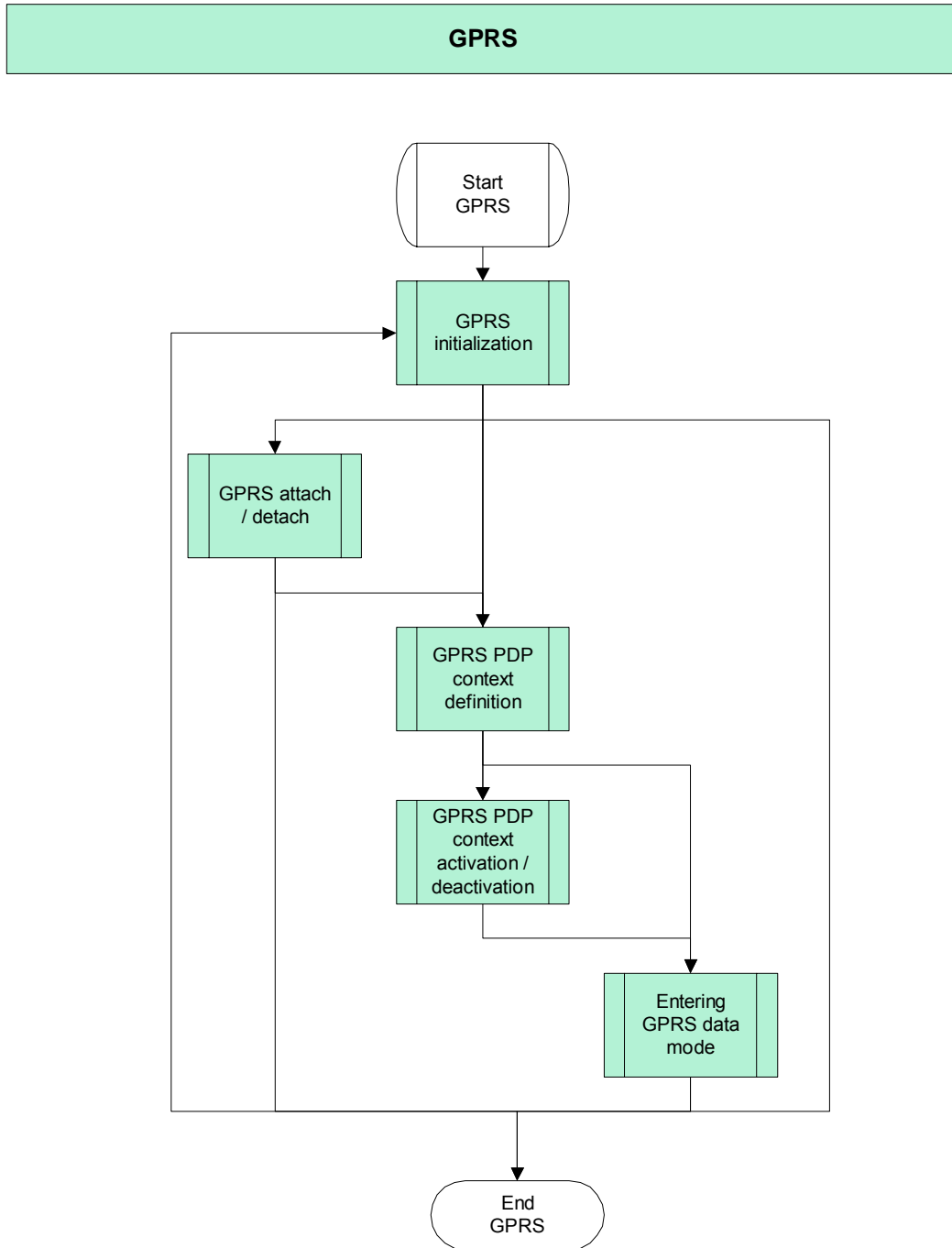
Figure 62: GPRS

Before using the GPRS service (transmit data) several steps have to be run through: At first all necessary initialization commands must be executed. Next the module must be attached to the GPRS service. From that moment onwards the device is reachable by the network, but no data transmission is yet possible. Before activating the PDP context, network provider specific context parameters have to be defined. Afterwards the context can be activated and the module can enter the GPRS data mode. From now one data can be exchanged between module and network.

The context deactivation and GPRS detach should be performed in the reverse order.

2.10.1   GPRS initialization

2.10.1.1   Description

This chapter describes initial settings suggested for using GPRS.

You can query the status of GPRS network registration with AT+CGREG. With AT+CGSMS you can specify the service or service preferences the MT shall use when sending MO SMS messages.
The authentication type for the PPP connection will be set with AT^SGAUTH. The default value is 3 (PAP and CHAP). To configure the LLC-PDU-length and the GPRS multislot class use AT^SGCONF.

If supported by your product you can use the AT^SCFG command for the following GPRS related settings. See [2] to find out whether AT^SCFG is available and includes settings for GPRS. Note that AT^SCFG settings illustrated in the examples are valid only if GSM character set is active.

- "GPRS/ATS0/withAttach" (<gaa>)
  Specifies whether or not ME will automatically attempt to perform a GPRS attach after receiving the command ATS0=<n> with parameter n>0.
- "GPRS/RingOnIncomingData (<groid>)
  Specifies if RING line shall be activated when ME receives GPRS IP packets during CYCLIC SLEEP mode AT+CFUN=7 or 8. This solution ensures that incoming GPRS IP packets will prompt the application to wake up from power saving.
- "URC/Ringline/ActiveTime" (<urat>)
  Specifies duration of RING activation to indicate URCs or incoming GPRS IP packets.

2.10.1.2   Used AT commands

AT+CGREG	-	GPRS Network registration status
AT+CGSMS	-	Select Service for MO SMS messages
AT^SGAUTH	-	Set type of authentication for PPP connection
AT^SGCONF	-	Configuration of GPRS related parameters
AT^SCFG	-	Extended Configuration setting (not supported by all products)

For further details about the commands see [2].

2.10.1.3   Flow chart
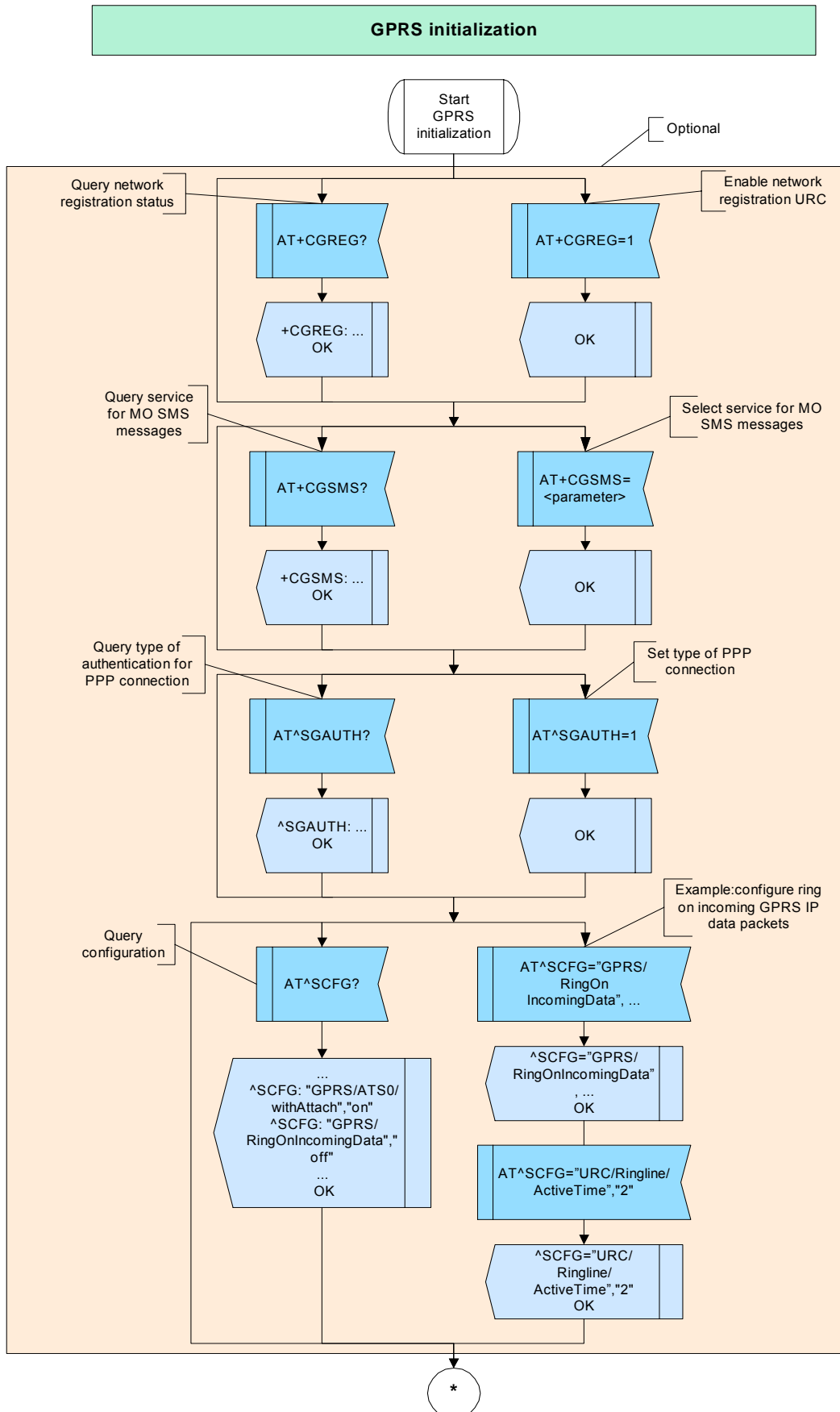
Figure 63: GPRS initialization - part 1
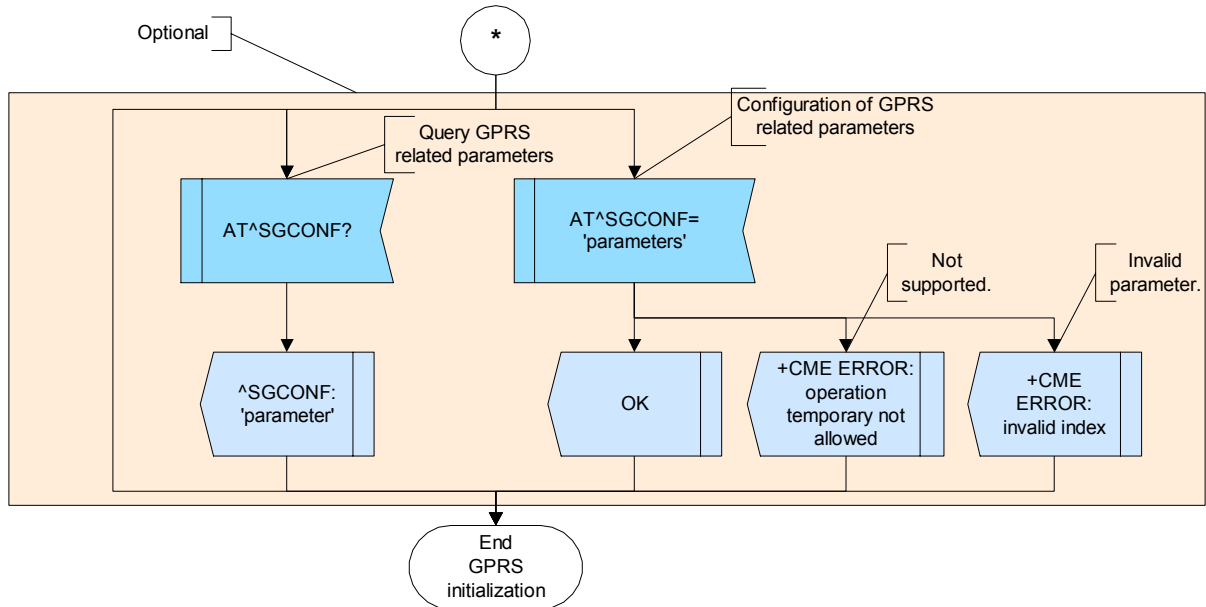
Figure 64: GPRS initialization - part 2

2.10.1.4   Hints

* Please consider that GPRS related command parameters cannot be stored with AT&W.

2.10.1.5   Example

```
***************************************
Comment:  GPRS initialization
***************************************
***************************************
Comment:  Query network registration status.
***************************************

Subscr 1     Send: AT+CGREG?
Subscr 1   Receive: AT+CGREG?
Subscr 1   Receive: +CGREG: 0,0
Subscr 1   Receive:
Subscr 1   Receive: OK

***************************************
Comment:  Enable network registration URC.
***************************************

Subscr 1     Send: AT+CGREG=1
Subscr 1   Receive: AT+CGREG=1
Subscr 1   Receive: OK

***************************************
Comment:  Query service for MO SMS messages (3 → GSM preferred).
***************************************

Subscr 1     Send: AT+CGSMS?
Subscr 1   Receive: AT+CGSMS?
Subscr 1   Receive: +CGSMS: 3
Subscr 1   Receive:
Subscr 1   Receive: OK
***************************************
```

Comment: Select service for SMS messages (0 → SMS over GPRS).
****

Subscr 1   Send: AT+CGSMS=0
Subscr 1   Receive: AT+CGSMS=0
Subscr 1   Receive: OK

****
Comment: Query type of authentication for PPP connection (3 → PAP/ CHAP)
****

Subscr 1   Send: AT^SGAUTH?
Subscr 1   Receive: AT^SGAUTH?
Subscr 1   Receive: ^SGAUTH: 3
Subscr 1   Receive:
Subscr 1   Receive: OK

****
Comment: Set type to PAP.
****

Subscr 1   Send: AT^SGAUTH=1
Subscr 1   Receive: AT^SGAUTH=1
Subscr 1   Receive: OK

****
Comment: Query various ME parameter (not supported by all products).
****

Subscr 1   Send: AT^SCFG?
Subscr 1   Receive: AT^SCFG?
Subscr 1   Receive: ^SCFG: "Audio/AMR","00101"
Subscr 1   Receive: ^SCFG: "GPRS/ATS0/withAttach","on"
Subscr 1   Receive: ^SCFG: "GPRS/RingOnIncomingData","off"
Subscr 1   Receive: ^SCFG: "PowerSaver/Mode9/Timeout","20"
Subscr 1   Receive: ^SCFG: "Radio/Band/HandOver","0"
Subscr 1   Receive: ^SCFG: "URC/CallStatus/CIEV","restricted"
Subscr 1   Receive: ^SCFG: "URC/CallStatus/SLCC","verbose"
Subscr 1   Receive: ^SCFG: "URC/Datamode/Ringline","off"
Subscr 1   Receive: ^SCFG: "URC/Ringline","local"
Subscr 1   Receive: ^SCFG: "URC/Ringline/ActiveTime","1"
Subscr 1   Receive:
Subscr 1   Receive: OK

****
Comment: Ring on incoming GPRS IP data packets (not supported by all products).
****

Subscr 1   Send: AT^SCFG="GPRS/RingOnIncomingData","on"
Subscr 1   Receive: AT^SCFG="GPRS/RingOnIncomingData","on"
Subscr 1   Receive: ^SCFG: "GPRS/RingOnIncomingData","on"
Subscr 1   Receive:
Subscr 1   Receive: OK

```
****************************************
```
Comment: RING line active time (not supported by all products).
```
****************************************
```

Subscr 1   Send: AT^SCFG="URC/Ringline/ActiveTime","2"
Subscr 1   Receive: AT^SCFG="URC/Ringline/ActiveTime","2"
Subscr 1   Receive: ^SCFG: "URC/Ringline/ActiveTime","2"
Subscr 1   Receive:
Subscr 1   Receive: OK


```
****************************************
```
Comment: Configuration of GPRS related parameters (ERROR).
```
****************************************
```

Subscr 1   Send: AT^SGCONF=1521,8
Subscr 1   Receive: AT^SGCONF=1521,8
Subscr 1   Receive: +CME ERROR: invalid index


```
****************************************
```
Comment: Configuration of GPRS related parameters.
```
****************************************
```

Subscr 1   Send: AT^SGCONF=1520,8
Subscr 1   Receive: AT^SGCONF=1520,8
Subscr 1   Receive:
Subscr 1   Receive: OK


```
****************************************
```
Comment: Query the parameters of the configuration (not supported by all products).
```
****************************************
```

Subscr 1   Send: AT^SGCONF?
Subscr 1   Receive: AT^SGCONF?
Subscr 1   Receive: ^SGCONF: 1520,8
Subscr 1   Receive:
Subscr 1   Receive: OK

2.10.2   GPRS attach / detach

2.10.2.1   Description

This chapter describes the AT+CGATT command that enables the ME to attach or to detach from the GPRS service. If the ME is already in the requested state, the command is ignored and OK response is returned.

Any active PDP Contexts will automatically be deactivated, if the ME detaches from the GPRS service.

2.10.2.2   Used AT commands

AT+CGATT   -   GPRS attach and detach

For further details about the commands see [2].

2.10.2.3   Flow chart
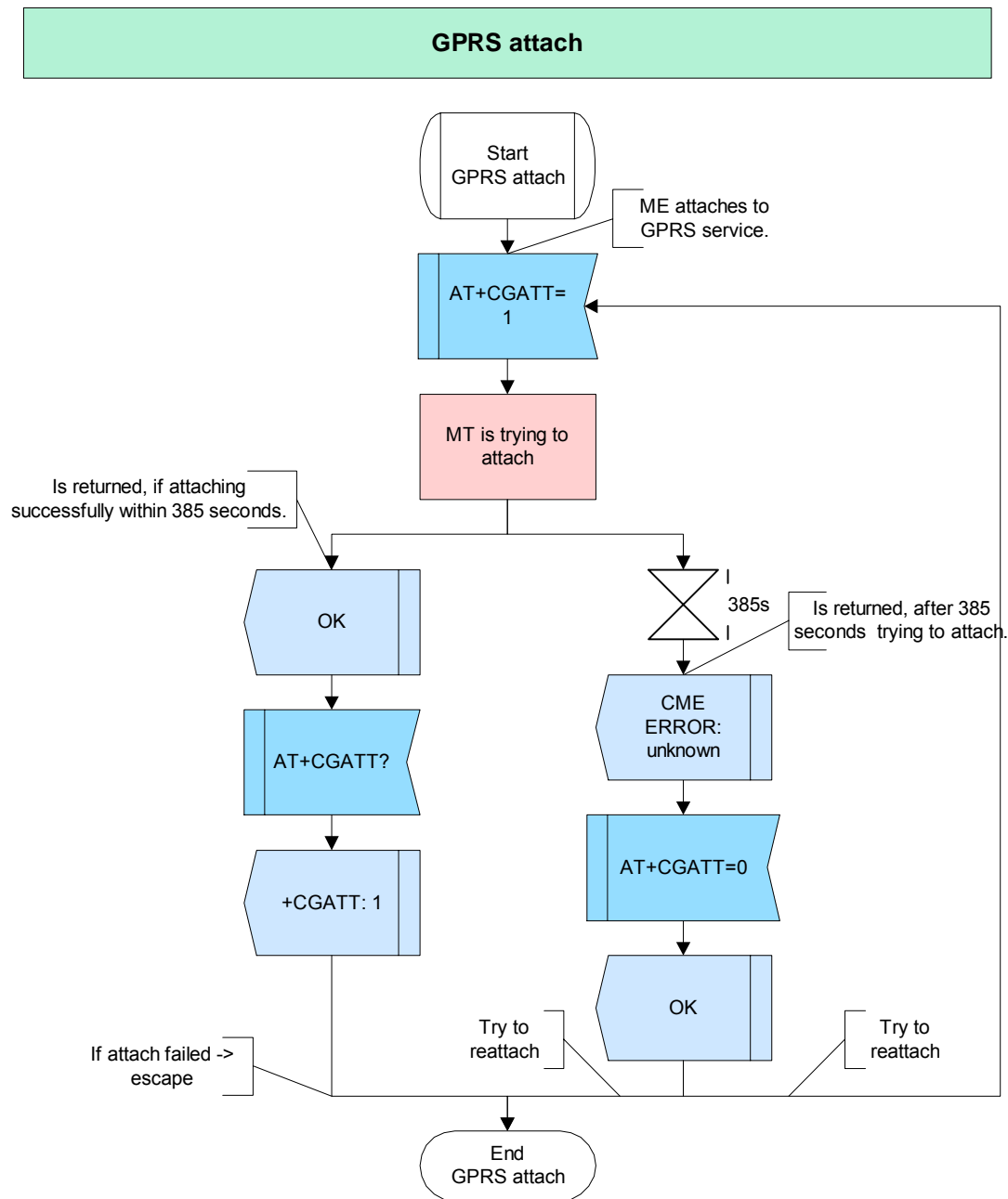
Figure 65: GPRS attach
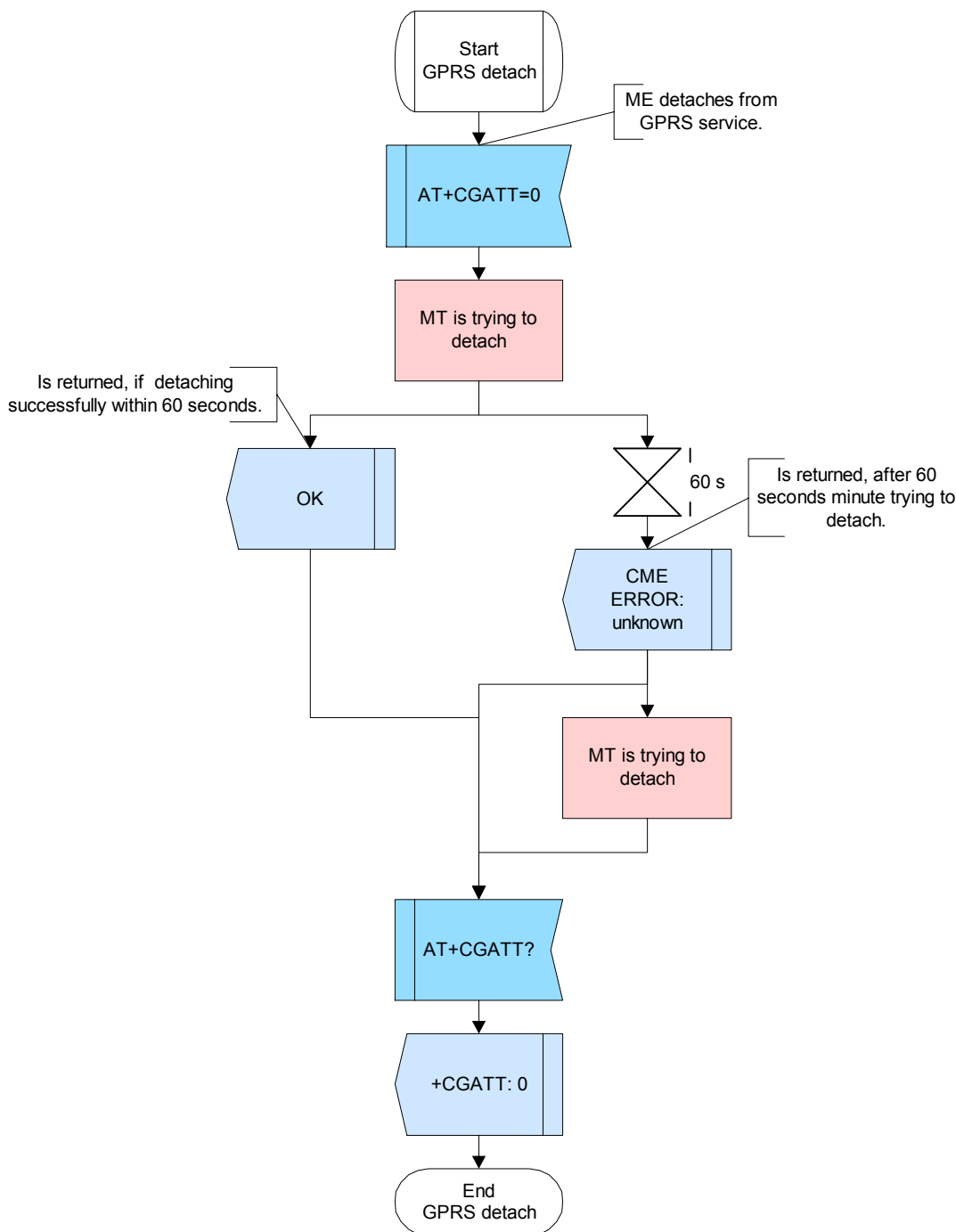
Figure 66: GPRS detach

2.10.2.4 Hints

- If the ME is not able to attach for more than 5 minutes or to detach for more than 1 minute, the command returns „ERROR" or „+CME ERROR: unknown", but the ME is still trying to attach/ detach.

2.10.2.5 Example

```
****************************************
Comment:  GPRS attach/ detach
****************************************
****************************************
Comment:  Attach to GPRS service
****************************************


Subscr 1     Send:  AT+CGATT=1
Subscr 1   Receive: AT+CGATT=1
Subscr 1   Receive:
Subscr 1   Receive: OK


****************************************
Comment:  Request attached state
****************************************


Subscr 1     Send:  AT+CGATT?
Subscr 1   Receive: AT+CGATT?
Subscr 1   Receive: +CGATT: 1
Subscr 1   Receive:
Subscr 1   Receive: OK


****************************************
Comment:  Detach from GPRS service
****************************************


Subscr 1     Send:  AT+CGATT=0
Subscr 1   Receive: AT+CGATT=0
Subscr 1   Receive:
Subscr 1   Receive: OK
```

2.10.3   GPRS context definition

2.10.3.1   Description

Exact settings of GPRS context and Quality of Service Profiles are provisioned by the network provider and must be requested before defining the GPRS context. Every PDP context has a context identifier <cid>. The context identifiers are numbered sequentially and have to start with value 1.
"AT+CGDCONT" is used to define a context ID and specify the PDP type and Access Point Name (APN). The PDP type describes the protocol to be used between the ME and the network. The APN specifies the gateway between mobile network and the internet.
Optionally, a Quality of Service Profile (Minimum acceptable and Requested) can be defined for every defined PDP Context with the commands "AT+CGQREQ" and "AT+CGQMIN". The required parameters depend on the network provider.

For further details see [2] and [4]

2.10.3.2   Used AT commands

AT+CGDCONT   -   Define PDP Context
AT+CGQMIN   -   Quality of Service Profile (Minimum acceptable)
AT+CGQREQ   -   Quality of Service Profile (Requested)

For further details about the commands see [2].

2.10.3.3   Flow chart
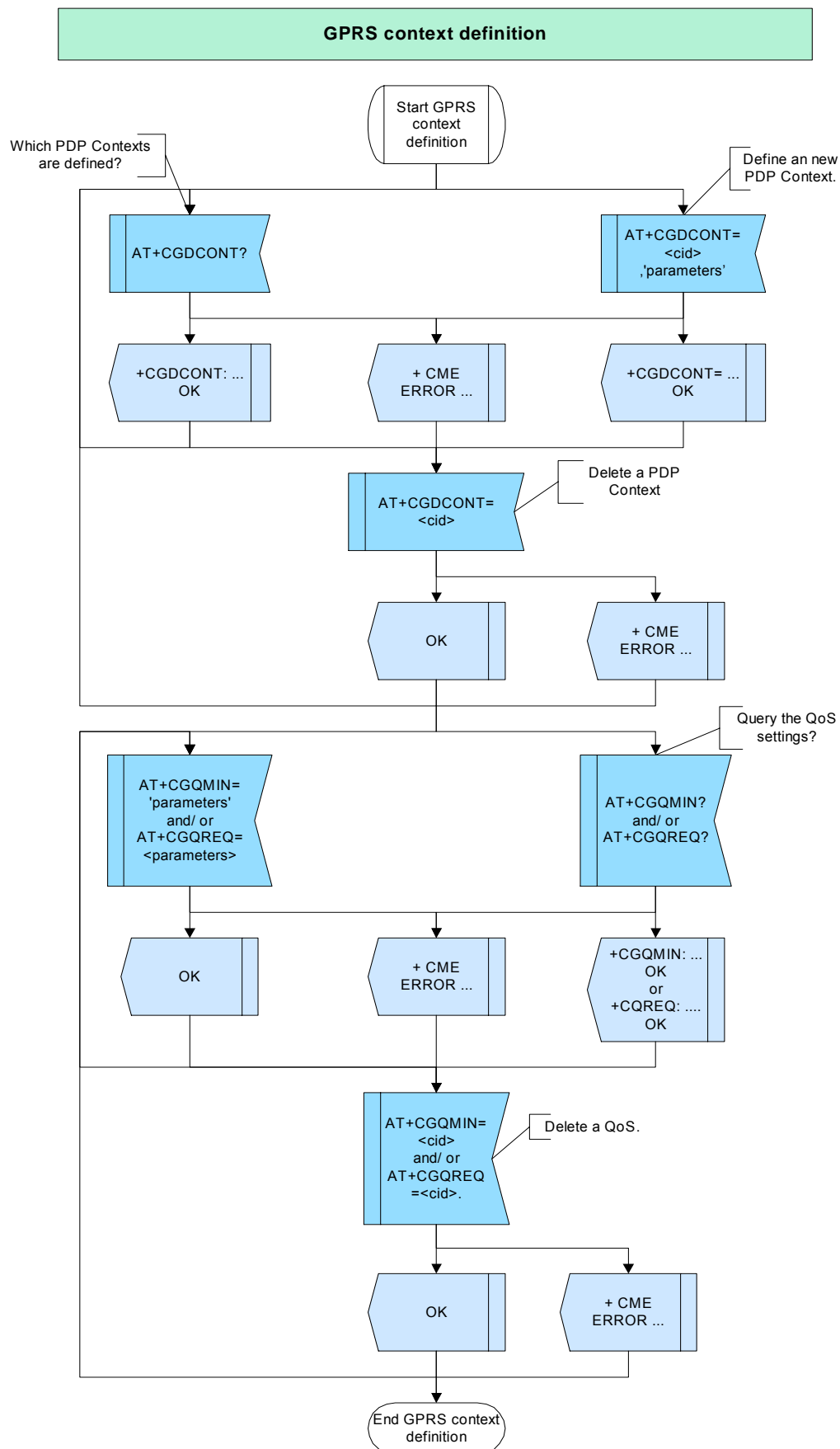
Figure 67: GPRS context definition

2.10.3.4 Hints

- Please consider that some providers do not support all of the settings enabled by AT+CGQREQ and AT+CGQMIN.

2.10.3.5 Example

```
***************************************
Comment:  GPRS context defintion
***************************************
***************************************
Comment:  Request defined PDP contexts.
***************************************


Subscr 1     Send: AT+CGDCONT?
Subscr 1   Receive: AT+CGDCONT?
Subscr 1   Receive: +CGDCONT: 2,"IP","www.siemens.com","",0,0
Subscr 1   Receive:
Subscr 1   Receive: OK


***************************************
Comment:  Define new PDP context.
***************************************


Subscr 1     Send: AT+CGDCONT=1,IP,www.siemens.de
Subscr 1   Receive: AT+CGDCONT=1,IP,www.siemens.de
Subscr 1   Receive: OK


***************************************
Comment:  Define new PDP context.
***************************************


Subscr 1     Send: AT+CGDCONT=2,IP,www.siemens.com
Subscr 1   Receive: AT+CGDCONT=2,IP,www.siemens.com
Subscr 1   Receive: OK


***************************************
Comment:  Request defined PDP contexts.
***************************************


Subscr 1     Send: AT+CGDCONT?
Subscr 1   Receive: AT+CGDCONT?
Subscr 1   Receive: +CGDCONT: 1,"IP","www.siemens.de","",0,0
Subscr 1   Receive: +CGDCONT: 2,"IP","www.siemens.com","",0,0
Subscr 1   Receive:
Subscr 1   Receive: OK


***************************************
Comment:  Deletet PDP context cid=1.
***************************************


Subscr 1     Send: AT+CGDCONT=1
Subscr 1   Receive: AT+CGDCONT=1
Subscr 1   Receive: OK


***************************************
Comment:  Request defined PDP contexts.
***************************************
Subscr 1     Send: AT+CGDCONT?
Subscr 1   Receive: AT+CGDCONT?
```

Subscr 1   Receive: +CGDCONT: 2,"IP","www.siemens.com","",0,0
Subscr 1   Receive:
Subscr 1   Receive: OK

****
Comment: Request QoS minimum acceptable.
****

Subscr 1   Send: AT+CGQMIN?
Subscr 1   Receive: AT+CGQMIN?
Subscr 1   Receive: +CGQMIN: 2,0,0,0,0,31
Subscr 1   Receive: OK

****
Comment: Define QoS for PDP context cid=2.
****

Subscr 1   Send: AT+CGQMIN=2,0,0,0,0,31
Subscr 1   Receive: AT+CGQMIN=2,0,0,0,0,31
Subscr 1   Receive: OK

****
Comment: Define QoS for PDP context cid=1.
****

Subscr 1   Send: AT+CGQMIN=1,0,0,0,0,31
Subscr 1   Receive: AT+CGQMIN=1,0,0,0,0,31
Subscr 1   Receive: OK

****
Comment: Request QoS minimum acceptable.
****

Subscr 1   Send: AT+CGQMIN?
Subscr 1   Receive: AT+CGQMIN?
Subscr 1   Receive: +CGQMIN: 1,0,0,0,0,31
Subscr 1   Receive: +CGQMIN: 2,0,0,0,0,31
Subscr 1   Receive:
Subscr 1   Receive: OK

****
Comment: Delete QoS for PDP context cid=1.
****

Subscr 1   Send: AT+CGQMIN=1
Subscr 1   Receive: AT+CGQMIN=1
Subscr 1   Receive: OK

****
Comment: Request QoS minimum acceptable.
****

Subscr 1   Send: AT+CGQMIN?
Subscr 1   Receive: AT+CGQMIN?
Subscr 1   Receive: +CGQMIN: 2,0,0,0,0,31
Subscr 1   Receive: OK

2.10.4   GPRS PDP Context activation/ deactivation

2.10.4.1   Description

This chapter describes how to activate and deactivate a specified PDP Context. If a PDP Context is already in the requested state, the state of this context remains unchanged.
If the ME is not yet attached to the GPRS service, the attach will be done before the context activation is executed. If no <cid> is specified (e.g. AT+CGACT=1 or AT+CGACT=0), all defined contexts become activated/ deactivated.
In many networks "AT+CGACT=1" does not work any longer (see Hints).
The command "AT+CGPADDR" shows the PDP address, which was assigned to the module during the activation process. The address may be static or dynamic.

2.10.4.2   Used AT commands

AT+CGPADDR   -   Show PDP address
AT+CGACT   -   PDP Context activate or deactivate
ATH   -   Disconnect existing connection

For further details about the commands see [2].

2.10.4.3 Flow Chart
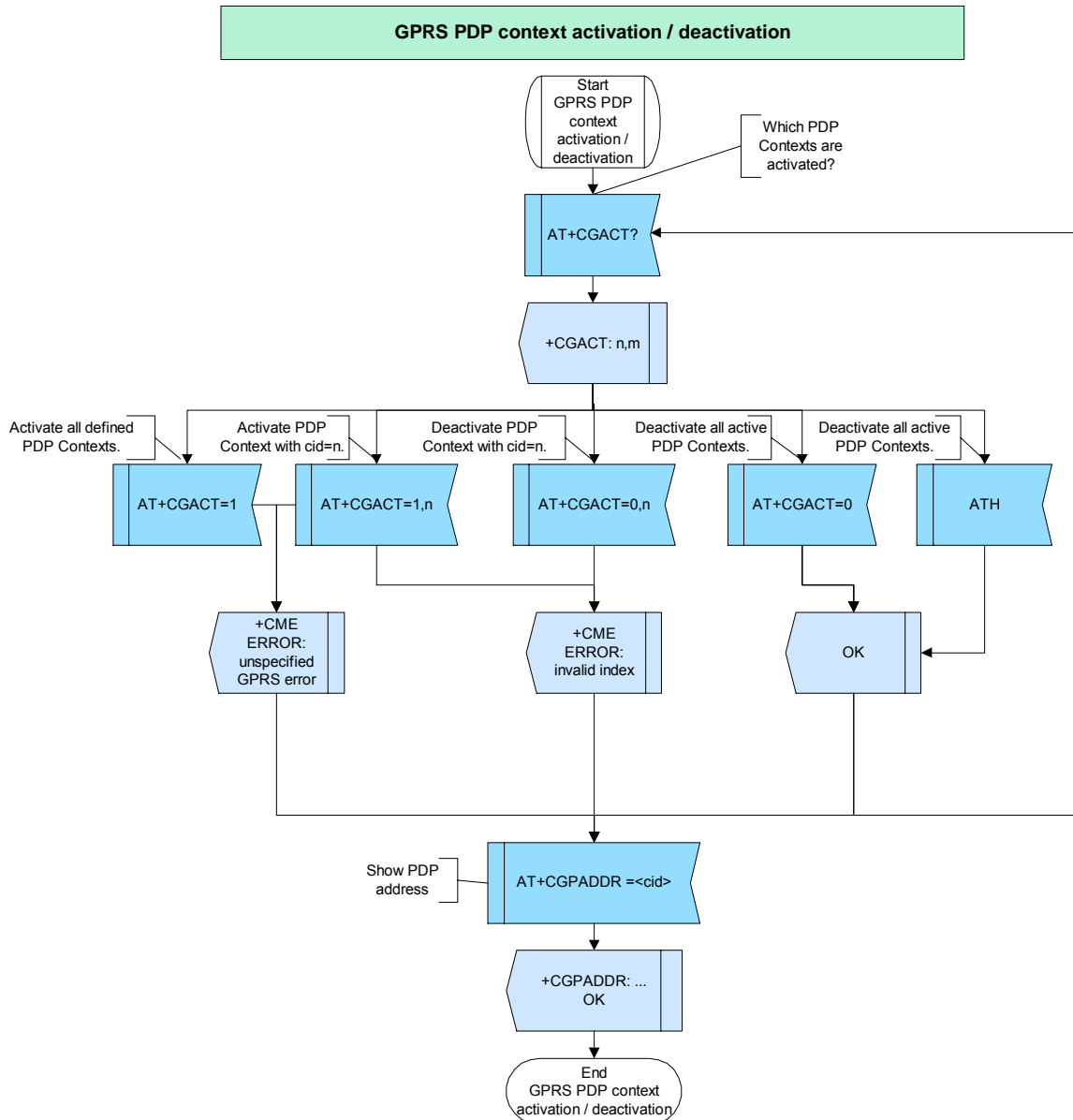
Figure 68: GPRS PDP context activation / deactivation

2.10.4.4 Hints

- In many networks the GPRS context activation command does not work any longer. Many networks require user name and password for context activation. However these parameters are only handed to module during the PPP traffic and not by AT command. Since the PPP traffic only starts when entering the data mode, it is necessary to enter data mode before the actual PDP context activation request is sent to the network. Use ATD*99***<cid># to do so.
- If the MT is not GPRS attached when the activation form of the AT+CGACT or AT+CGDATA command is executed, it performs a GPRS attach and then attempts to activate the specified context.

2.10.4.5 Example

```
***************************************
Comment  PDP context activate/deactivate
***************************************
***************************************
Comment  Request activated PDP contexts
***************************************

Subscr 1    Send: AT+CGACT?
Subscr 1  Receive: AT+CGACT?
Subscr 1  Receive: +CGACT: 1,0
Subscr 1  Receive: +CGACT: 2,1
Subscr 1  Receive:
Subscr 1  Receive: OK


***************************************
Comment  Activate PDP context cid=2
***************************************

Subscr 1    Send: AT+CGACT=1,2
Subscr 1  Receive: AT+CGACT=1,2
Subscr 1  Receive: OK


***************************************
Comment  Request activated PDP contexts
***************************************

Subscr 1    Send: AT+CGACT?
Subscr 1  Receive: AT+CGACT?
Subscr 1  Receive: +CGACT: 1,0
Subscr 1  Receive: +CGACT: 2,1
Subscr 1  Receive:
Subscr 1  Receive: OK


***************************************
Comment  Deactivate all PDP contexts
***************************************

Subscr 1    Send: AT+CGACT=0
Subscr 1  Receive: AT+CGACT=0
Subscr 1  Receive: OK


***************************************
Comment  Request activated PDP contexts
***************************************

Subscr 1    Send: AT+CGACT?
Subscr 1  Receive: AT+CGACT?
Subscr 1  Receive: +CGACT: 1,0
Subscr 1  Receive: +CGACT: 2,0
Subscr 1  Receive:
Subscr 1  Receive: OK
```

```
***************************************
Comment  Show PDP adress
***************************************

Subscr 1     Send: AT+CGPADDR=?
Subscr 1   Receive: AT+CGPADDR=?
Subscr 1   Receive: +CGPADDR: (1,2)
Subscr 1   Receive:
Subscr 1   Receive: OK


***************************************
Comment  Activate all PDP contexts
***************************************


Subscr 1     Send: AT+CGACT=1
Subscr 1   Receive: AT+CGACT=1
Subscr 1   Receive: OK


***************************************
Comment  Request activated PDP contexts
***************************************


Subscr 1     Send: AT+CGACT?
Subscr 1   Receive: AT+CGACT?
Subscr 1   Receive: +CGACT: 1,1
Subscr 1   Receive: +CGACT: 2,1
Subscr 1   Receive:
Subscr 1   Receive: OK


***************************************
Comment  Show PDP address without <cid>
***************************************


Subscr 1     Send: AT+CGPADDR=
Subscr 1   Receive: AT+CGPADDR=
Subscr 1   Receive: +CGPADDR: 1,"10.10.0.33"
Subscr 1   Receive: +CGPADDR: 2,"10.10.1.33"
Subscr 1   Receive:
Subscr 1   Receive: OK


***************************************
Comment  Deactivate PDP context cid=1
***************************************


Subscr 1     Send: AT+CGACT=0,1
Subscr 1   Receive: AT+CGACT=0,1
Subscr 1   Receive: OK


***************************************
Comment  Request activated PDP contexts
***************************************


Subscr 1     Send: AT+CGACT?
Subscr 1   Receive: AT+CGACT?
Subscr 1   Receive: +CGACT: 1,0
Subscr 1   Receive: +CGACT: 2,1
Subscr 1   Receive:
Subscr 1   Receive: OK
```

```
**************************************
Comment  Show PDP address cid=2
**************************************

Subscr 1     Send: AT+CGPADDR=2
Subscr 1   Receive: AT+CGPADDR=2
Subscr 1   Receive: +CGPADDR: 2,"10.10.1.33"
Subscr 1   Receive:
Subscr 1   Receive: OK


**************************************
Comment  Deactivate all PDP contexts
**************************************

Subscr 1     Send: ATH
Subscr 1   Receive: ATH
Subscr 1   Receive: OK


**************************************
Comment  Request activated PDP contexts
**************************************

Subscr 1     Send: AT+CGACT?
Subscr 1   Receive: AT+CGACT?
Subscr 1   Receive: +CGACT: 1,0
Subscr 1   Receive: +CGACT: 2,0
Subscr 1   Receive:
Subscr 1   Receive: OK


**************************************
Comment  Request defined PDP contexts
**************************************

Subscr 1     Send: AT+CGDCONT?
Subscr 1   Receive: AT+CGDCONT?
Subscr 1   Receive: +CGDCONT: 1,"IP","www.siemens.de","",0,0
Subscr 1   Receive: +CGDCONT: 2,"IP","www.siemens.com","",0,0
Subscr 1   Receive:
Subscr 1   Receive: OK
```

2.10.5 Entering GPRS data mode

2.10.5.1 Description

There are several ways to go into GPRS data mode. The best approach is using the command ATD*99***<cid>#. The command AT+CGDATA=PPP,<cid>, however, is provided for reference purposes only.

The PDP context (parameter <cid>) must be defined before via AT+CGDCONT.

If ATD*99***<cid># or AT+CGDATA are entered without specifying a parameter, default parameters will be used.

When entering the GPRS data mode, PPP traffic between the module and the application is transferred. Therefore the application must be capable of handling PPP protocol.

2.10.5.2 Used AT commands

AT+CGDATA / ATD*99***1#	-	Enter GPRS data mode
+++	-	Switch from data mode or PPP online mode to command mode
ATO / AT+CGDATA	-	Switch from command mode to data mode

For further details about the commands see [2].

2.10.5.3   Flow chart
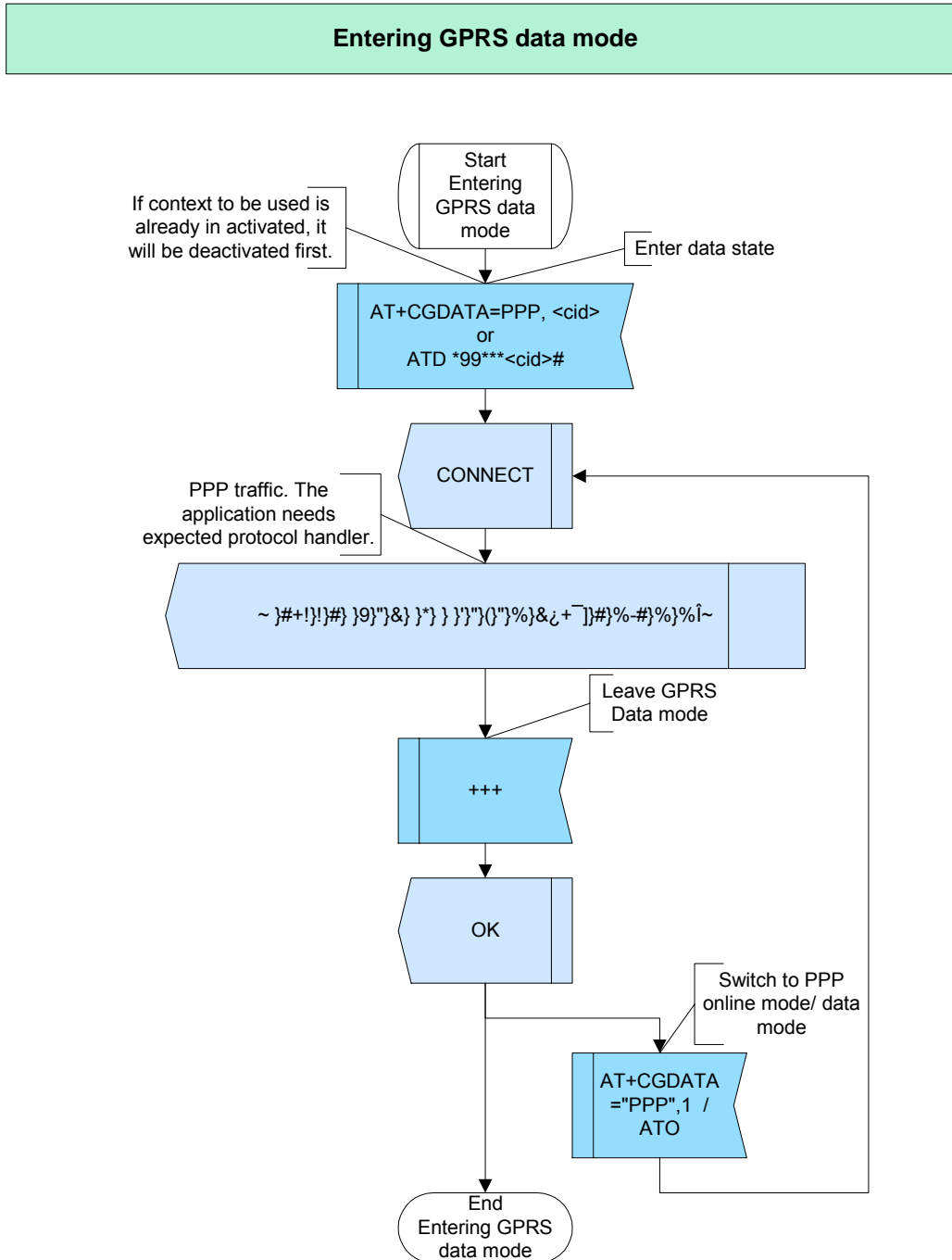
Figure 69: Entering GPRS data mode

2.10.5.4   Hints

- Even though specified the command ATD*99# will not be accepted by many networks, because the default context does not contain the network specific parameters. Rather, use ATD*99***<cid># because this will activate the defined context with all required parameters.
- When the module is not attached and/or PDP Context activated, when trying to enter the GPRS data mode, the module first performs a GPRS attach, then attempts to activate the specified context and enters the GPRS data mode.

2.10.5.5 Example

```
****************************************
Comment: Entering GPRS data mode
****************************************

****************************************
Comment: Enter GPRS data mode by using PDP Context cid=1
****************************************


Subscr 1     Send:  ATD*99***1#
Subscr 1   Receive: ATD*99***1#
Subscr 1   Receive: CONNECT


****************************************
Comment: PPP traffic
****************************************


Subscr 1   Receive: ~'255'}#'192'!}!}#} }9}"}&} }*} } }"}"}(}"}%}&9G}1}]}#}%'194'#}%Y'196'~


****************************************
Comment: Leave GPRS data mode
****************************************


Subscr 1     Send:  +++
Subscr 1   Receive:
Subscr 1   Receive: OK


****************************************
Comment: Switch back to GPRS data mode
****************************************


Subscr 1     Send:  AT+CGDATA="PPP",1
Subscr 1   Receive: AT+CGDATA="PPP",1
Subscr 1   Receive: CONNECT
****************************************
Comment: PPP traffic
****************************************


Subscr 1   Receive: ~'255'}#'192'!}!}#} }9}"}&} }*} }
}"}"}(}"}%}&9G}1}]}#}%'194'#}%Y'196'~~'255'}#'192'!}!}#} }9}"}&} }*} }
}"}"}(}"}%}&9G}1}]}#}%'194'#}%Y'196'~


****************************************
Comment: Leave GPRS data mode
****************************************


Subscr 1     Send:  +++
Subscr 1   Receive:
Subscr 1   Receive: OK
```

2.11   SMS
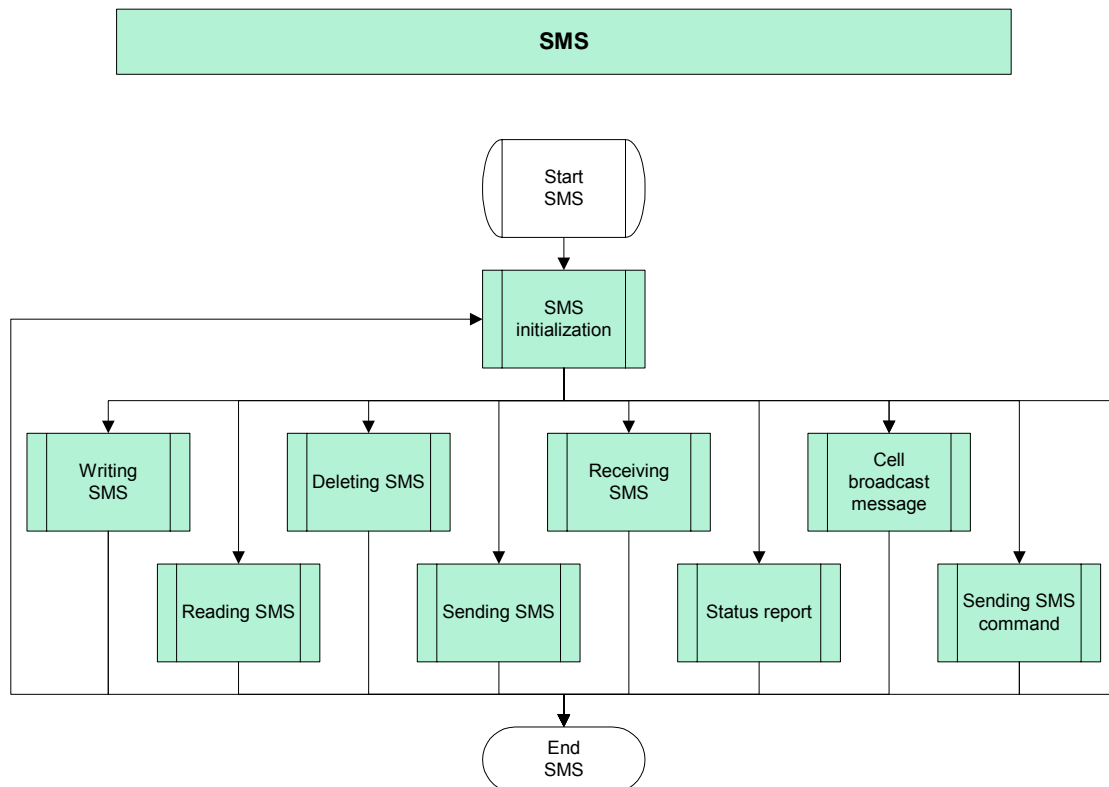
Figure 70: SMS

SMS is a service to transfer short messages between a GSM MS and an SME via an SC. Siemens GSM modules support two modes: text mode and PDU mode. The minimal requirements to send a short message are:

- Service center address of your provider
- Destination address
- Content of your message

To write or send short messages in text mode the ME must be configured to use text mode, and the service center address must be set. For further settings see chapters 2.11.1, 2.11.2 and 2.11.4.

Writing or sending a short message in PDU mode requires all attributes the short message to be coded in PDU. A PDU consists of the following parts:

- **Service Center Address** encodes the length of address field, the SCA type and the SCA
- **First Octet** encodes the message type indicator, reject-duplicates, more messages to send, validity period format, user data header indicator, status report request and status report indication
- **Message Reference**
- **Destination-Address** encodes the destination address, the length of destination address field and the type of destination address
- **Protocol-Identifier**
- **DataCoding-Scheme**
- **Validity Period**
- **User-Data-Length**
- **User-Data** encodes the user data header and user data

For detailed explanation of all fields and parameters see [8].

Type of
number

PDU-
type

PID

DCS
(8-bit
coding)

len | SCA (+491710760000) | MR | len

07919471016700001100078121 4365F700F6AA0568656C6C6F

Destination Address:
(1234567)

UD ("hello" in 8 bit
ASCII format)

Type of
number

UDL

VP
(four days)
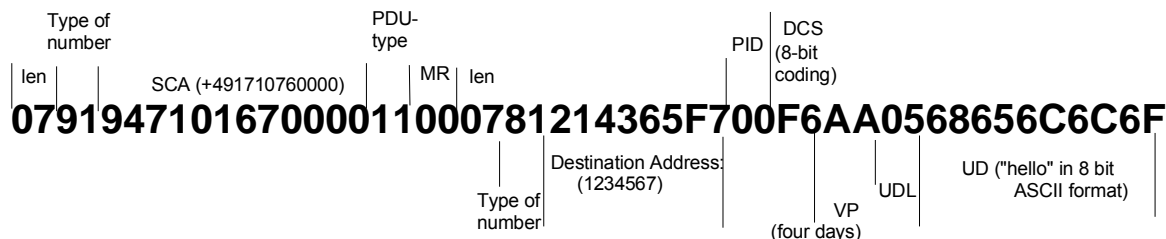
Figure 71: PDU example

2.11.1 SMS initialization

2.11.1.1 Description

This chapter summarizes all the AT commands suggested to set up the ME for using SMS.

- Siemens GSM modules support two character sets: the GSM default alphabet defined in GSM 03.38 (7 bit) and the UCS2 character set. UCS2 is a 16-bit universal multiple-octet coded character set, defined in ISO/IEC10646. To choose one of them use the command AT+CSCS.
- To set the SMS message format use AT+CMGF. Choose AT+CMGF=1 for text mode, or AT+CMGF=0 for PDU mode.
- If text mode is activated, you can enable the presentation of text mode parameters in the result codes of SMS reading and listing commands by using "AT+CSDH".
- To change the text mode parameters use AT+CSMP. You can set the following SMS parameters: first octet, service center time stamp, validity period and the protocol identifier.
- Basically, the service center address supplied by the service provider must be specified. In text mode (AT+CMGF=1), this is done by using the AT+CSCA command. If you use PDU mode it is possible to code the service center address in your PDU. Therefore, in PDU mode, setting the service center address with AT+CSCA is optional.
- If you want to use SMS features specified in GSM 07.05 Phase 2+, you need to enable Phase 2+ functionality with "AT+CSMS".
- To be notified by a URC, when the module receives a short message, a cell broadcast message or status report use AT+CNMI to enable the presentation of URCs.
- To be notified by a URC, when the SMS storage is full, use AT^SMGO to enable the presentation of URCs.
- Use AT+CPMS to select the preferred storage for short messages. If the preferred storage is "MT" you can determine the storage sequence with "AT^SSMSS". This gives you the choice of using first either the SIM or the ME storage.
- With AT+CGSMS you can select preferences for transmitting MO short messages over GPRS or circuit switched services.
- AT^SSCONF allows you to enable or disable the presentation of the parameters <ra> and <tora> fpr status reports in the result codes of SMS reading and listing commands.
- If you want to receive cell broadcast messages activate the URC presentation for CBS with AT+CNMI and subscribe to a CBS channel with AT+CSCB.
- The AT^SM20 command specifies different modes of responses returned when sending and writing short messages:
  AT^SM20=,0 causes the ME return "+CMS ERROR: <err>" when writing or sending of short messages fails.
  AT^SM20=,1 (factory default) causes the ME to return "OK" no matter whether or not the SMS command was succesfully executed.

Some of the above settings can be stored to the user profile. See [2] for a list of settings storable with AT&W.

2.11.1.2   Used AT commands

AT+CSCS	-	Set TE character set
AT+CSCA	-	SMS service center address
AT+CSMS	-	Select Message Service
AT+CNMI	-	New SMS message indications
AT^SMGO	-	Set or query SMS overflow presentation mode or query SMS overflow
AT^SM20	-	Set M20 Compatibility
AT+CPMS	-	Preferred SMS message storage
AT^SSMSS	-	Set Short Message Storage Sequence
AT+CGSMS	-	Select service for MO SMS messages
AT^SSCONF	-	SMS Configuration
AT+CMGF	-	Select SMS message format
AT+CSDH	-	Show SMS text mode parameters
AT+CSMP	-	Set SMS text mode parameters
AT&W	-	Store current configuration to user defined profile

For further details about the commands see [2].

2.11.1.3 Flow chart

SMS initialization

Start
SMS
initialization

Request TE
character set.

Example: set TE
character set to
GSM.

AT+CSCS?

AT+CSCS="
GSM"

+CSCS:
"UCS2"
OK

OK

Request service
center address.

Example: set service
center address - O2
Germany.

AT+CSCA?

AT+CSCA=+
49176000044
3

Example: no service
center adress set.

+CSCA:
"",129

OK

Request message
service.

Set message
service.

AT+CSMS?

AT+CSMS=1

+CSMS:
0,1,1,1
OK

+CSMS:
1,1,1
OK

*

Figure 72: SMS initialization - part 1
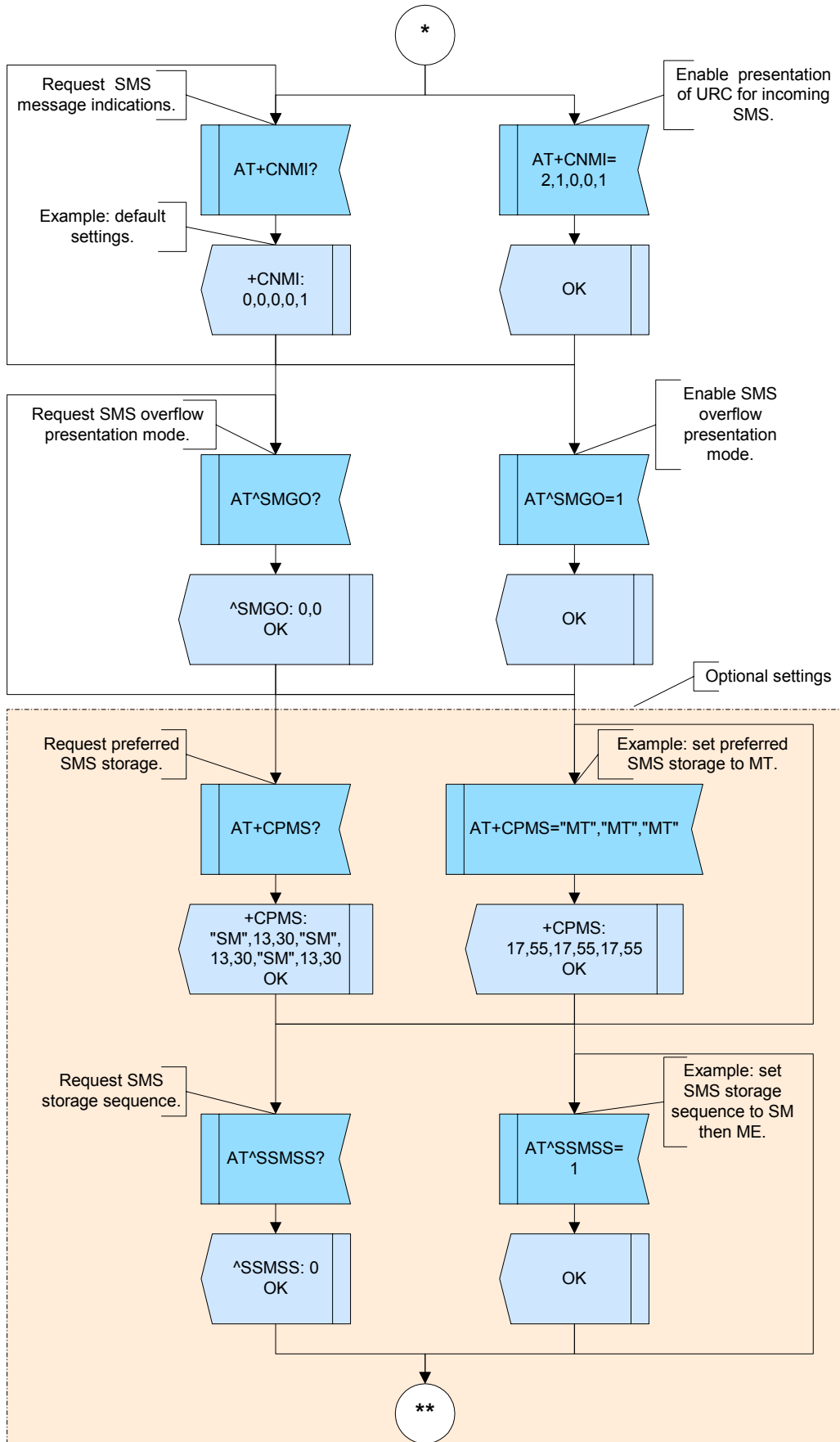
Figure 73: SMS initialization - part 2

optional settings

**

Request service
selected for MO SMS.

Note: This command may not be
available in every product. Refer
to your AT Command Set.

Example: set service for
MO SMS to GPRS
preferred.

AT+CGSMS?

AT+CGSMS=
2

+CGSMS: 3
OK

OK

AT^SM20?

AT^SM20=1,0

^SM20: 1,1
OK

OK

Request SMS
message format.

AT+CMGF?

Example: PDU
mode set.

+CMGF: 0
OK

***
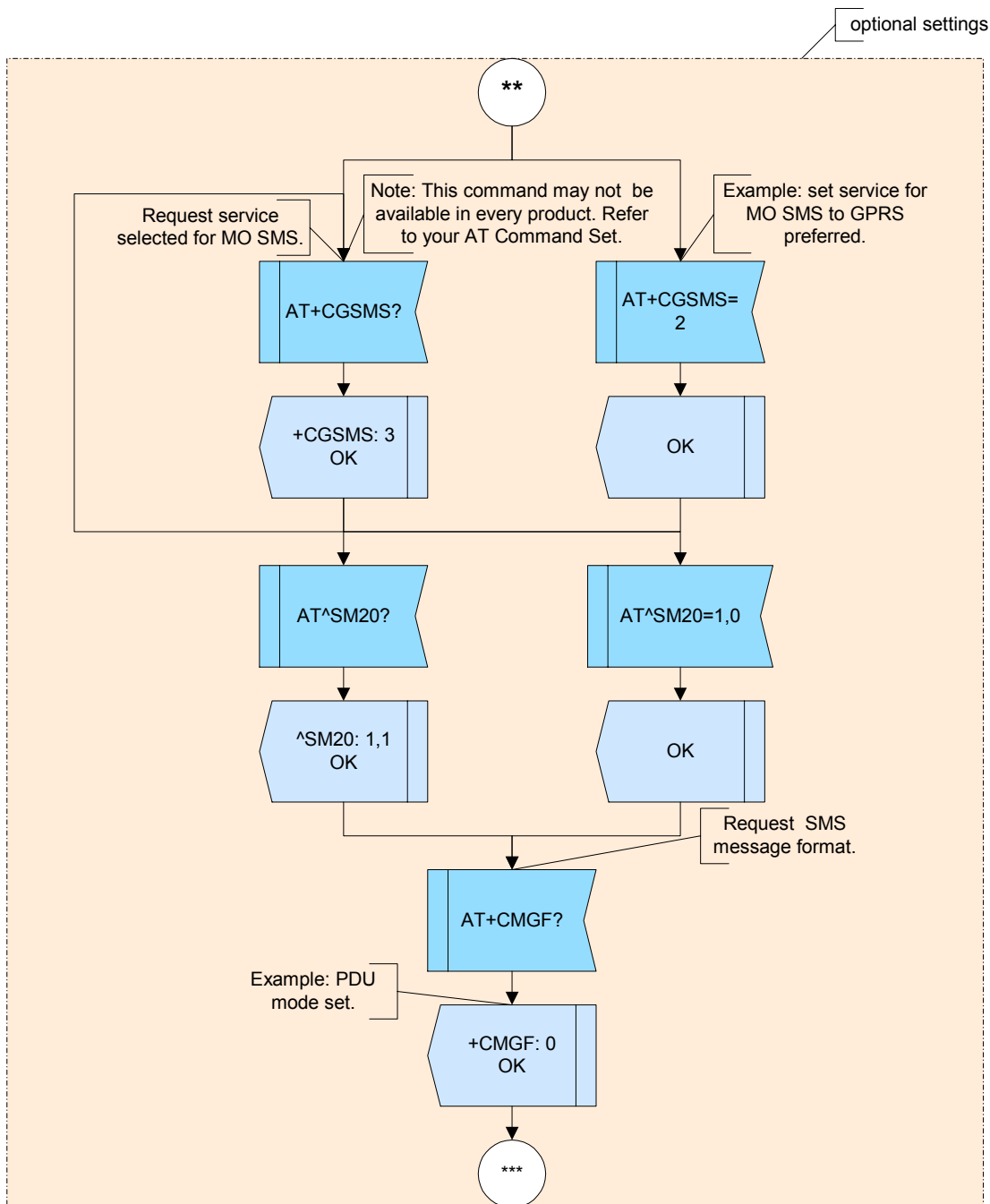
Figure 74: SMS initialization - part 3
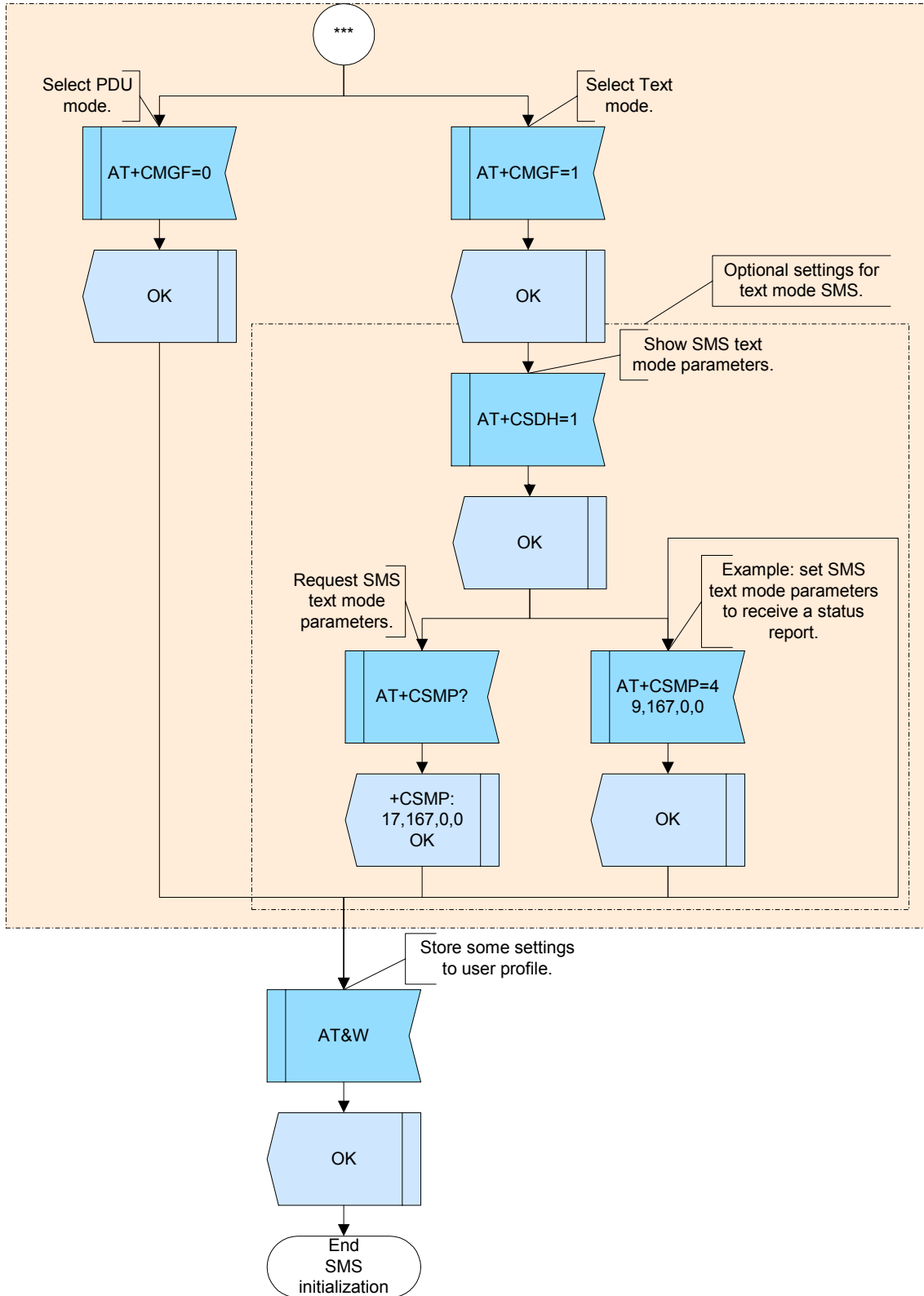
Figure 75: SMS initialization - part 4

Figure 76: SMS initialization (cell broadcast)

Figure 77: SMS initialization (status report)

2.11.1.4 Hints

GCF-CC note: The GSM character set must be supported. For further details see [2]

GCF-CC note: GCF test cases verify the initialization of Cell Broadcast settings. Therefore, we recommend that the necessary settings be included in your application.
Some applications store all short messages to a local memory since it offers more space. Please consider that some GCF test cases verify if short messages are properly stored on the SIM or on the ME RAM.

2.11.1.5 Example

```
***************************************
Comment:  SMS initialization
***************************************
***************************************
Comment:  Request TE character set.
***************************************

Subscr 1    Send: AT+CSCS?
Subscr 1  Receive: AT+CSCS?
Subscr 1  Receive: +CSCS: "UCS2"
Subscr 1  Receive:
Subscr 1  Receive: OK


***************************************
Comment:  Set TE character set to GSM.
***************************************

Subscr 1    Send: AT+CSCS="GSM"
Subscr 1  Receive: AT+CSCS="GSM"
Subscr 1  Receive: OK


***************************************
Comment:  Request service center address.
***************************************

Subscr 1    Send: AT+CSCA?
Subscr 1  Receive: AT+CSCA?
Subscr 1  Receive: +CSCA: "",129
Subscr 1  Receive:
Subscr 1  Receive: OK


***************************************
Comment:  Set service center address. Example: address of O2 Germany.
***************************************

Subscr 1    Send: AT+CSCA=+491760000443
Subscr 1  Receive: AT+CSCA=+491760000443
Subscr 1  Receive: OK
```

```
**************************************
Comment:  Request message service.
**************************************

Subscr 1     Send:  AT+CSMS?
Subscr 1   Receive:  AT+CSMS?
Subscr 1   Receive:  +CSMS: 0,1,1,1
Subscr 1   Receive:
Subscr 1   Receive:  OK


**************************************
Comment:  Set message service to phase 2+.
**************************************

Subscr 1     Send:  AT+CSMS=1
Subscr 1   Receive:  AT+CSMS=1
Subscr 1   Receive:  +CSMS: 1,1,1
Subscr 1   Receive:
Subscr 1   Receive:  OK


**************************************
Comment:  Request SMS message indication.
**************************************

Subscr 1     Send:  AT+CNMI?
Subscr 1   Receive:  AT+CNMI?
Subscr 1   Receive:  +CNMI: 0,0,0,0,1
Subscr 1   Receive:
Subscr 1   Receive:  OK


**************************************
Comment:  Set SMS message indication.
**************************************

Subscr 1     Send:  AT+CNMI=2,1,0,0,1
Subscr 1   Receive:  AT+CNMI=2,1,0,0,1
Subscr 1   Receive:  OK


**************************************
Comment:  Request SMS overflow presentation.
**************************************

Subscr 1     Send:  AT^SMGO?
Subscr 1   Receive:  AT^SMGO?
Subscr 1   Receive:  ^SMGO: 0,0
Subscr 1   Receive:
Subscr 1   Receive:  OK


**************************************
Comment:  Enable SMS overflow presentation.
**************************************

Subscr 1     Send:  AT^SMGO=1
Subscr 1   Receive:  AT^SMGO=1
Subscr 1   Receive:  OK
```

****
Comment: Request preferred SMS storage.
****

Subscr 1   Send: AT+CPMS?
Subscr 1   Receive: AT+CPMS?
Subscr 1   Receive: +CPMS: "SM",12,30,"ME",1,25,"MT",13,55
Subscr 1   Receive:
Subscr 1   Receive: OK

****
Comment: Set preferred SMS storage to MT,MT,MT.
****

Subscr 1   Send: AT+CPMS="MT","MT","MT"
Subscr 1   Receive: AT+CPMS="MT","MT","MT"
Subscr 1   Receive: +CPMS: 13,55,13,55,13,55
Subscr 1   Receive:
Subscr 1   Receive: OK

****
Comment: Request SMS storage sequence.
****

Subscr 1   Send: AT^SSMSS?
Subscr 1   Receive: AT^SSMSS?
Subscr 1   Receive: ^SSMSS: 0
Subscr 1   Receive:
Subscr 1   Receive: OK

****
Comment: Set SMS storage sequence to SM then ME.
****

Subscr 1   Send: AT^SSMSS=1
Subscr 1   Receive: AT^SSMSS=1
Subscr 1   Receive: OK

****
Comment: Request selected service for MO SMS.
****

Subscr 1   Send: AT+CGSMS?
Subscr 1   Receive: AT+CGSMS?
Subscr 1   Receive: +CGSMS: 3
Subscr 1   Receive:
Subscr 1   Receive: OK

****
Comment: Set service for MO SMS to GPRS preferred.
****

Subscr 1   Send: AT+CGSMS=2
Subscr 1   Receive: AT+CGSMS=2
Subscr 1   Receive: OK

```
****************************************
Comment:  Request M20 compatibility settings.
****************************************
Subscr 1     Send:  AT^SM20?
Subscr 1   Receive:  AT^SM20?
Subscr 1   Receive:  ^SM20: 1,1
Subscr 1   Receive:
Subscr 1   Receive:  OK
****************************************
Comment:  Set Siemens mobile phones compatibility.
****************************************
Subscr 1     Send:  AT^SM20=1,0
Subscr 1   Receive:  AT^SM20=1,0
Subscr 1   Receive:  OK


****************************************
Comment:  Request SMS message format.
****************************************

Subscr 1     Send:  AT+CMGF?
Subscr 1   Receive:  AT+CMGF?
Subscr 1   Receive:  +CMGF: 1
Subscr 1   Receive:
Subscr 1   Receive:  OK


****************************************
Comment:  Set SMS message format to PDU mode.
****************************************

Subscr 1     Send:  AT+CMGF=0
Subscr 1   Receive:  AT+CMGF=0
Subscr 1   Receive:  OK


****************************************
Comment:  Store some settings to user profile.
****************************************

Subscr 1     Send:  AT&W
Subscr 1   Receive:  AT&W
Subscr 1   Receive:  OK
```

2.11.2   Writing SMS

2.11.2.1   Description

This chapter describes all the steps required to write a short message to the memory. You can do this by using text mode, or by using PDU mode. If you want to write your short message in text mode, first use AT+CSMP to set some parameters. When using PDU mode you have to create the PDU by an external tool or your application first.

2.11.2.2   Used AT commands

AT+CMGF	-	Select SMS message format
AT^SMGO	-	Set or query SMS overflow presentation mode or query SMS overflow
AT+CSMP	-	Set SMS text mode parameters
AT+CMGW	-	Write SMS message to memory

For further details about the commands see [2].

2.11.2.3 Flow chart
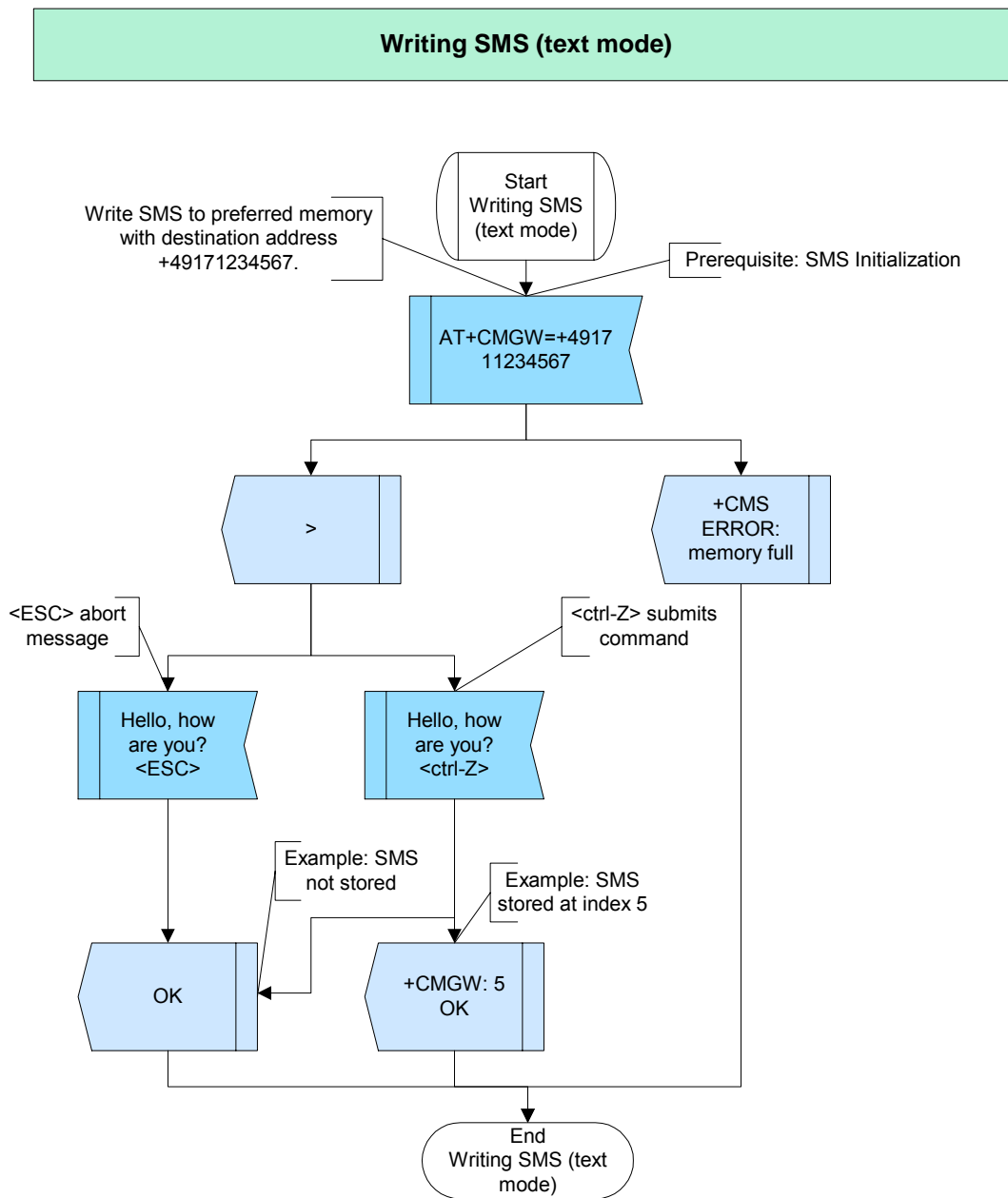
Figure 78: Writing SMS (text mode)
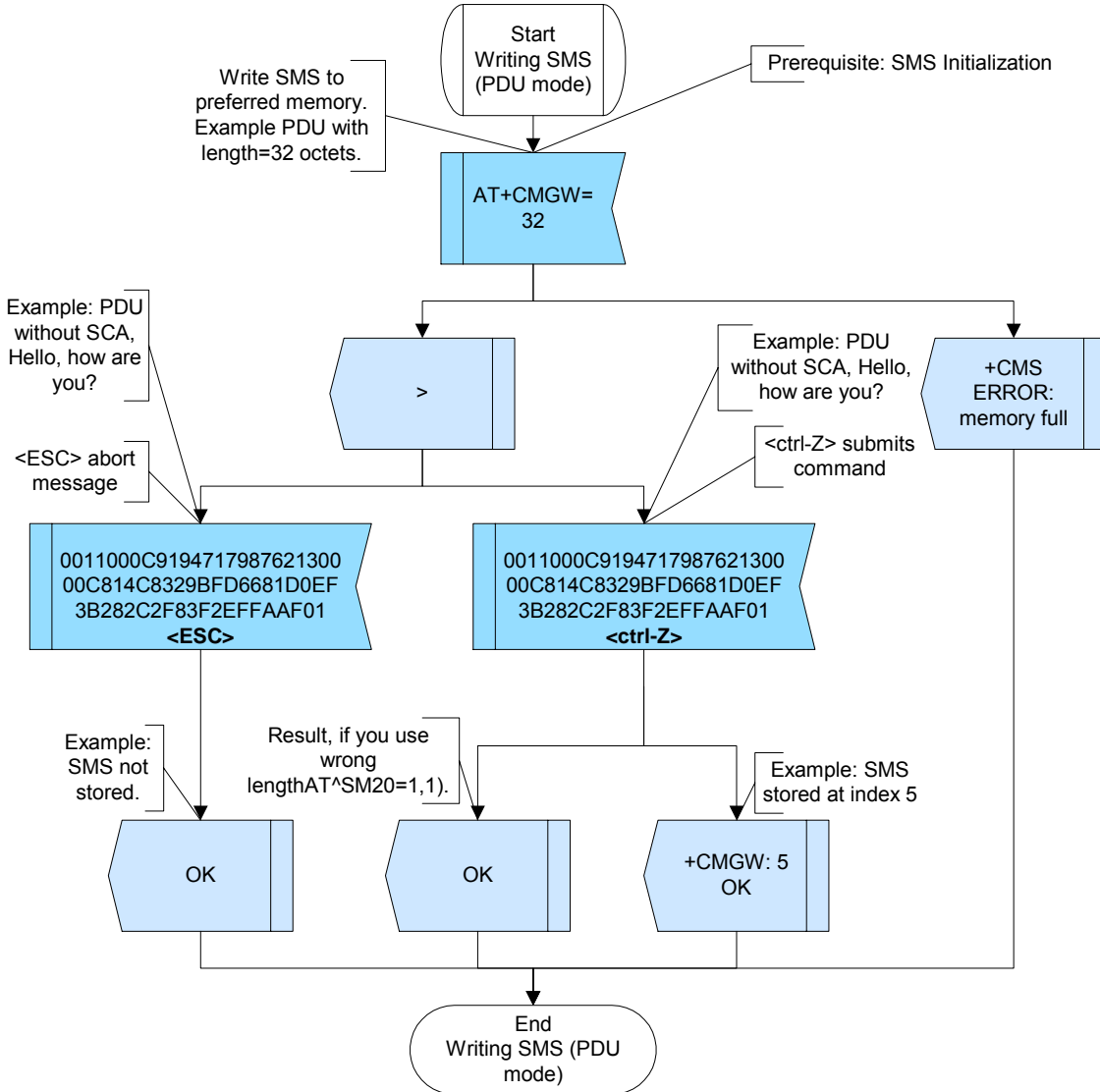
Figure 79: Writing SMS (PDU mode)

2.11.2.4　Hints

* Tools to decode and encode PDUs can be found in the Internet.

2.11.2.5　Example

Example 1:

```
***************************************
Comment:  Writing SMS (text mode)
***************************************
***************************************
Comment:  Write SMS in text mode to memory
***************************************
```

Subscr 1   Send: AT+CMGW=+491797782631
Subscr 1   Receive: AT+CMGW=+491797782631
Subscr 1   Receive: >
Subscr 1   Send: Hello, how are you?
Subscr 1   Receive: Hello, how are you?'26'
Subscr 1   Receive: +CMGW: 30
Subscr 1   Receive:
Subscr 1   Receive: OK

****
Comment: Attempt to write SMS in text mode to memory if memory is full
****

Subscr 1   Send: AT+CMGW=+491797782631
Subscr 1   Receive: AT+CMGW=+491797782631
Subscr 1   Receive: +CMS ERROR: memory full

Example 2:

****
Comment: Writing SMS (PDU mode)
****

****
Comment: Try to write SMS in PDU mode with wrong length to memory
****

Subscr 1   Send: AT+CMGW=50
Subscr 1   Receive: AT+CMGW=50
Subscr 1   Receive: >
Subscr 1   Send: 0011000A9171798762130000A713C8329BFD6681D0EF3B282C2F83F2EFFA0F
Subscr 1   Receive:
0011000A9171798762130000A713C8329BFD6681D0EF3B282C2F83F2EFFA0F'26'
Subscr 1   Receive:
Subscr 1   Receive: OK

****
Comment: Write SMS in PDU mode to memory
****

Subscr 1   Send: AT+CMGW=30
Subscr 1   Receive: AT+CMGW=30
Subscr 1   Receive: >
Subscr 1   Send: 0011000A9171798762130000A713C8329BFD6681D0EF3B282C2F83F2EFFA0F
Subscr 1   Receive:
0011000A9171798762130000A713C8329BFD6681D0EF3B282C2F83F2EFFA0F'26'
Subscr 1   Receive: +CMGW: 30
Subscr 1   Receive:
Subscr 1   Receive: OK

****
Comment: Attempt to write SMS in PDU mode to memory if memory is full
****
Subscr 1   Send: AT+CMGW=30
Subscr 1   Receive: AT+CMGW=30
Subscr 1   Receive: +CMS ERROR: memory full

2.11.3   Deleting SMS

2.11.3.1   Description

This chapter describes all the steps required to delete a short message from the preferred memory chosen by the init setting (using AT+CPMS).
The AT+CMGL command can be used optionally before deleting the SMS.

2.11.3.2   Used AT commands

AT+CMGL   -   List SMS messages from preferred store (optional)
AT+CMGD   -   Delete SMS message (mandatory)

For further details about the commands see [2].

2.11.3.3   Flow chart
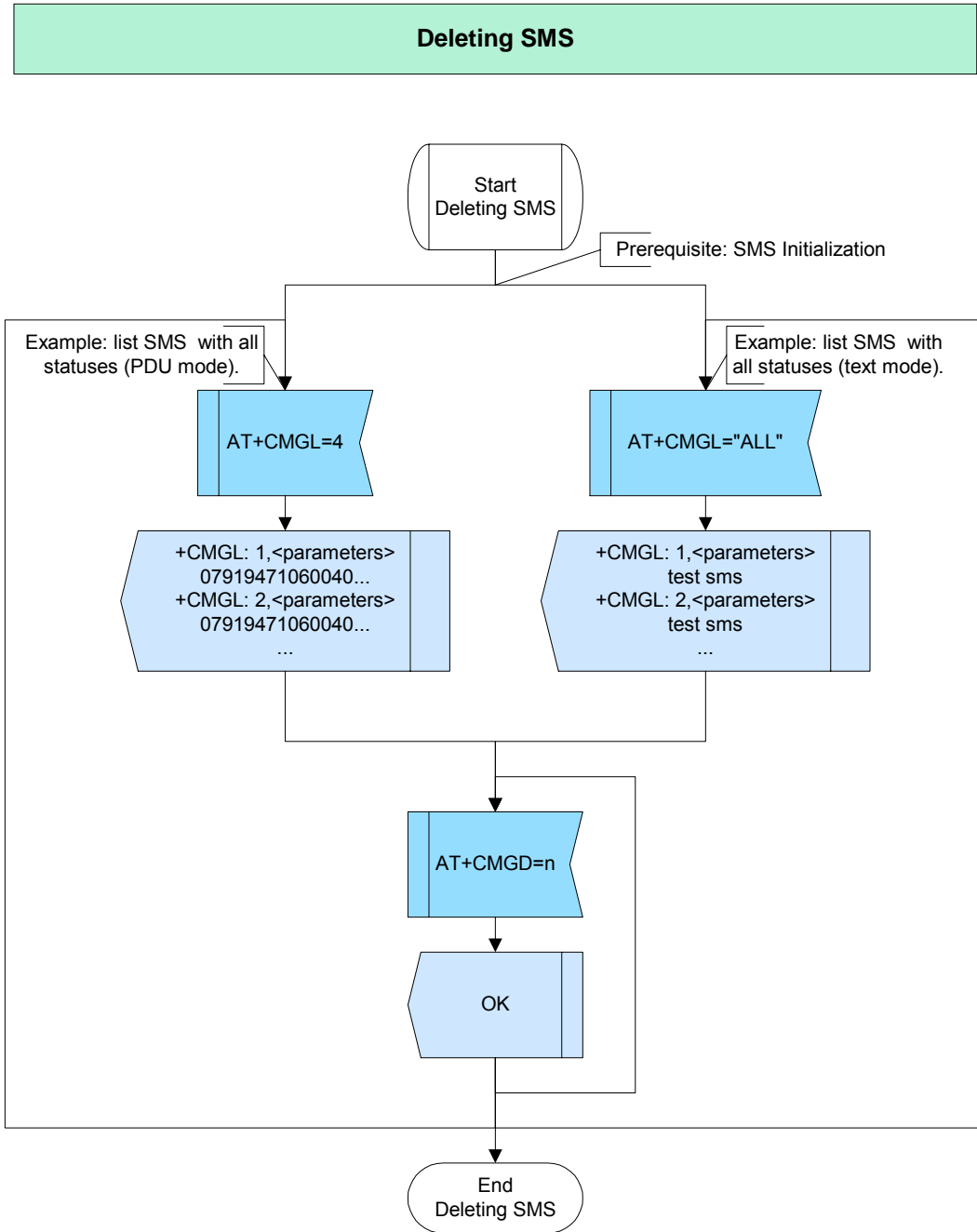
Figure 80: Deleting SMS

2.11.3.4   Hints

- A short message can be deleted anytime, however in general, if not deleting the complete memory, it is necessary to know the index. Therefore it is often recommended to execute the AT+CMGL command before deletion.
- You can delete short messages regardless of their state, for example received unread messages, received read messages etc.
- If no SMS is stored, an empty list and "OK" will be returned.

2.11.3.5 Example

****

Comment: Deleting SMS

****

****

Comment: List SMS with all statuses (PDU mode)

****

Subscr 1   Send: AT+CMGL=4
Subscr 1 Receive: AT+CMGL=4
Subscr 1 Receive: +CMGL: 6,2,,30
Subscr 1 Receive:
0011000A9171798762130000A713C8329BFD6681D0EF3B282C2F83F2EFFA0F
Subscr 1 Receive: +CMGL: 11,1,,36
Subscr 1 Receive:
0791947106004013240C91947159826990000003080413115748013C8329BFD6681D0EF3B282C2F
83F2EFFA0F
Subscr 1 Receive:
Subscr 1 Receive: OK

****

Comment: Delete SMS at index 1

****

Subscr 1   Send: AT+CMGD=1
Subscr 1 Receive: AT+CMGD=1
Subscr 1 Receive: OK

2.11.4   Sending SMS

2.11.4.1   Description

This chapter describes the steps required to send a short message. There are two ways:

- One way is sending a stored message from memory. This applies only to messages stored as "STO SEND" or "STO UNSENT".
- Another way is to create a new short message in PDU or text mode using the AT+CMGS command. In this case, the message will be sent directly.

2.11.4.2   Used AT commands

AT+CMGS   -   Send SMS message
AT+CMSS   -   Send SMS message from storage

For further details about the commands see [2].

2.11.4.3 Flow Chart
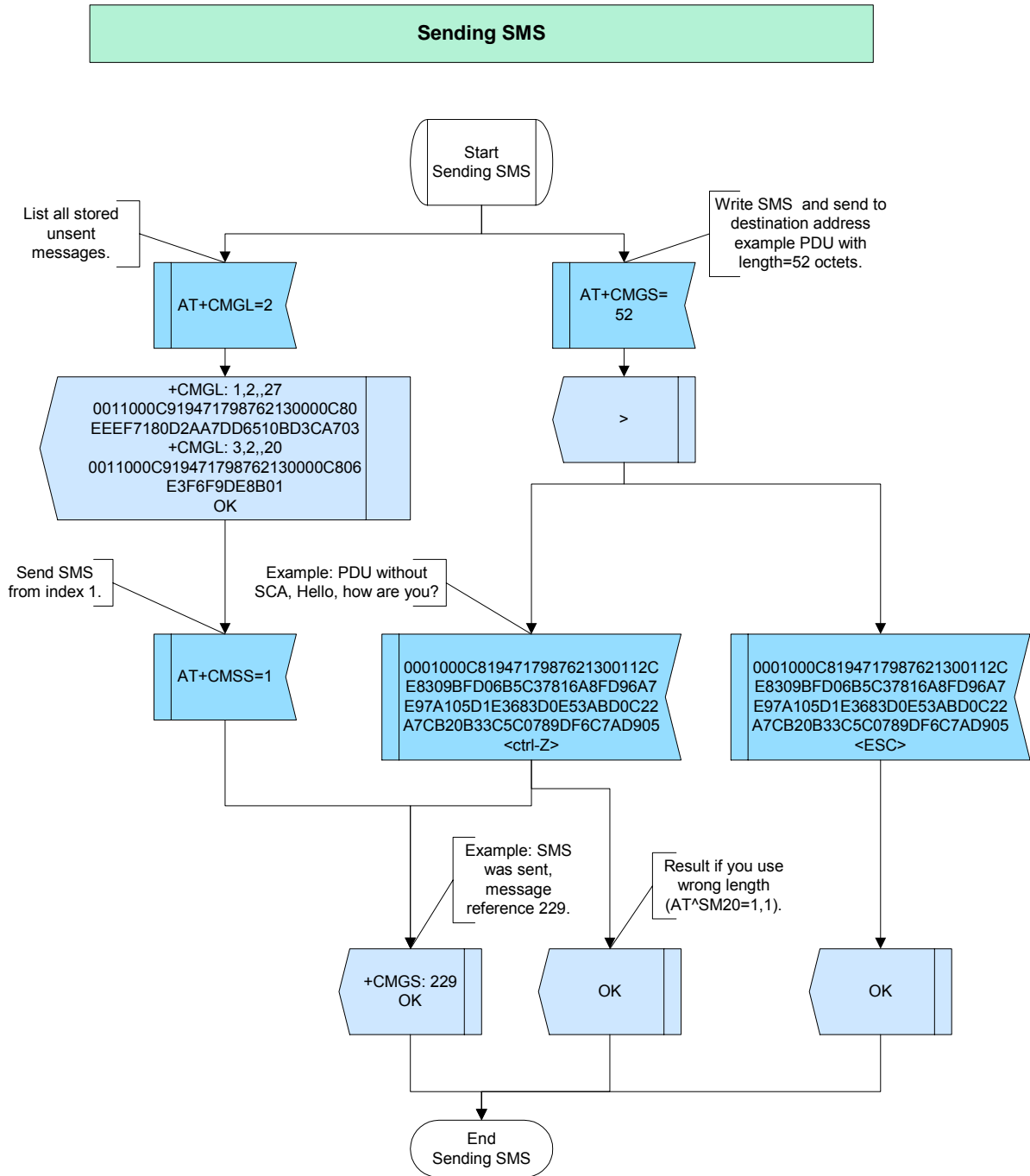
Figure 81: Sending SMS

2.11.4.4 Hints

Not applicable.

2.11.4.5 Example

```
***************************************
Comment: Sending SMS
***************************************
***************************************
Comment: List all stored unsent messages (PDU mode)
***************************************


Subscr 1     Send: AT+CMGL=2
Subscr 1   Receive: AT+CMGL=2
Subscr 1   Receive: +CMGL: 5,2,,31
Subscr 1   Receive:
0031000C919471798762130000C813C8329BFD6681D0EF3B282C2F83F2EFFA0F
Subscr 1   Receive:
Subscr 1   Receive: OK


***************************************
Comment: Send message at index 5
***************************************


Subscr 1     Send: AT+CMSS=5
Subscr 1   Receive: AT+CMSS=5
Subscr 1   Receive:
Subscr 1   Receive: +CMSS: 121
Subscr 1   Receive:
Subscr 1   Receive: OK


***************************************
Comment: Send a new message created in PDU mode <ctrl-Z>
***************************************


Subscr 1     Send: AT+CMGS=30
Subscr 1   Receive: AT+CMGS=30
Subscr 1   Receive:  >
Subscr 1     Send:
0011000A9171798762130000A713C8329BFD6681D0EF3B282C2F83F2EFFA0F'26'
Subscr 1   Receive:
0011000A9171798762130000A713C8329BFD6681D0EF3B282C2F83F2EFFA0F'26'
Subscr 1   Receive:
Subscr 1   Receive: +CMGS: 122
Subscr 1   Receive:
Subscr 1   Receive: OK


***************************************
Comment: Try to send a SMS in PDU mode with wrong length
***************************************


Subscr 1     Send: AT+CMGS=25
Subscr 1   Receive: AT+CMGS=25
Subscr 1   Receive:  >
Subscr 1     Send:
0011000A9171798762130000A713C8329BFD6681D0EF3B282C2F83F2EFFA0F'26'
Subscr 1   Receive:
0011000A9171798762130000A713C8329BFD6681D0EF3B282C2F83F2EFFA0F'26'
Subscr 1   Receive: +CMS ERROR: unknown error
```

2.11.5   Reading SMS

2.11.5.1   Description

This chapter describes all the steps required to read a short message. There are several ways:

- You can list all short messages from the specified storage using AT+CMGL or AT^SMGL. The only difference between both commands is that the standard command AT+CMGL changes the state of the listed messages from status "REC UNREAD" to "REC READ", while the Siemens defined command leaves the status unchanged.
- Also, you can read a short message by using AT+CMGR and AT^SMGR. Both commands serve to read a message from a specific index of the preferred memory. As stated above, the standard command AT+CMGR changes the state of a read message from status "REC UNREAD" to "REC READ", while the Siemens defined command leaves the status unchanged.

2.11.5.2   Used AT commands

AT+CMGL   -   List SMS messages from preferred storage
AT^SMGL   -   List SMS messages from preferred storage (does not change status)
AT+CMGR   -   Read SMS message
AT^SMGR   -   Read SMS message (does not change status)

For further details about the commands see [2].

2.11.5.3 Flow Chart

Reading SMS - 1

Start
Reading SMS

Example: List SMS with status "REC UNREAD" in PDU mode. Status will be changed to "REC READ".

AT+CMGL=0

Example: List SMS with status "REC UNREAD" in text mode. Status will be changed to "REC READ".

AT+CMGL="REC UNREAD"

Example: response for AT+CMGL=0 (PDU mode).

+CMGL: 26,0,,36
0791947122720014040C91947...
+CMGL: 27,0,,36
0791947122720014040C91947...
OK

Example: response to AT+CMGL="REC UNREAD" (text mode).

+CMGL: 26,"REC UNREAD","+4917...",,"..."
Hello, how are you?
+CMGL: 27,"REC UNREAD","+4917...",,"..."
Hello, how are you?
OK

Read SMS at index n.

AT+CMGR=n

Example in PDU mode.

+CMGR: 1,,36
0791947122720014040C9194...
OK

Example in text mode.

+CMGR: "REC READ","+491735966373",,"03/08/12,14:31:45+08"
Hello, how are you?
OK

End
Reading SMS

Figure 82: Reading SMS – 1

Figure 83: Reading SMS - 2

2.11.5.4 Hints

- Of course, if the index of a short message is known you need not list all messages before reading.

2.11.5.5 Example

```
****************************************
Comment:  Reading SMS
****************************************

****************************************
Comment:  List all received unread short message in text mode
Comment:  Status "REC UNREAD" remains unchanged
****************************************

Subscr 1     Send:  AT^SMGL="REC UNREAD"
Subscr 1   Receive:  AT^SMGL="REC UNREAD"
Subscr 1   Receive:  ^SMGL: 1,"REC UNREAD","+491795289609",,"03/08/13,19:18:46+08"
```

Subscr 1 Receive: Hello, how are you?
Subscr 1 Receive: ^SMGL: 2,"REC UNREAD","+491795289609",,"03/08/13,19:20:00+08"
Subscr 1 Receive: Hi, did you receive my last message?
Subscr 1 Receive: ^SMGL: 3,"REC UNREAD","+491795289609",,"03/08/13,19:21:47+08"
Subscr 1 Receive: Hi, did you call me yesterday?
Subscr 1 Receive:
Subscr 1 Receive: OK
****
Comment: Read short message at index 1
Comment: Status "REC UNREAD" remains unchanged
****

Subscr 1   Send: AT^SMGR=1
Subscr 1 Receive: AT^SMGR=1
Subscr 1 Receive: ^SMGR: "REC UNREAD","+491795289609",,"03/08/13,19:18:46+08"
Subscr 1 Receive: Hello, how are you?
Subscr 1 Receive:
Subscr 1 Receive: OK
****
Comment: List all received unread short message in text mode
Comment: Status "REC UNREAD" changes to "REC READ"
****

Subscr 1   Send: AT+CMGL="REC UNREAD"
Subscr 1 Receive: AT+CMGL="REC UNREAD"
Subscr 1 Receive: +CMGL: 1,"REC UNREAD","+491795289609",,"03/08/13,19:18:46+08"
Subscr 1 Receive: Hello, how are you?
Subscr 1 Receive: +CMGL: 2,"REC UNREAD","+491795289609",,"03/08/13,19:20:00+08"
Subscr 1 Receive: Hi, did you receive my last message?
Subscr 1 Receive: +CMGL: 3,"REC UNREAD","+491795289609",,"03/08/13,19:21:47+08"
Subscr 1 Receive: Hi, did you call me yesterday?
Subscr 1 Receive:
Subscr 1 Receive: OK
****
Comment: List all received read short message in text mode
****

Subscr 1   Send: AT+CMGL="REC READ"
Subscr 1 Receive: AT+CMGL="REC READ"
Subscr 1 Receive: +CMGL: 1,"REC READ","+491795289609",,"03/08/13,19:18:46+08"
Subscr 1 Receive: Hello, how are you?
Subscr 1 Receive: +CMGL: 2,"REC READ","+491795289609",,"03/08/13,19:20:00+08"
Subscr 1 Receive: Hi, did you receive my last message?
Subscr 1 Receive: +CMGL: 3,"REC READ","+491795289609",,"03/08/13,19:21:47+08"
Subscr 1 Receive: Hi, did you call me yesterday?
Subscr 1 Receive:
Subscr 1 Receive: OK
****
Comment: Read short message from index 3
****

Subscr 1   Send: AT+CMGR=3
Subscr 1 Receive: AT+CMGR=3
Subscr 1 Receive: +CMGR: "REC READ","+491795289609",,"03/08/13,19:21:47+08"
Subscr 1 Receive: Hi, did you call me yesterday?
Subscr 1 Receive:
Subscr 1 Receive: OK

2.11.6   Receiving SMS

2.11.6.1   Description

This chapter takes you through all the steps involved in receiving short messages. To be notified of received short messages switch on the URC presentation with AT+CNMI (see chapter 2.11.1 "SMS initialization").

Two kinds of URCs are available to indicate a new SMS. Which one is used depends on the settings made with AT+CNMI.

- If URC "+CMTI: …" is presented, the information contains the storage type and the index where the received message was stored. You can then proceed to read the message from the indicated index, using one of the SMS reading commands.
- If URC "+CMT: … " is presented you have to acknowledge the reception of the short message by using AT+CNMA.

If SMS overflow presentation is enabled with AT^SMGO (see chapter 2.11.1 "SMS initialization"), the URC "^SMGO: 1" or "^SMGO: 2" will be presented, when the SMS storage is full. This notification is to inform you that you need to clear the SMS storage before you can receive the next short message.

2.11.6.2   Used AT commands

AT+CMGR   -   Read SMS message
AT+CNMA   -   New SMS message acknowledge to ME/TE, only phase 2+

For further details about the commands see [2].

2.11.6.3 Flow Chart
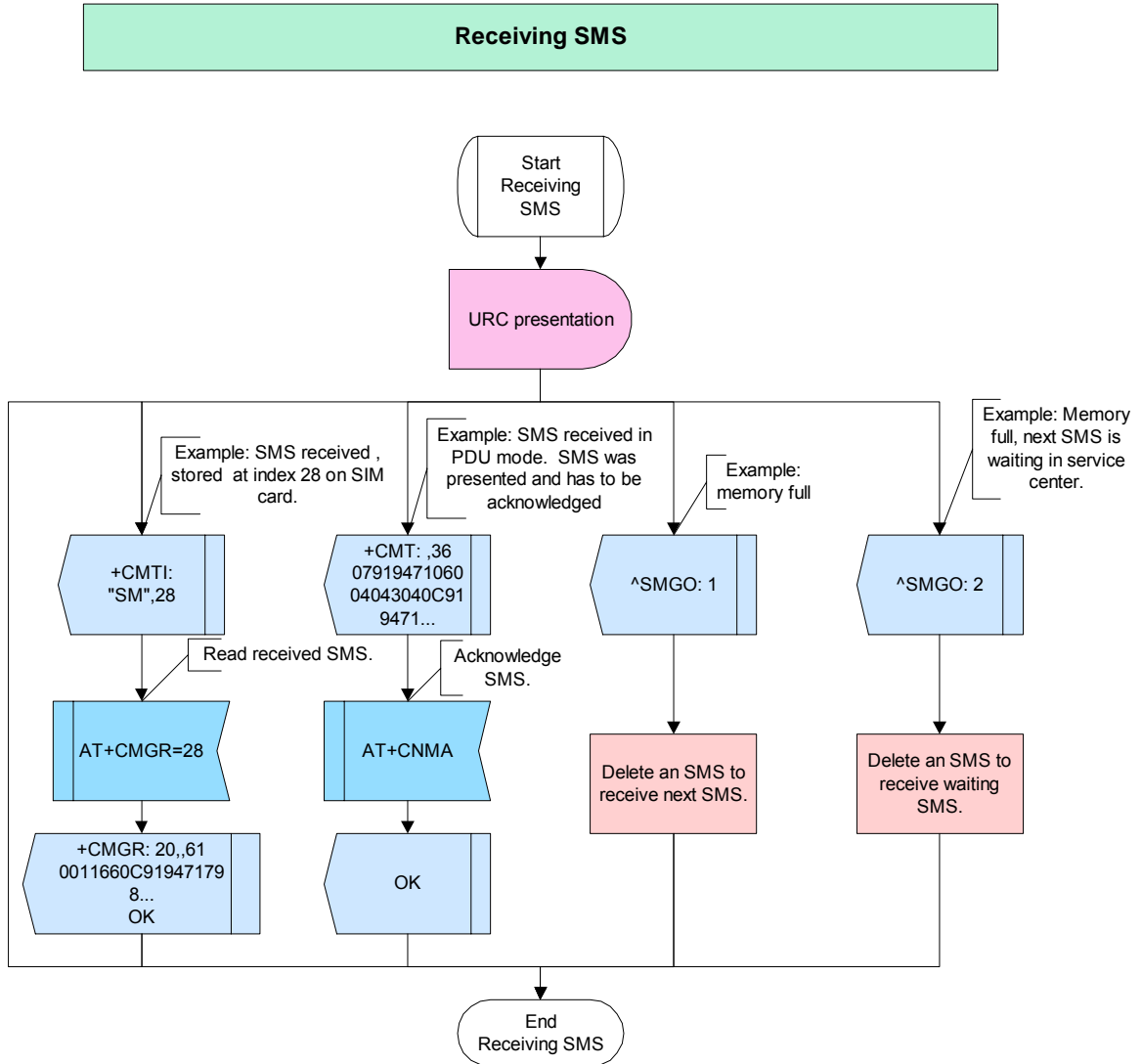
Figure 84: Receiving SMS

2.11.6.4 Hints

Not applicable.

2.11.6.5 Example

```
**************************************
Comment:  Receiving SMS
**************************************

**************************************
Comment:  Request SMS storage capacity (subscriber 1)
**************************************

Subscr 1    Send:  AT+CPMS?
Subscr 1  Receive:  AT+CPMS?
Subscr 1  Receive:  +CPMS: "SM",27,30,"SM",27,30,"SM",27,30
Subscr 1  Receive:
Subscr 1  Receive:  OK
```

```
****************************************
Comment:  Set URC presentation mode (indication of memory location)
****************************************


Subscr 1     Send:  AT+CNMI=2,1
Subscr 1   Receive:  AT+CNMI=2,1
Subscr 1   Receive:  OK


****************************************
Comment:  Subscriber 2 send a new SMS to subscriber 1
****************************************


Subscr 2     Send:  AT+CMGS=+491797782631
Subscr 2   Receive:  AT+CMGS=+491797782631
Subscr 2   Receive:  >
Subscr 2     Send:  new SMS to subscriber 1
Subscr 2   Receive:  new SMS to subscriber 1
Subscr 2   Receive:
Subscr 2   Receive:  +CMGS: 218
Subscr 2   Receive:
Subscr 2   Receive:  OK
Subscr 1   Receive:
Subscr 1   Receive:  +CMTI: "SM",28


****************************************
Comment:  Read new received SMS
****************************************


Subscr 1     Send:  AT+CMGR=28
Subscr 1   Receive:  AT+CMGR=28
Subscr 1   Receive:  +CMGR: "REC UNREAD","+491795289609",,"03/08/14,14:44:38+08"
Subscr 1   Receive:  new SMS to subscriber 1
Subscr 1   Receive:
Subscr 1   Receive:  OK


****************************************
Comment:  Set URC presentation mode (SMS is routed directly to TE) is depending on message class
****************************************


Subscr 1     Send:  AT+CNMI=2,2
Subscr 1   Receive:  AT+CNMI=2,2
Subscr 1   Receive:  OK


****************************************
Comment:  Subscriber 2 send a new SMS to subscriber 1
****************************************


Subscr 2     Send:  AT+CMGS=+491797782631
Subscr 2   Receive:  AT+CMGS=+491797782631
Subscr 2   Receive:  >
Subscr 2     Send:  second SMS to subscriber 1
Subscr 2   Receive:  second SMS to subscriber 1
Subscr 2   Receive:
Subscr 2   Receive:  +CMGS: 219
Subscr 2   Receive:
Subscr 2   Receive:  OK
Subscr 1   Receive:
Subscr 1   Receive:  +CMT: "+491795289609",,"03/08/14,14:44:49+08"
Subscr 1   Receive:  second SMS to subscriber 1
```

```
***************************************
Comment:  Acknowledge received SMS
***************************************


Subscr 1     Send:  AT+CNMA
Subscr 1   Receive:  AT+CNMA
Subscr 1   Receive:  OK


***************************************
Comment:  Set URC presentation mode (indication of memory location)
***************************************


Subscr 1     Send:  AT+CNMI=2,1
Subscr 1   Receive:  AT+CNMI=2,1
Subscr 1   Receive:  OK


***************************************
Comment:  Subscriber 2 send two more messages to provoke storage overflow presentation
***************************************


Subscr 2     Send:  AT+CMGS=+491797782631
Subscr 2   Receive:  AT+CMGS=+491797782631
Subscr 2   Receive:  >
Subscr 2     Send:  third SMS to subscriber 1
Subscr 2   Receive:  third SMS to subscriber 1
Subscr 1   Receive:
Subscr 1   Receive:  +CMTI: "SM",29
Subscr 2     Send:  AT+CMGS=+491797782631
Subscr 2   Receive:
Subscr 2   Receive:  OK
Subscr 2     Send:  fourth SMS to subscriber 1
Subscr 1   Receive:
Subscr 1   Receive:  +CMTI: "SM",30
Subscr 1   Receive:
Subscr 1   Receive:  ^SMGO: 1
Subscr 1   Receive:
Subscr 1   Receive:  ^SMGO: 2


***************************************
Comment:  Delete SMS at index 30 to receive the waiting one
***************************************


Subscr 1     Send:  AT+CMGD=30
Subscr 1   Receive:  AT+CMGD=30
Subscr 1   Receive:  OK
Subscr 1   Receive:
Subscr 1   Receive:  ^SMGO: 0
Subscr 1   Receive:
Subscr 1   Receive:  +CMTI: "SM",30
Subscr 1   Receive:
Subscr 1   Receive:  ^SMGO: 1
```

2.11.7   Receiving status report

2.11.7.1   Description

This chapter describes all the steps required to obtain a status report. There are two ways to activate the presentation of status reports:

- When using PDU mode, status reports can be enabled with the first octet of the PDU.
- When using text mode, you can switch it on with the first parameter (<fo>) of AT+CSMP (see chapter 2.11.1 "SMS initialization").

To be notified when a status report is received, activate the URC presentation with AT+CNMI as described in chapter 2.11.6 "Receiving SMS".

2.11.7.2   Used AT commands

AT+CMGR   -   Read SMS message
AT+CNMA   -   New SMS message acknowledge to ME/TE, only phase 2+

For further details about the commands see [2].

2.11.7.3 Flow Chart
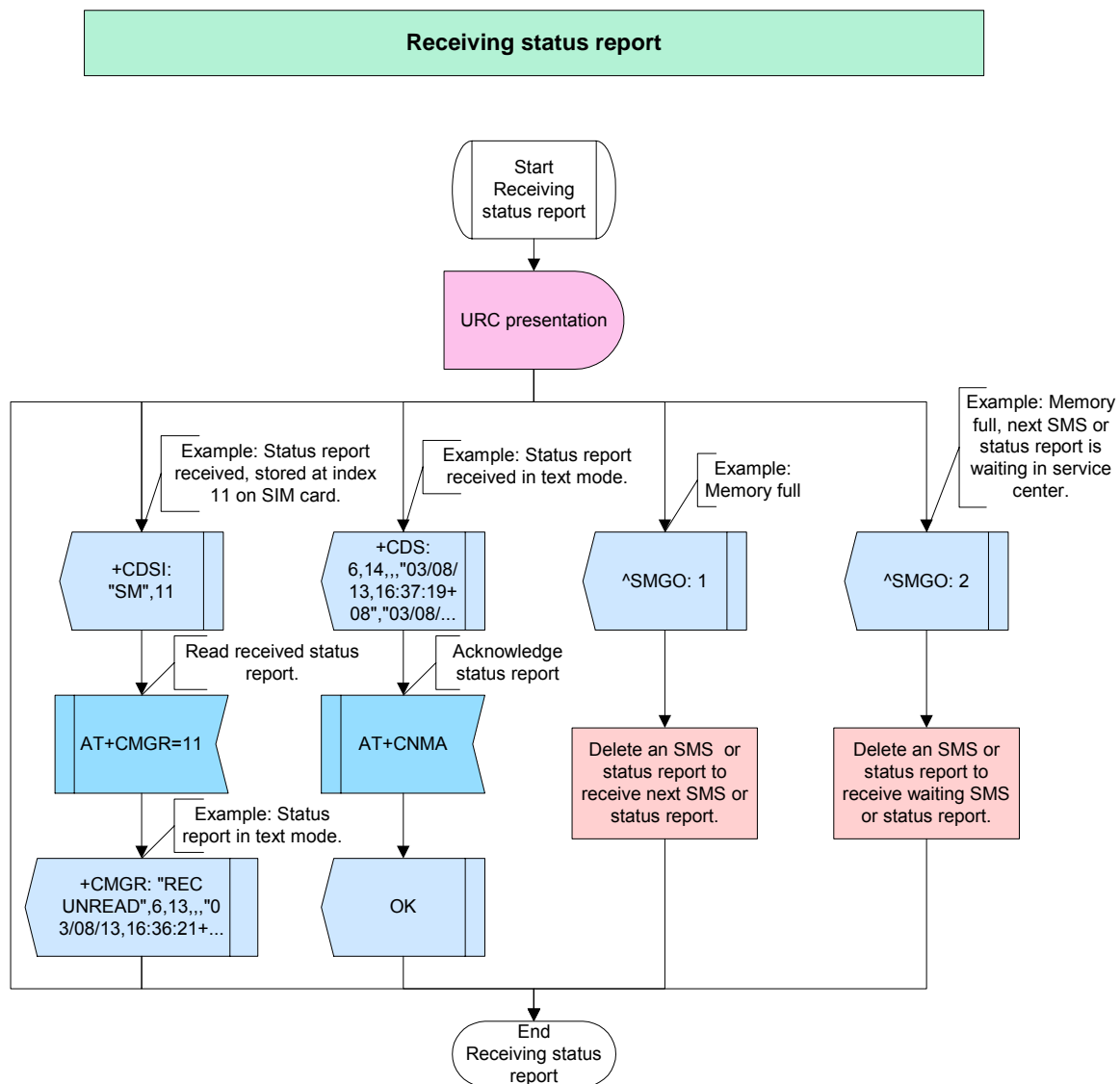
Figure 85: Receiving status report

2.11.7.4 Hints

Not applicable.

2.11.7.5   Example

****

Comment: Receiving status report

****

****

Comment: Enable URC presentation (status report is routed directly to TE)

****

Subscr 1   Send: AT+CNMI=2,1,0,1
Subscr 1   Receive: AT+CNMI=2,1,0,1
Subscr 1   Receive: OK

****

Comment: Set text mode Parameter (enable status report)

****

Subscr 1   Send: AT+CSMP=49,200,0,0
Subscr 1   Receive: AT+CSMP=49,200,0,0
Subscr 1   Receive: OK

****

Comment: Send SMS

****

Subscr 1   Send: AT+CMGS=+491797782631
Subscr 1   Receive: AT+CMGS=+491797782631
Subscr 1   Receive: >
Subscr 1   Send: Test SMS
Subscr 1   Receive: Test SMS
Subscr 1   Receive:
Subscr 1   Receive: +CMGS: 121
Subscr 1   Receive:
Subscr 1   Receive: OK
Subscr 1   Receive:
Subscr 1   Receive: +CDS: 6,121,,,"03/08/14,17:14:56+08","03/08/14,17:14:57+08",48

****

Comment: Acknowledge status report

****

Subscr 1   Send: AT+CNMA
Subscr 1   Receive: AT+CNMA
Subscr 1   Receive: OK

****

Comment: Enable URC presentation (indication of the memory location is routed to TE)

****

Subscr 1   Send: AT+CNMI=2,1,0,2
Subscr 1   Receive: AT+CNMI=2,1,0,2
Subscr 1   Receive: OK

****

Comment: Send SMS

****

Subscr 1   Send: AT+CMGS=+491797782631
Subscr 1   Receive: AT+CMGS=+491797782631

Subscr 1   Receive: >
Subscr 1   Send: Test SMS 2
Subscr 1   Receive: Test SMS 2
Subscr 1   Receive:
Subscr 1   Receive: +CMGS: 122
Subscr 1   Receive:
Subscr 1   Receive: OK
Subscr 1   Receive:
Subscr 1   Receive: +CDSI: "SM",10

****
Comment: Read status report
****

Subscr 1   Send: AT+CMGR=10
Subscr 1   Receive: AT+CMGR=10
Subscr 1   Receive: +CMGR: "REC
UNREAD",6,122,,,"03/08/14,17:15:08+08","03/08/14,17:15:10+08",48
Subscr 1   Receive:
Subscr 1   Receive: OK

2.11.8   Receiving cell broadcast message

2.11.8.1   Description

This chapter describes all the steps required to receive a cell broadcast message. First, you need to subscribe to a CBS channel in order to receive CBSs on this channel. To do so, use the command AT+CSCB. For details see chapter 2.11.1 "SMS initialization".

To be notified when a CBS is received, activate the URC presentation with AT+CNMI as described in chapter 2.11.6 "Receiving SMS". The application should be able to display the received message once the URC "+CBS: …" is presented.

2.11.8.2   Used AT commands

AT+CSCB   -   Select Cell Broadcast message indication
AT+CNMI   -   New SMS message indications

For further details about the commands see [2].

2.11.8.3   Flow Chart
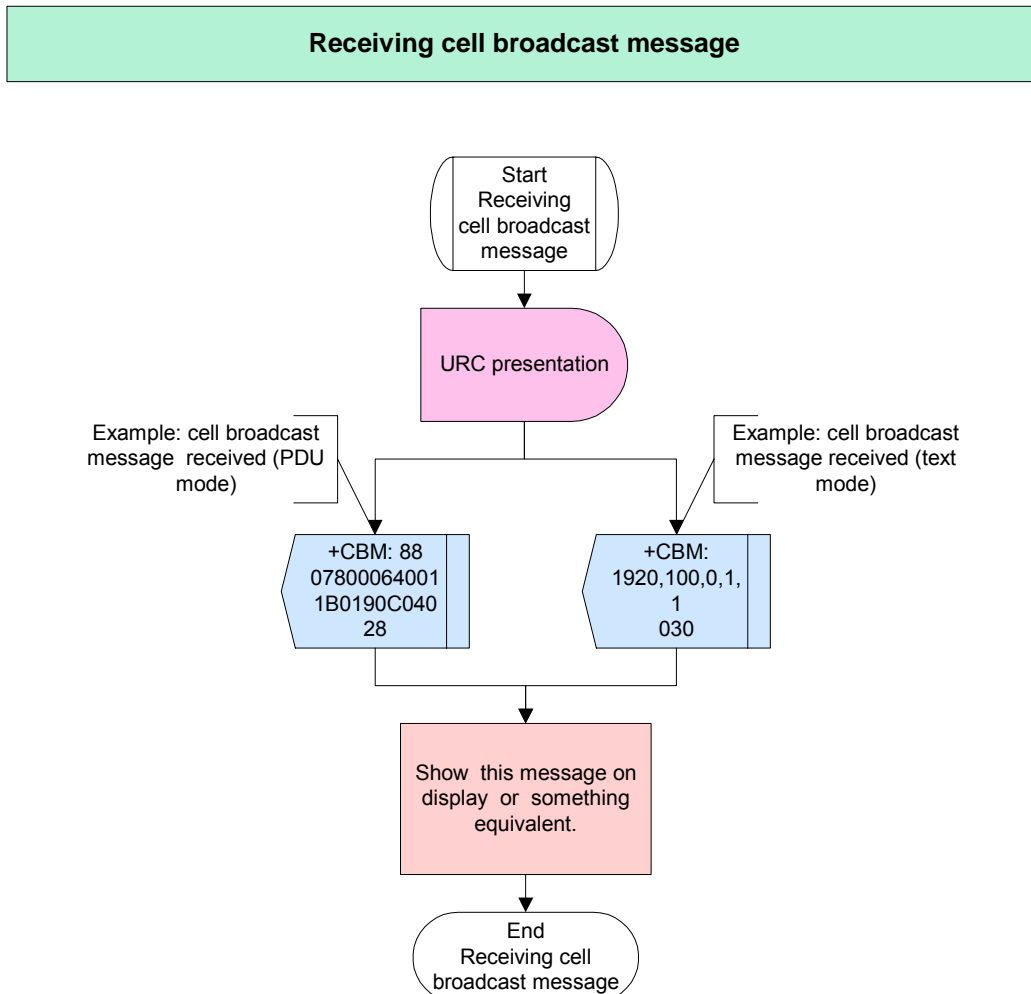
Figure 86: Receiving cell broadcast message

2.11.8.4   Hints

- Which channel is supported depends on your provider, please ask for it.

2.11.8.5   Example

```
****************************************

Comment:  Receive cell broadcast message
****************************************

****************************************

Comment:  Enable URC presentation for CBS
****************************************


Subscr 1     Send:  AT+CNMI=2,1,2
Subscr 1   Receive: AT+CNMI=2,1,2
Subscr 1   Receive: OK


****************************************

Comment:  subscribe to CBS channel 221
****************************************


Subscr 1     Send:  AT+CSCB=0,221,0
Subscr 1   Receive: AT+CSCB=0,221,0
Subscr 1   Receive: OK
Subscr 1   Receive:
Subscr 1   Receive: +CBM: 17,221,0,1,1
Subscr 1   Receive: 379019583119
Subscr 1   Receive:
Subscr 1   Receive: +CBM: 17,221,0,1,1
Subscr 1   Receive: 378938583242
Subscr 1   Receive:
Subscr 1   Receive: +CBM: 17,221,0,1,1
Subscr 1   Receive: 379019583119
```

2.12   Phonebook
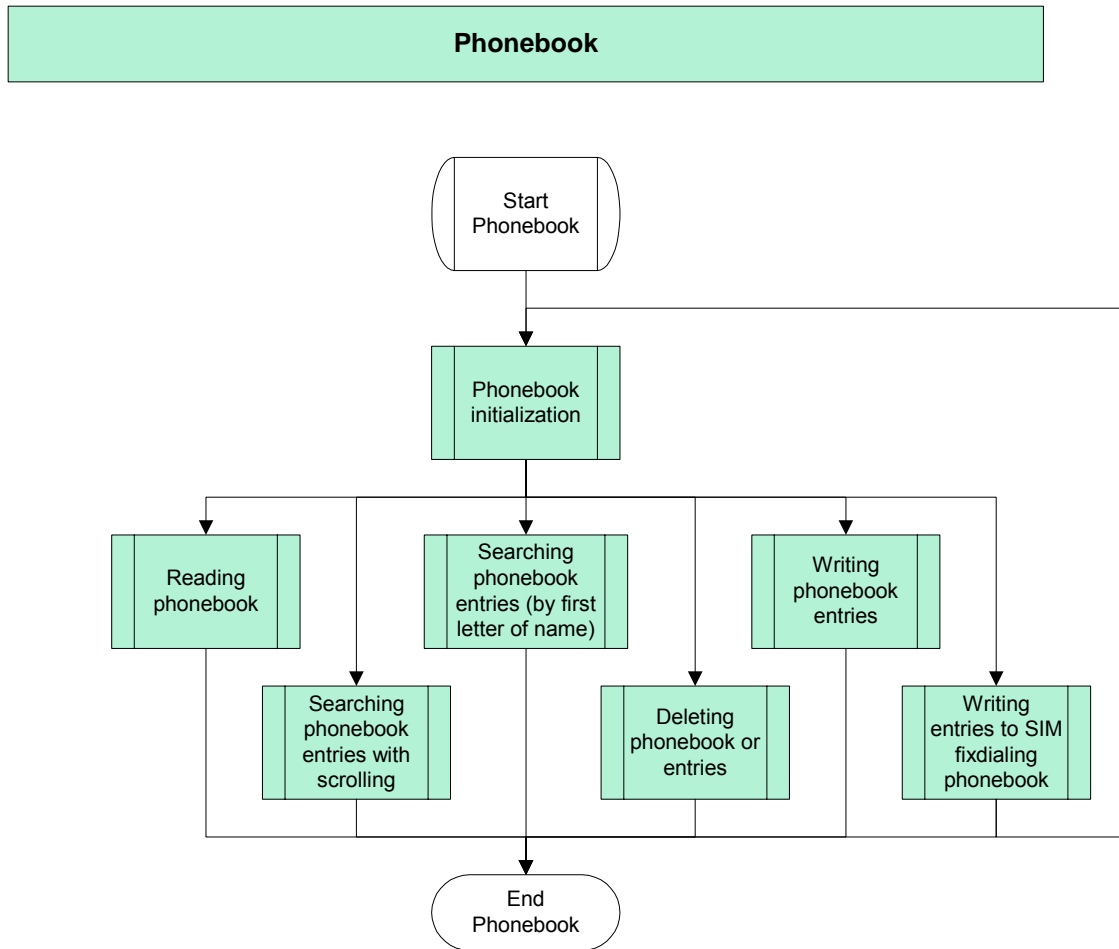
Figure 87: Phonebook

2.12.1   Phonebook initialization

2.12.1.1   Description

This chapter describes how to initialize the module for using phonebook functions. Note that all AT commands available for reading or editing any entries are related to the active phonebook storage. To select a phonebook use the command AT+CPBS.

If you wish to write entries to the fixdialing phonebook, it is necessary to enter PIN2 before. You have only 3 attempts to enter the correct PIN2. After 3 wrong attempts PUK2 is required. For detailed information about entering PIN2 see chapter 2.5.5.

2.12.1.2   Used AT commands

AT+CPBS   -   Select phonebook memory storage
AT+CPIN2   -   Enter PIN2

For further details about the commands see [2].

2.12.1.3 Flow chart
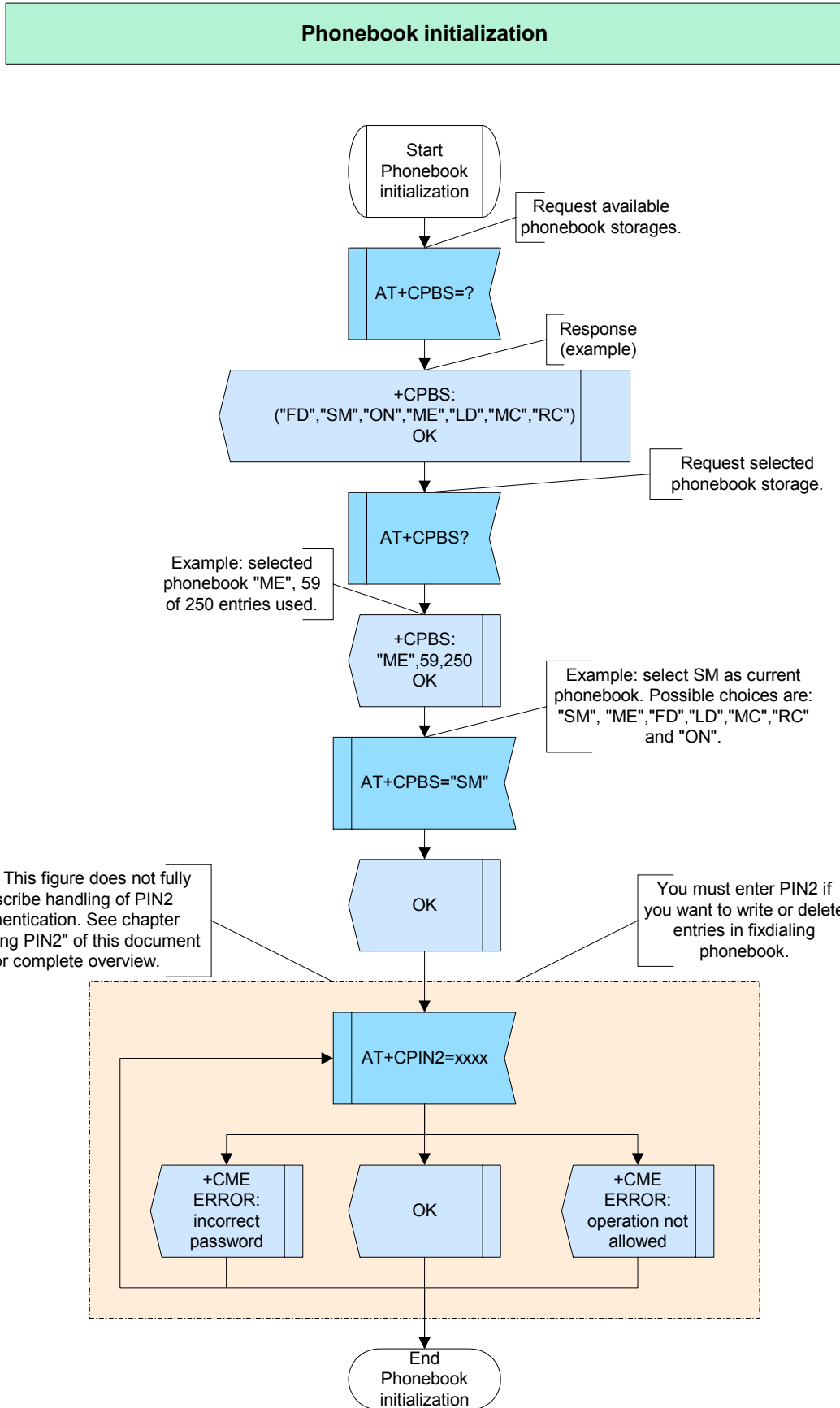
Figure 88: Phonebook initialization

2.12.1.4 Hints

Not applicable.

2.12.1.5 Example

```
***************************************
Comment:  Phonebook initialization
***************************************
***************************************
Comment:  Request selected phonebook storage.
***************************************

Subscr 1     Send:  AT+CPBS?
Subscr 1   Receive: AT+CPBS?
Subscr 1   Receive: +CPBS: "ME",53,250
Subscr 1   Receive:
Subscr 1   Receive: OK


***************************************
Comment:  Select FD as current phonebook storage.
***************************************

Subscr 1     Send:  AT+CPBS="FD"
Subscr 1   Receive: AT+CPBS="FD"
Subscr 1   Receive: OK


***************************************
Comment:  Entering wrong PIN2
***************************************

Subscr 1     Send:  AT+CPIN2=0000
Subscr 1   Receive: AT+CPIN2=0000
Subscr 1   Receive: +CME ERROR: incorrect password


***************************************
Comment:  Entering correct PIN2.
***************************************

Subscr 1     Send:  AT+CPIN2=1234
Subscr 1   Receive: AT+CPIN2=1234
Subscr 1   Receive: OK


***************************************
Comment:  Entering correct PIN2 second time.
***************************************

Subscr 1     Send:  AT+CPIN2=1234
Subscr 1   Receive: AT+CPIN2=1234
Subscr 1   Receive: +CME ERROR: operation not allowed
```

2.12.2   Reading phonebook entries

2.12.2.1   Description

This chapter describes all the steps used to read one or more entries from your phonebooks. You can read entries sorted by index or sorted by name in alphabetical order. Sorting by name is only supported for the phonebook types "SM", "ME", "FD" (fixdialing phonebook) and "ON" (own number phonebook).

Other phonebooks are "LD" (last dialed numbers), "MC" (list of your missed calls) and "RC" (list of received calls). These phonebooks only support reading by sorted index.

2.12.2.2   Used AT commands

AT+CPBS   -   Select phonebook memory storage
AT^SPBG   -   Read entry from active telephone book via sorted index
AT+CPBR   -   Read current phonebook entries

For further details about the commands see [2].

2.12.2.3 Flow Chart

Reading phonebook entries

Start
Reading
phonebook
entries

Query type of active
phonebook.

AT+CPBS?

Example: FD
phonebook 3 of
10 entries used.

Example: ON
phonebook 1 of
5 entries used.

Example: LD
phonebook 10 of
10 entries used.

Example: RC
phonebook 1 of
10 entries used.

+CPBS:
"FD",3,10
OK

+CPBS:
"ON",1,5
OK

+CPBS:
"LD",10,10
OK

+CPBS:
"RC",1,10
OK

Example: SM
phonebook 20 of
250 entries
used.

Example: ME
phonebook 26 of
250 entries
used.

Example: some
other phone-
books, supported
by your ME.

Example: MC
phonebook 0 of
10 entries used.

+CPBS:
"SM",20,250+
OK

+CPBS:
"ME",26,250
OK

+CPBS:
"XX",y,z
OK

+CPBS:
"MC",0,10
OK

*(1)

*(2)

Figure 89: Reading phonebook entries – part 1
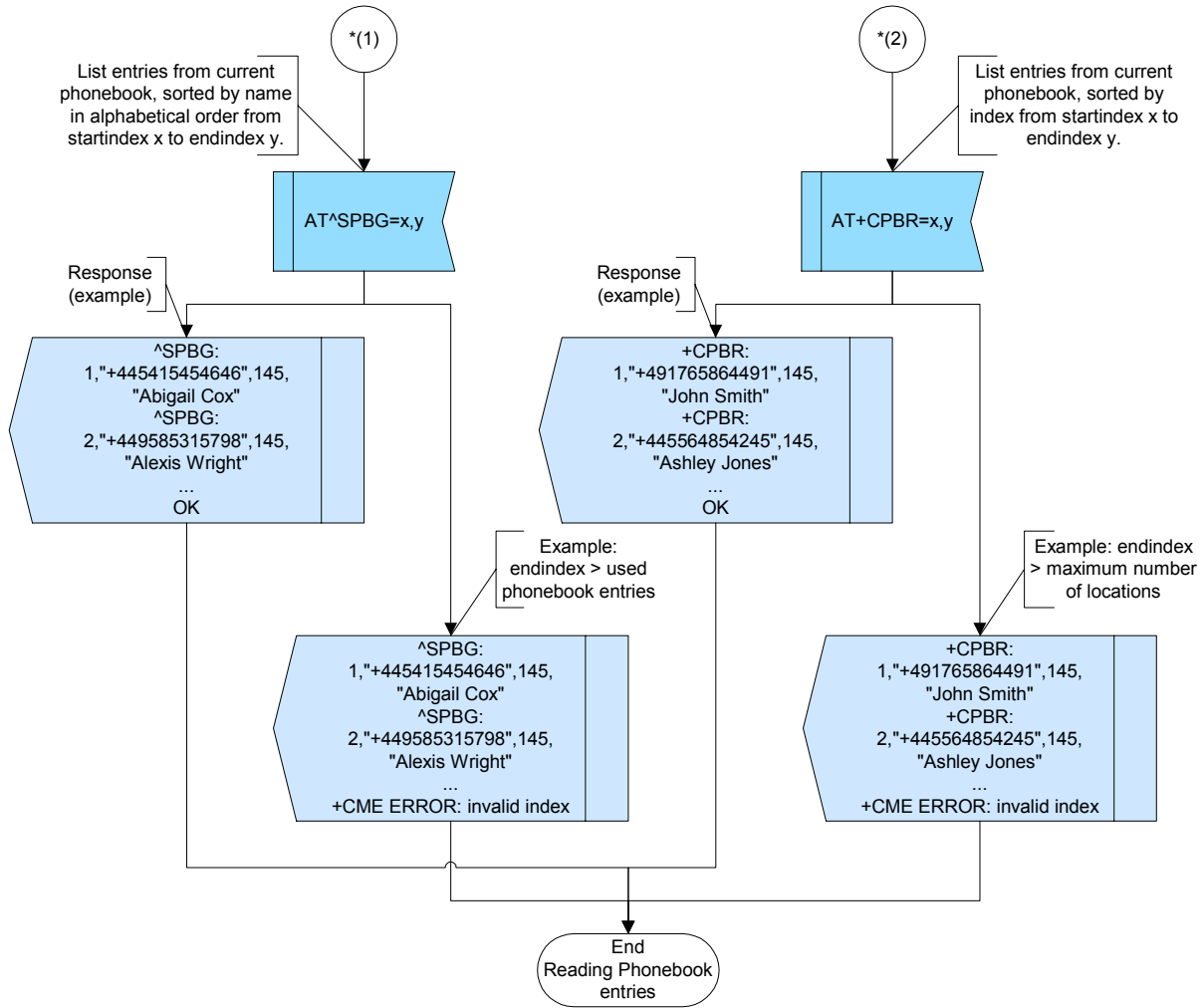
Figure 90: Reading phonebook entries – part 2

2.12.2.4   Hints

• For some products an extra parameter for AT^SPBG is available to get the physical index of an entry. For detail please see [2].

2.12.2.5   Example

```
**************************************
Comment:  Reading phonebook entries
**************************************
**************************************
Comment:  Request selected phonebook and number of entries.
**************************************
Subscr 1    Send:  AT+CPBS?
Subscr 1    Receive:  AT+CPBS?
Subscr 1    Receive:  +CPBS: "SM",9,20
Subscr 1    Receive:
Subscr 1    Receive:  OK
**************************************
Comment:  List phonebook entries sorted by name.
**************************************
Subscr 1    Send:  AT^SPBG=1,8
```

```
Subscr 1   Receive: AT^SPBG=1,8
Subscr 1   Receive: ^SPBG: 1,"+445415454646",145,"Abigail Cox"
Subscr 1   Receive: ^SPBG: 2,"+449585315798",145,"Alexis Wright"
Subscr 1   Receive: ^SPBG: 3,"+445565656899",145,"Hannah Adams"
Subscr 1   Receive: ^SPBG: 4,"+44556565657",145,"Joe Anderson"
Subscr 1   Receive: ^SPBG: 5,"+491765864491",145,"John Smith"
Subscr 1   Receive: ^SPBG: 6,"+446565689115",145,"Kyla Clark"
Subscr 1   Receive: ^SPBG: 7,"+445636934485",145,"Oscar  Thomson"
Subscr 1   Receive: ^SPBG: 8,"+44545896638",145,"Paul Williams"
Subscr 1   Receive:
Subscr 1   Receive: OK
***************************************
Comment:  List phonebook entries sorted by name (endindex > number of used entries).
***************************************
Subscr 1    Send:  AT^SPBG=1,20
Subscr 1   Receive: AT^SPBG=1,20
Subscr 1   Receive: ^SPBG: 1,"+445415454646",145,"Abigail Cox"
Subscr 1   Receive: ^SPBG: 2,"+449585315798",145,"Alexis Wright"
Subscr 1   Receive: ^SPBG: 3,"+445565656899",145,"Hannah Adams"
Subscr 1   Receive: ^SPBG: 4,"+44556565657",145,"Joe Anderson"
Subscr 1   Receive: ^SPBG: 5,"+491765864491",145,"John Smith"
Subscr 1   Receive: ^SPBG: 6,"+446565689115",145,"Kyla Clark"
Subscr 1   Receive: ^SPBG: 7,"+445636934485",145,"Oscar  Thomson"
Subscr 1   Receive: ^SPBG: 8,"+44545896638",145,"Paul Williams"
Subscr 1   Receive: ^SPBG: 9,"+447982865563",145,"Samantha Young"
Subscr 1   Receive: +CME ERROR: invalid index
***************************************
Comment:  List phonebook entries sorted by index.
***************************************
Subscr 1    Send:  AT+CPBR=1,20
Subscr 1   Receive: AT+CPBR=1,20
Subscr 1   Receive: +CPBR: 1,"+491765864491",145,"John Smith"
Subscr 1   Receive: +CPBR: 2,"+44545896638",145,"Paul Williams"
Subscr 1   Receive: +CPBR: 3,"+44556565657",145,"Joe Anderson"
Subscr 1   Receive: +CPBR: 4,"+445636934485",145,"Oscar  Thomson"
Subscr 1   Receive: +CPBR: 5,"+445565656899",145,"Hannah Adams"
Subscr 1   Receive: +CPBR: 6,"+447982865563",145,"Samantha Young"
Subscr 1   Receive: +CPBR: 7,"+449585315798",145,"Alexis Wright"
Subscr 1   Receive: +CPBR: 8,"+445415454646",145,"Abigail Cox"
Subscr 1   Receive: +CPBR: 12,"+446565689115",145,"Kyla Clark"
Subscr 1   Receive:
Subscr 1   Receive: OK
***************************************
Comment:  List phonebook entries sorted by index (endindex > maximum number of locations).
***************************************
Subscr 1    Send:  AT+CPBR=1,260
Subscr 1   Receive: AT+CPBR=1,260
Subscr 1   Receive: +CPBR: 1,"+491765864491",145,"John Smith"
Subscr 1   Receive: +CPBR: 2,"+44545896638",145,"Paul Williams"
Subscr 1   Receive: +CPBR: 3,"+44556565657",145,"Joe Anderson"
Subscr 1   Receive: +CPBR: 4,"+445636934485",145,"Oscar  Thomson"
Subscr 1   Receive: +CPBR: 5,"+445565656899",145,"Hannah Adams"
Subscr 1   Receive: +CPBR: 6,"+447982865563",145,"Samantha Young"
Subscr 1   Receive: +CPBR: 7,"+449585315798",145,"Alexis Wright"
Subscr 1   Receive: +CPBR: 8,"+445415454646",145,"Abigail Cox"
Subscr 1   Receive: +CPBR: 12,"+446565689115",145,"Kyla Clark"
Subscr 1   Receive: +CME ERROR: invalid index
```

2.12.3 Searching phonebook entries by scrolling up and down

2.12.3.1 Description

This chapter describes how to search for a phonebook entry by scrolling up and down with AT^SPBS. Every time the write command AT^SPBS=<value> is executed, 3 rows of phonebook records are returned. Each triplet overlaps with the next one, i.e. the last two records of the preceding triplet will be presented on top of the next one.

2.12.3.2 Used AT commands

AT&F   -   Set all current parameters to manufacturer defaults
ATZ   -   Set all current parameters to user defined profile
AT^SPBS   -   Read entry from active telephone book via sorted index

For further details about the commands see [2].

2.12.3.3 Flow chart
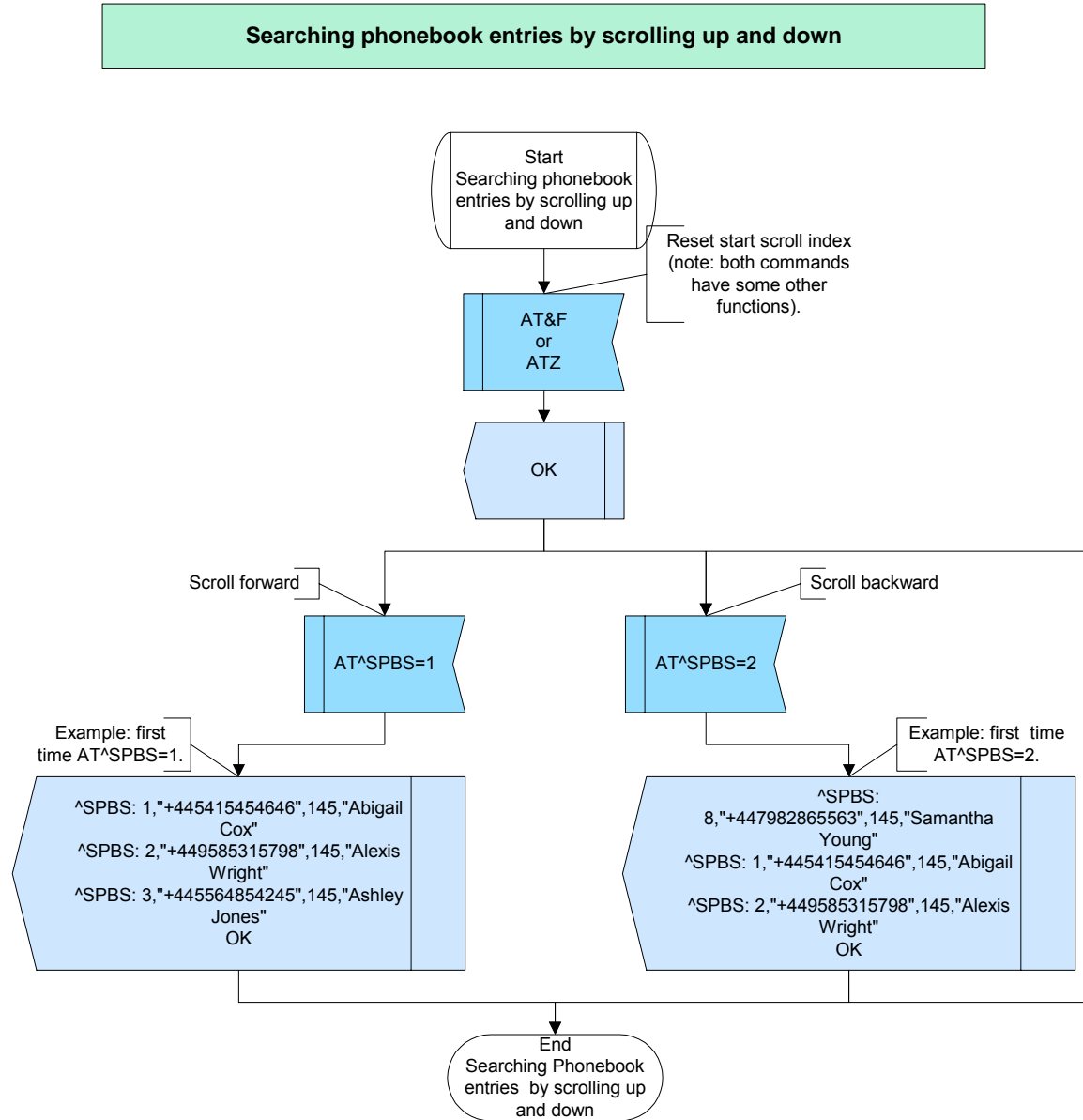
Figure 91: Searching phonebook entries by scrolling up and down

2.12.3.4 Hints

Not applicable.

2.12.3.5 Example

```
****************************************
Comment: Searching phonebook entries by scrolling up and down
****************************************

****************************************
Comment:  Reset start scroll index.
****************************************


Subscr 1     Send:  ATZ
Subscr 1   Receive:  ATZ
Subscr 1   Receive:  OK


****************************************
Comment:  Scrolling forward.
****************************************


Subscr 1     Send:  AT^SPBS=1
Subscr 1   Receive:  AT^SPBS=1
Subscr 1   Receive:  ^SPBS: 1,"+445415454646",145,"Abigail Cox"
Subscr 1   Receive:  ^SPBS: 2,"+449585315798",145,"Alexis Wright"
Subscr 1   Receive:  ^SPBS: 3,"+445565656899",145,"Hannah Adams"
Subscr 1   Receive:
Subscr 1   Receive:  OK


****************************************
Comment:  Scrolling forward.
****************************************


Subscr 1     Send:  AT^SPBS=1
Subscr 1   Receive:  AT^SPBS=1
Subscr 1   Receive:  ^SPBS: 2,"+449585315798",145,"Alexis Wright"
Subscr 1   Receive:  ^SPBS: 3,"+445565656899",145,"Hannah Adams"
Subscr 1   Receive:  ^SPBS: 4,"+44556565657",145,"Joe Anderson"
Subscr 1   Receive:
Subscr 1   Receive:  OK


****************************************
Comment:  Scrolling forward.
****************************************


Subscr 1     Send:  AT^SPBS=1
Subscr 1   Receive:  AT^SPBS=1
Subscr 1   Receive:  ^SPBS: 3,"+445565656899",145,"Hannah Adams"
Subscr 1   Receive:  ^SPBS: 4,"+44556565657",145,"Joe Anderson"
Subscr 1   Receive:  ^SPBS: 5,"+491765864491",145,"John Smith"
Subscr 1   Receive:
Subscr 1   Receive:  OK


****************************************
Comment:  Scrolling backward.
****************************************


Subscr 1     Send:  AT^SPBS=2
Subscr 1   Receive:  AT^SPBS=2
Subscr 1   Receive:  ^SPBS: 2,"+449585315798",145,"Alexis Wright"
Subscr 1   Receive:  ^SPBS: 3,"+445565656899",145,"Hannah Adams"
Subscr 1   Receive:  ^SPBS: 4,"+44556565657",145,"Joe Anderson"
```

Subscr 1 Receive:
Subscr 1 Receive: OK

****
Comment: scroll backward
****

Subscr 1   Send: AT^SPBS=2
Subscr 1 Receive: AT^SPBS=2
Subscr 1 Receive: ^SPBS: 1,"+445415454646",145,"Abigail Cox"
Subscr 1 Receive: ^SPBS: 2,"+449585315798",145,"Alexis Wright"
Subscr 1 Receive: ^SPBS: 3,"+445565656899",145,"Hannah Adams"
Subscr 1 Receive:
Subscr 1 Receive: OK

****
Comment: Scrolling backward.
****

Subscr 1   Send: AT^SPBS=2
Subscr 1 Receive: AT^SPBS=2
Subscr 1 Receive: ^SPBS: 9,"+447982865563",145,"Samantha Young"
Subscr 1 Receive: ^SPBS: 1,"+445415454646",145,"Abigail Cox"
Subscr 1 Receive: ^SPBS: 2,"+449585315798",145,"Alexis Wright"
Subscr 1 Receive:
Subscr 1 Receive: OK

****
Comment: Scrolling backward.
****

Subscr 1   Send: AT^SPBS=2
Subscr 1 Receive: AT^SPBS=2
Subscr 1 Receive: ^SPBS: 8,"+44545896638",145,"Paul Williams"
Subscr 1 Receive: ^SPBS: 9,"+447982865563",145,"Samantha Young"
Subscr 1 Receive: ^SPBS: 1,"+445415454646",145,"Abigail Cox"
Subscr 1 Receive:
Subscr 1 Receive: OK

2.12.4 Searching phonebook entries by first letter of name

2.12.4.1 Description

This chapter describes all the steps used to search a phonebook entry by first letter of name. The function applies only to the following phonebook types: "SM", "ME", "FD".

AT^SPBC returns the index of the searched entry. Please note that the sorted entries are assigned an index of their own which is not identical with the location numbers used in the various phonebooks. Do not use the listed index numbers to dial out or edit entries.

2.12.4.2 Used AT commands

AT^SPBC   -   Search the first entry in the sorted telephone book
AT^SPBG   -   Read entry from active telephone book via sorted index

For further details about the commands see [2].

2.12.4.3 Flow Chart
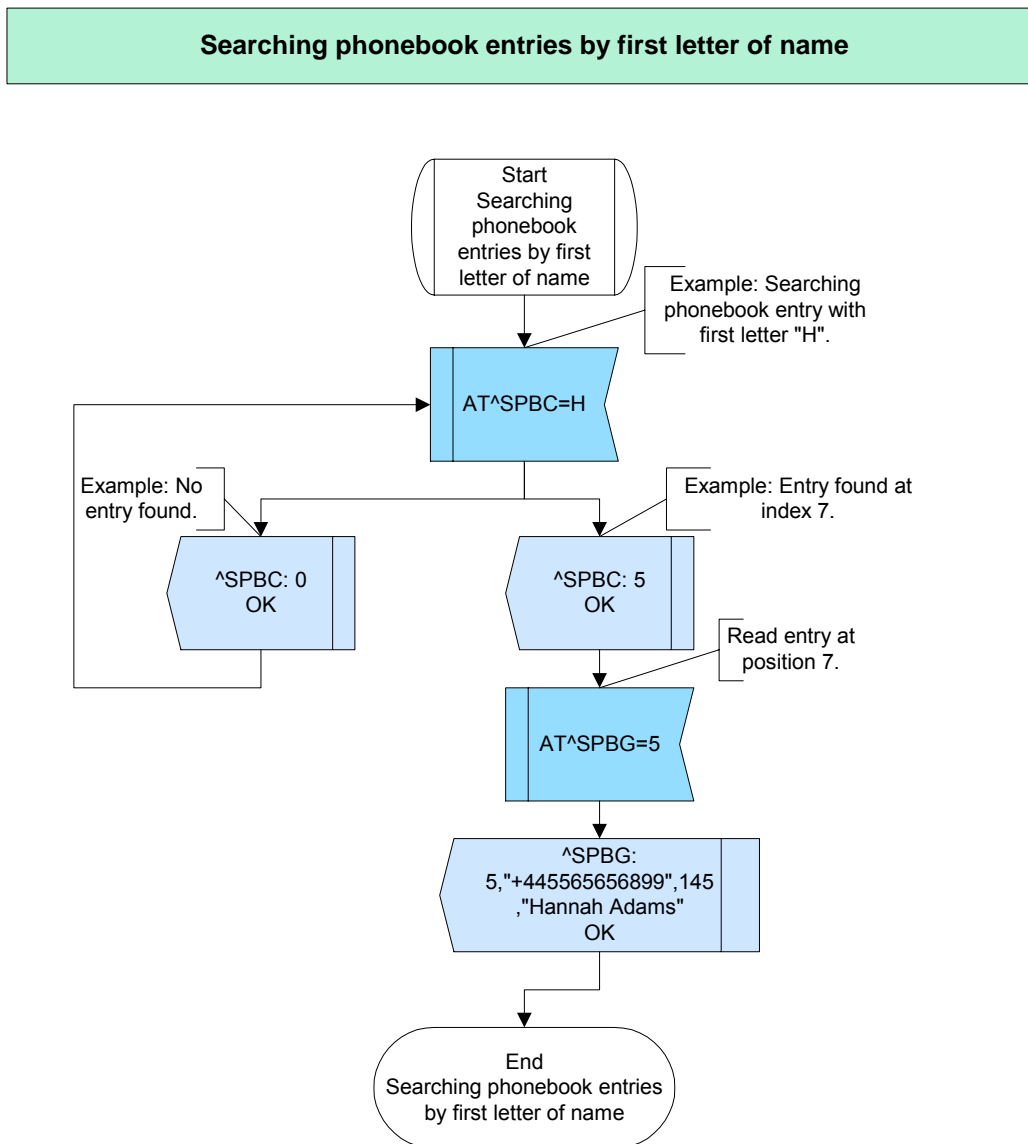
Figure 92: Searching phonebook entries by first letter of name

2.12.4.4 Hints

Not applicable.

2.12.4.5 Example

```
****************************************
Comment:  Searching phonebook entries by first letter of name
****************************************

****************************************
Comment:  Searching phonebook entry with first letter "H".
****************************************


Subscr 1     Send:  AT^SPBC="H"
Subscr 1   Receive: AT^SPBC="H"
Subscr 1   Receive: ^SPBC: 3
Subscr 1   Receive:
Subscr 1   Receive: OK


****************************************
Comment:  Read entry at index 3.
****************************************


Subscr 1     Send:  AT^SPBG=3
Subscr 1   Receive: AT^SPBG=3
Subscr 1   Receive: ^SPBG: 3,"+445565656899",145,"Hannah Adams"
Subscr 1   Receive:
Subscr 1   Receive: OK
```

2.12.5   Deleting phonebook or phonebook entries

2.12.5.1   Description

This chapter describes the steps used to delete an entry of a phonebook or to delete a whole phonebook.

Depending on the type of phonebook there are different ways to delete entries.
- If the active phonebook is "SM", "ME", "FD" or "ON":
  Use the AT+CPBW command and simply enter the location number of the entry to be deleted. To delete the entire phonebook this action must be performed for each single entry.
  If you wish to delete entries in the "FD" phonebook remember that PIN2 authentication must be done before as described in chapter 2.12.7.

- If the active phonebook is "LD", "RC" or "MC":
  There is no way to edit a single entry (AT+CPBW cannot be used). The command AT^SPBD clears all entries stored in the phonebook.
  The "LD" phonebook can also be deleted with AT^SDLD. See [2] for detail.

2.12.5.2   Used AT commands

AT+CPBR   -   Read current phonebook entries
AT+CPBW   -   Write phonebook entry
AT^SPBD   -   Delete the given phonebook

For further details about the commands see [2].

2.12.5.3 Flow chart
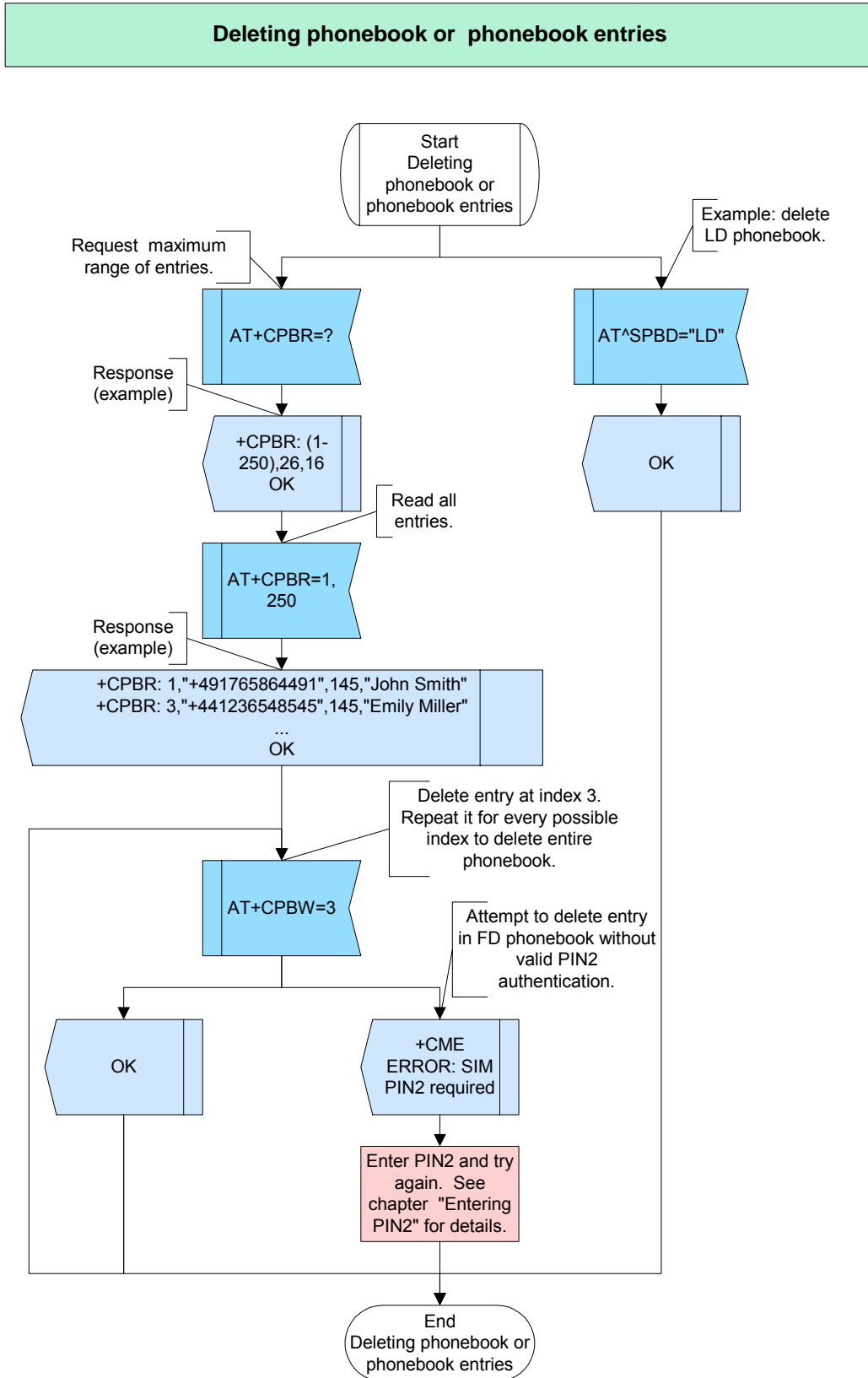
Figure 93: Deleting phonebook entries

2.12.5.4   Hints

- For PIN2 see phonebook initialization in chapter 2.12.1 and details on "FD" phonebook in chapter 2.12.7.

2.12.5.5   Example

```
***************************************
Comment:  Deleting phonebook or phonebook entries
***************************************
***************************************
Comment:  Request maximum range of entries and number of used memory locations.
***************************************


Subscr 1     Send:  AT+CPBR=?
Subscr 1   Receive:  AT+CPBR=?
Subscr 1   Receive:  +CPBR: (1-20),20,14
Subscr 1   Receive:
Subscr 1   Receive:  OK


***************************************
Comment:  Read all entries.
***************************************


Subscr 1     Send:  AT+CPBR=1,20
Subscr 1   Receive:  AT+CPBR=1,20
Subscr 1   Receive:  +CPBR: 1,"+491765864491",145,"John Smith"
Subscr 1   Receive:  +CPBR: 2,"+44545896638",145,"Paul Williams"
Subscr 1   Receive:  +CPBR: 3,"+44556565657",145,"Joe Anderson"
Subscr 1   Receive:  +CPBR: 4,"+445636934485",145,"Oscar  Thomson"
Subscr 1   Receive:  +CPBR: 5,"+445565656899",145,"Hannah Adams"
Subscr 1   Receive:  +CPBR: 6,"+447982865563",145,"Samantha Young"
Subscr 1   Receive:  +CPBR: 7,"+449585315798",145,"Alexis Wright"
Subscr 1   Receive:  +CPBR: 8,"+445415454646",145,"Abigail Cox"
Subscr 1   Receive:  +CPBR: 12,"+446565689115",145,"Kyla Clark"
Subscr 1   Receive:
Subscr 1   Receive:  OK


***************************************
Comment:  Delete entry at index 3.
***************************************


Subscr 1     Send:  AT+CPBW=3
Subscr 1   Receive:  AT+CPBW=3
Subscr 1   Receive:  OK


***************************************
Comment:  Read all entries.
***************************************


Subscr 1     Send:  AT+CPBR=1,20
Subscr 1   Receive:  AT+CPBR=1,20
Subscr 1   Receive:  +CPBR: 1,"+491765864491",145,"John Smith"
Subscr 1   Receive:  +CPBR: 2,"+44545896638",145,"Paul Williams"
Subscr 1   Receive:  +CPBR: 4,"+445636934485",145,"Oscar  Thomson"
Subscr 1   Receive:  +CPBR: 5,"+445565656899",145,"Hannah Adams"
Subscr 1   Receive:  +CPBR: 6,"+447982865563",145,"Samantha Young"
Subscr 1   Receive:  +CPBR: 7,"+449585315798",145,"Alexis Wright"
Subscr 1   Receive:  +CPBR: 8,"+445415454646",145,"Abigail Cox"
Subscr 1   Receive:  +CPBR: 12,"+446565689115",145,"Kyla Clark"
```

Subscr 1   Receive:
Subscr 1   Receive: OK

****
Comment: Delete "LD" phonebook.
****

Subscr 1   Send: AT^SPBD="LD"
Subscr 1   Receive: AT^SPBD="LD"
Subscr 1   Receive: OK

2.12.6   Writing phonebook entries

2.12.6.1   Description

This chapter describes the steps used to write a phonebook entry.

There are two ways to edit an entry with AT+CPBW:
- You can write a new entry to a specific position. In this case first read the phonebook, for example by using AT+CPBR. Then you can specify the position to change an existing entry or to add a new one.
- The other way is to write a new entry to the next free position. In this case, simply type the entry without specifying the location number.

The command AT+CPBW can be used to edit the following phonebooks: "SM", "ME", "FD", "ON".

2.12.6.2   Used AT commands

AT+CPBR   -   Read current phonebook entries
AT+CPBW   -   Write phonebook entry

For further details about the commands see [2].

2.12.6.3   Flow chart
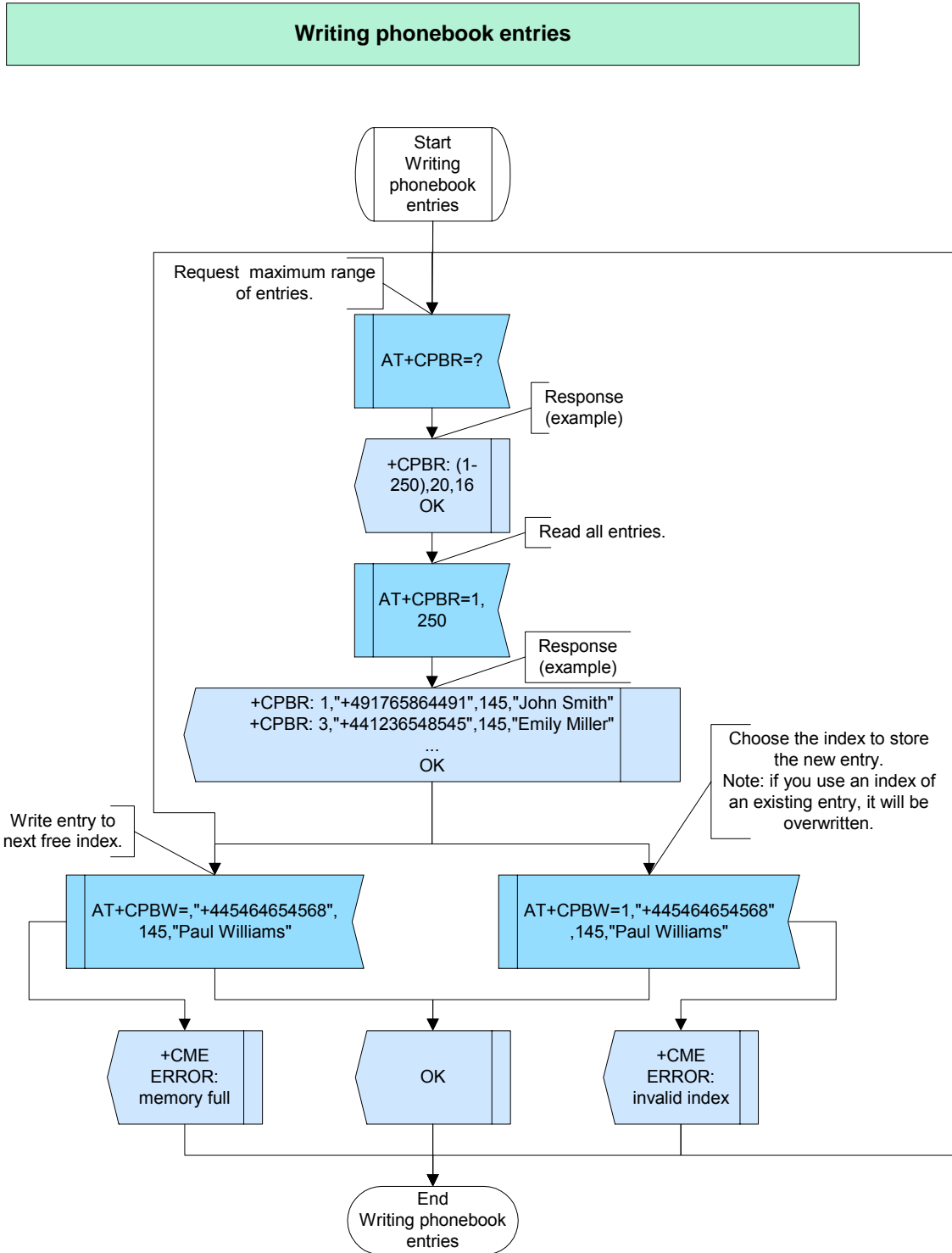
Figure 94: Writing phonebook entries

2.12.6.4   Hints

- For PIN2 see Phonebook initialization.

2.12.6.5   Example

```
****************************************
Comment:  Writing phonebook entries
****************************************

****************************************
Comment:  Request  maximum range of entries.
****************************************


Subscr 1     Send: AT+CPBR=?
Subscr 1   Receive: AT+CPBR=?
Subscr 1   Receive: +CPBR: (1-20),20,14
Subscr 1   Receive:
Subscr 1   Receive: OK


****************************************
Comment:  Read all entries.
****************************************


Subscr 1     Send: AT+CPBR=1,20
Subscr 1   Receive: AT+CPBR=1,20
Subscr 1   Receive: +CPBR: 1,"+491765864491",145,"John Smith"
Subscr 1   Receive: +CPBR: 4,"+445636934485",145,"Tamara Jones"
Subscr 1   Receive: +CPBR: 5,"+445565656899",145,"Hannah Adams"
Subscr 1   Receive: +CPBR: 7,"+449585315798",145,"Alexis Wright"
Subscr 1   Receive: +CPBR: 8,"+445415454646",145,"Abigail Cox"
Subscr 1   Receive: +CPBR: 12,"+446565689115",145,"Kyla Clark"
Subscr 1   Receive:
Subscr 1   Receive: OK


****************************************
Comment:  Write a new entry to second index.
****************************************


Subscr 1     Send: AT+CPBW=2,+44545896638,145,"Paul Williams"
Subscr 1   Receive: AT+CPBW=2,+44545896638,145,"Paul Williams"
Subscr 1   Receive: OK


****************************************
Comment:  Read all entries.
****************************************


Subscr 1     Send: AT+CPBR=1,20
Subscr 1   Receive: AT+CPBR=1,20
Subscr 1   Receive: +CPBR: 1,"+491765864491",145,"John Smith"
Subscr 1   Receive: +CPBR: 2,"+44545896638",145,"Paul Williams"
Subscr 1   Receive: +CPBR: 4,"+445636934485",145,"Tamara Jones"
Subscr 1   Receive: +CPBR: 5,"+445565656899",145,"Hannah Adams"
Subscr 1   Receive: +CPBR: 7,"+449585315798",145,"Alexis Wright"
Subscr 1   Receive: +CPBR: 8,"+445415454646",145,"Abigail Cox"
Subscr 1   Receive: +CPBR: 12,"+446565689115",145,"Kyla Clark"
Subscr 1   Receive:
Subscr 1   Receive: OK


****************************************
Comment:  Overwrite entry at fourth index.
****************************************


Subscr 1     Send: AT+CPBW=4,+445636934485,145,"Oscar  Thomson"
Subscr 1   Receive: AT+CPBW=4,+445636934485,145,"Oscar  Thomson"
Subscr 1   Receive: OK
```

```
***************************************
Comment:  Read all entries.
***************************************


Subscr 1     Send:  AT+CPBR=1,20
Subscr 1   Receive:  AT+CPBR=1,20
Subscr 1   Receive:  +CPBR: 1,"+491765864491",145,"John Smith"
Subscr 1   Receive:  +CPBR: 2,"+44545896638",145,"Paul Williams"
Subscr 1   Receive:  +CPBR: 4,"+445636934485",145,"Oscar  Thomson"
Subscr 1   Receive:  +CPBR: 5,"+445565656899",145,"Hannah Adams"
Subscr 1   Receive:  +CPBR: 7,"+449585315798",145,"Alexis Wright"
Subscr 1   Receive:  +CPBR: 8,"+445415454646",145,"Abigail Cox"
Subscr 1   Receive:  +CPBR: 12,"+446565689115",145,"Kyla Clark"
Subscr 1   Receive:
Subscr 1   Receive:  OK


***************************************
Comment:  Add new entry to the next free position.
***************************************


Subscr 1     Send:  AT+CPBW=,+44321546546,145,"Tamara Jones"
Subscr 1   Receive:  AT+CPBW=,+44321546546,145,"Tamara Jones"
Subscr 1   Receive:  OK


***************************************
Comment:  Read all entries.
***************************************


Subscr 1     Send:  AT+CPBR=1,20
Subscr 1   Receive:  AT+CPBR=1,20
Subscr 1   Receive:  +CPBR: 1,"+491765864491",145,"John Smith"
Subscr 1   Receive:  +CPBR: 2,"+44545896638",145,"Paul Williams"
Subscr 1   Receive:  +CPBR: 3,"+44321546546",145,"Tamara Jones"
Subscr 1   Receive:  +CPBR: 4,"+445636934485",145,"Oscar  Thomson"
Subscr 1   Receive:  +CPBR: 5,"+445565656899",145,"Hannah Adams"
Subscr 1   Receive:  +CPBR: 7,"+449585315798",145,"Alexis Wright"
Subscr 1   Receive:  +CPBR: 8,"+445415454646",145,"Abigail Cox"
Subscr 1   Receive:  +CPBR: 12,"+446565689115",145,"Kyla Clark"
Subscr 1   Receive:
Subscr 1   Receive:  OK
```

2.12.7 Writing entries to SIM fixdialing phonebook

2.12.7.1 Description

This chapter describes how to write an entry to the fixdialing phonebook. Before editing the "FD" phonebook be sure that PIN2 authentication has been done. Then follow the steps listed in chapter 2.12.6.

After entering the correct PIN2, the PIN2 authentication code changes to READY and remains valid for 300s. Then a repetition of the authentication process is required, i.e. the PIN2 authentication code changes from READY to SIM PIN2. In this case any attempt to edit the "FD" phonebook will be denied with "+CME ERROR: SIM PIN2 required" until PIN2 is entered once again.

2.12.7.2 Used AT commands

AT+CPBR   -   Read current phonebook entries
AT+CPBW   -   Write phonebook entry

For further details about the commands see [2].

2.12.7.3 Flow chart
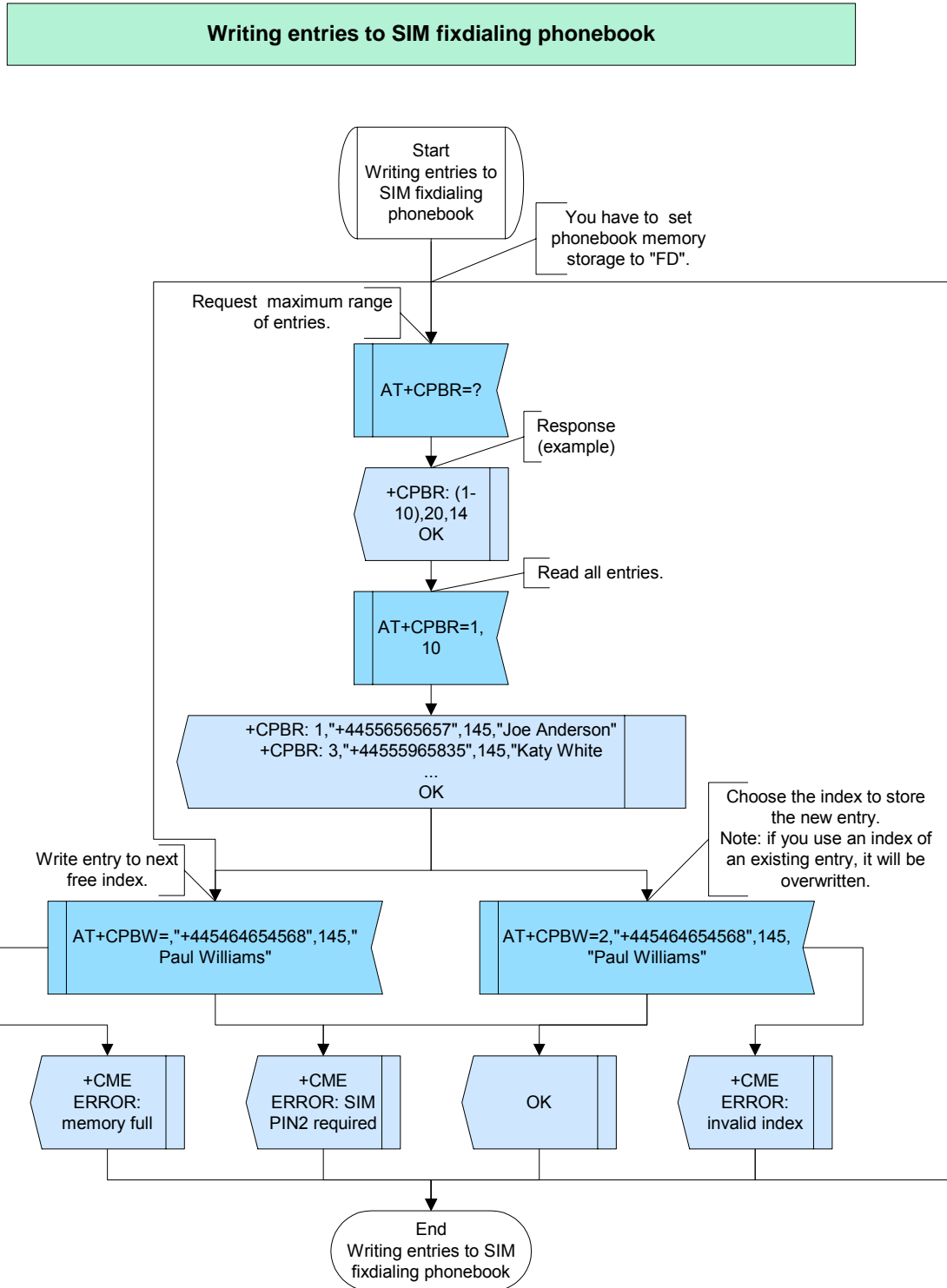
Figure 95: Writing entries to SIM fixdialing phonebook

2.12.7.4 Hints

Not applicable.

2.12.7.5 Example

****

Comment: Writing entries to SIM fixdialing phonebook
****

****

Comment: Request maximum range of entries.
****

Subscr 1   Send: AT+CPBR=?
Subscr 1   Receive: AT+CPBR=?
Subscr 1   Receive: +CPBR: (1-10),20,14
Subscr 1   Receive:
Subscr 1   Receive: OK

****

Comment: Read all entries.
****

Subscr 1   Send: AT+CPBR=1,10
Subscr 1   Receive: AT+CPBR=1,10
Subscr 1   Receive: +CPBR: 1,"+445636934485",145,"Oscar Thomson"
Subscr 1   Receive: +CPBR: 2,"+44555965835",145,"Katy White"
Subscr 1   Receive:
Subscr 1   Receive: OK

****

Comment: Write a new entry to third index. PIN2 was not entered before.
****

Subscr 1   Send: AT+CPBW=3,+44545896638,145,"Paul Williams"
Subscr 1   Receive: AT+CPBW=3,+44545896638,145,"Paul Williams"
Subscr 1   Receive: +CME ERROR: SIM PIN2 required

****

Comment: Entering PIN2.
****

Subscr 1   Send: AT+CPIN2=1234
Subscr 1   Receive: AT+CPIN2=1234
Subscr 1   Receive: OK

****

Comment: Write a new entry to fourth index.
****

Subscr 1   Send: AT+CPBW=4,+44545896638,145,"Paul Williams"
Subscr 1   Receive: AT+CPBW=4,+44545896638,145,"Paul Williams"
Subscr 1   Receive: OK

****

Comment: Read all entries.
****

Subscr 1   Send: AT+CPBR=1,10
Subscr 1   Receive: AT+CPBR=1,10
Subscr 1   Receive: +CPBR: 1,"+445636934485",145,"Oscar Thomson"
Subscr 1   Receive: +CPBR: 2,"+44555965835",145,"Katy White"
Subscr 1   Receive: +CPBR: 4,"+44545896638",145,"Paul Williams"

Subscr 1 Receive:
Subscr 1 Receive: OK

****
Comment: Overwrite entry at first index.
****

Subscr 1   Send: AT+CPBW=1,+445636934485,145,"Oscar Thomson"
Subscr 1 Receive: AT+CPBW=1,+445636934485,145,"Oscar Thomson"
Subscr 1 Receive: OK

****
Comment: Read all entries.
****

Subscr 1   Send: AT+CPBR=1,10
Subscr 1 Receive: AT+CPBR=1,10
Subscr 1 Receive: +CPBR: 1,"+445636934485",145,"Oscar Thomson"
Subscr 1 Receive: +CPBR: 2,"+44555965835",145,"Katy White"
Subscr 1 Receive: +CPBR: 4,"+44545896638",145,"Paul Williams"
Subscr 1 Receive:
Subscr 1 Receive: OK

****
Comment: Add new entry to the next free position.
****

Subscr 1   Send: AT+CPBW=,+44321546546,145,"Tamara Jones"
Subscr 1 Receive: AT+CPBW=,+44321546546,145,"Tamara Jones"
Subscr 1 Receive: OK

****
Comment: Read all entries.
****

Subscr 1   Send: AT+CPBR=1,10
Subscr 1 Receive: AT+CPBR=1,10
Subscr 1 Receive: +CPBR: 1,"+445636934485",145,"Oscar Thomson"
Subscr 1 Receive: +CPBR: 2,"+44555965835",145,"Katy White"
Subscr 1 Receive: +CPBR: 3,"+44321546546",145,"Tamara Jones"
Subscr 1 Receive: +CPBR: 4,"+44545896638",145,"Paul Williams"
Subscr 1 Receive:
Subscr 1 Receive: OK

2.13   Security
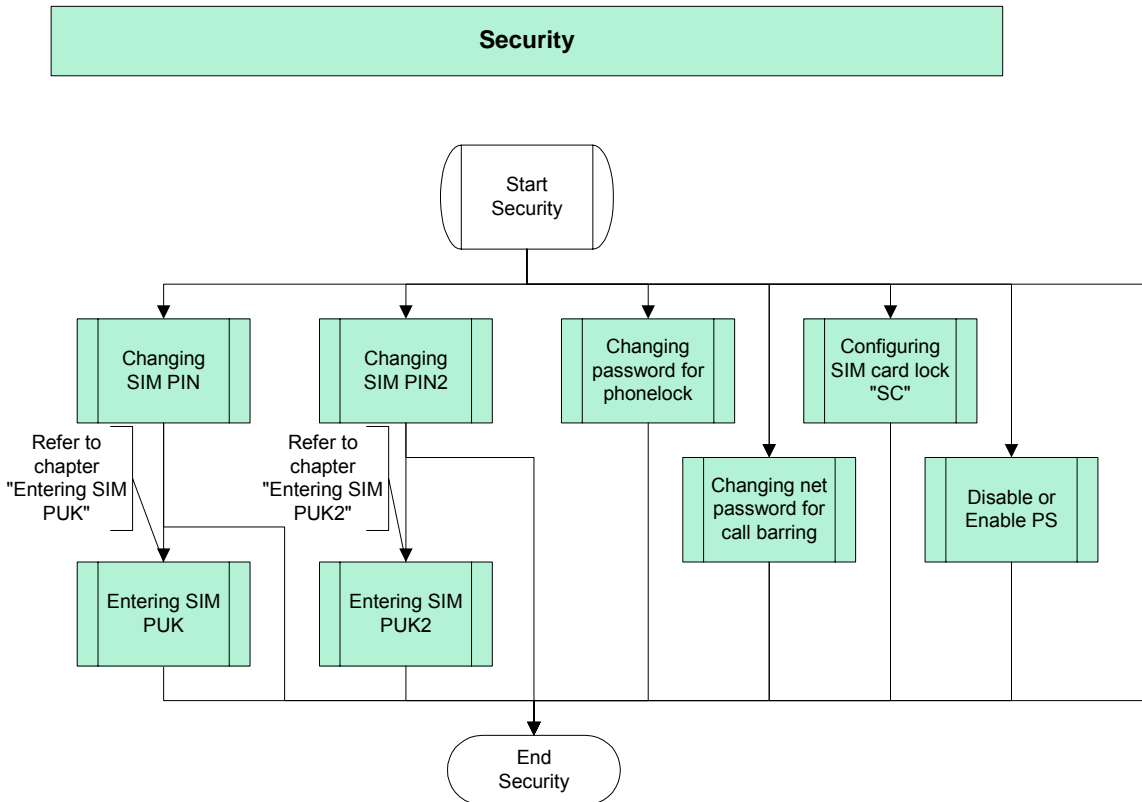
Figure 96: Security

General remark

For all procedures described in this chapter it is advisory to check the number of attempts left for entering a PIN or password. This can be done using the command AT^SPIC. Please note that the handling of this command varies with the type of Siemens module:

The execute command AT^SPIC that is common to all module types delivers the counter related to the pending PIN or password request. In addition, some module types provide the read command AT^SPIC? and the write command AT^SPIC=<facility> to allow retrieving the PIN counter of a specific lock type. For details see the specifications provided in [2]. In the following chapters different flowcharts and examples are shown, each for products with execute command AT^SPIC only and for products with the additional write command AT^SPIC=<facility>.

2.13.1 Changing SIM PIN

2.13.1.1 Description

This chapter lists the steps required to change the SIM PIN and describes what happens, if a wrong PIN was entered too many times. The command AT+CPWD can be used to change the SIM PIN. The SIM PIN must be entered, if the lock command is issued before configuring the password. After entering a wrong SIM PIN three times in succession, the SIM PUK is required. When using AT^SPIC please consider that its functionality is product dependent (see "General remark" in section 2.13).

2.13.1.2 Used AT commands

AT^SPIC   -   Display PIN counter
AT+CPIN   -   Enter PIN
AT+CPWD   -   Change password

For further details about the commands see [2].

2.13.1.3 Flow chart

Figure 97: Changing SIM PIN

Figure 98: Changing SIM PIN and retrieving PIN counter with write command AT^SPIC=<facility>

2.13.1.4 Hints

- If the response to AT+CPWD="SC",xxxx,yyyy is "+CME ERROR: operation not allowed", SIM PIN authentication must be done first.
- As an alternative to the AT+CPWD you can use the command AT^SPWD="SC"",""old password","new password" or the command AT+CPIN=<password>,<new password>.
- For unlocking a blocked SIM PIN see chapter 2.5.2.

2.13.1.5 Example

Example 1:

****

Comment: Changing SIM PIN
To request the PIN counter example 1 uses the AT^SPIC execute command supported by all products.

****

****

Comment: Request counter for SIM PIN ("SC" lock)

****

Subscr 1   Send: AT^SPIC="SC"
Subscr 1   Receive: AT^SPIC="SC"
Subscr 1   Receive: ^SPIC: 3
Subscr 1   Receive:
Subscr 1   Receive: OK(password for "SC" lock).

****

Comment: Changing SIM PIN
Comment: old password=9999, new password =1111

****

Subscr 1   Send: AT+CPWD="SC","9999","1111"
Subscr 1   Receive: AT+CPWD="SC","9999","1111"
Subscr 1   Receive: OK

****

Comment: Request PIN counter with AT^SPIC execute command

****

Subscr 1   Send: AT^SPIC
Subscr 1   Receive: AT^SPIC
Subscr 1   Receive: ^SPIC: 3
Subscr 1   Receive:
Subscr 1   Receive: OK

****

Comment: Entering wrong SIM PIN (first attempt)

****

Subscr 1   Send: AT+CPWD="SC","0001","1111"
Subscr 1   Receive: AT+CPWD="SC","0001","1111"
Subscr 1   Receive: +CME ERROR: incorrect password
Subscr 1   Send: AT^SPIC
Subscr 1   Receive: AT^SPIC
Subscr 1   Receive: ^SPIC: 2
Subscr 1   Receive:
Subscr 1   Receive: OK

****

Comment: Entering wrong SIM PIN (second attempt)

****

Subscr 1   Send: AT+CPWD="SC","0001","1111"
Subscr 1   Receive: AT+CPWD="SC","0001","1111"
Subscr 1   Receive: +CME ERROR: incorrect password
Subscr 1   Send: AT^SPIC

Subscr 1   Receive: AT^SPIC
Subscr 1   Receive: ^SPIC: 1
Subscr 1   Receive:
Subscr 1   Receive: OK

****
Comment: Entering wrong SIM PIN (third attempt)
****

Subscr 1   Send: AT+CPWD="SC","0001","1111"
Subscr 1   Receive: AT+CPWD="SC","0001","1111"
Subscr 1   Receive: +CME ERROR: incorrect password

****
Comment: Request required PIN
****

Subscr 1   Send: AT+CPIN?
Subscr 1   Receive: AT+CPIN?
Subscr 1   Receive: +CPIN: SIM PUK
Subscr 1   Receive:
Subscr 1   Receive: OK

****
Comment: Entering SIM PUK
****

Subscr 1   Send: AT+CPIN=12345678,9999
Subscr 1   Receive: AT+CPIN=12345678,9999
Subscr 1   Receive:
Subscr 1   Receive: OK

Example 2:

****
Comment: Changing SIM PIN (password for "SC" lock)
To request the PIN counter example 2 uses the read command AT^SPIC? and the write command
AT^SPIC=<facility>. Keep in mind that both command types are not supported by all products.
****
****
Comment: Changing SIM PIN
Comment: old password=0000, new password =1234
****

Subscr 1   Send: AT+CPWD="SC","0000","1234"
Subscr 1   Receive: OK

****
Comment: Entering wrong SIM PIN (first attempt)
****

Subscr 1   Send: AT+CPWD="SC","1113","1233"
Subscr 1   Receive: AT+CPWD="SC","1113","1233"
Subscr 1   Receive: +CME ERROR: incorrect password

****
Comment: Request counter for SIM PIN ("SC" lock)
****

Subscr 1   Send: AT^SPIC="SC"

Subscr 1   Receive: AT^SPIC="SC"
Subscr 1   Receive: ^SPIC: 2
Subscr 1   Receive:
Subscr 1   Receive: OK
****
Comment: Entering wrong SIM PIN (second attempt)
****

Subscr 1   Send: AT+CPWD="SC","3333","1255"
Subscr 1   Receive: AT+CPWD="SC","3333","1255"
Subscr 1   Receive: +CME ERROR: incorrect password

****
Comment: Request counter for SIM PIN ("SC" lock)
****

Subscr 1   Send: AT^SPIC="SC"
Subscr 1   Receive: AT^SPIC="SC"
Subscr 1   Receive: ^SPIC: 1
Subscr 1   Receive:
Subscr 1   Receive: OK

****
Comment: Entering wrong SIM PIN (third attempt)
****

Subscr 1   Send: AT+CPWD="SC","4711","1331"
Subscr 1   Receive: AT+CPWD="SC","4711","1331"
Subscr 1   Receive: +CME ERROR: incorrect password

****
Comment: Request counter for SIM PIN ("SC" lock)
****

Subscr 1   Send: AT^SPIC="SC"
Subscr 1   Receive: AT^SPIC="SC"
Subscr 1   Receive: ^SPIC: 10
Subscr 1   Receive:
Subscr 1   Receive: OK

****
Comment: Ask which PIN is required (via AT^SPIC read command)
****

Subscr 1   Send: AT^SPIC?
Subscr 1   Receive: AT^SPIC?
Subscr 1   Receive: ^SPIC: SIM PUK
Subscr 1   Receive:
Subscr 1   Receive: OK

****
Comment: Enter SIM PUK and specify new SIM PIN (activates new "SC lock).
****

Subscr 1   Send: AT+CPIN=12345678,0000
Subscr 1   Receive: AT+CPIN=12345678,0000
Subscr 1   Receive: OK

****
Comment: Request counter for SIM PIN ("SC" lock)

```
**************************************
Subscr 1     Send: AT^SPIC="SC"
Subscr 1   Receive: AT^SPIC="SC"
Subscr 1   Receive: ^SPIC: 3
Subscr 1   Receive:
Subscr 1   Receive: OK
```

2.13.2   Changing SIM PIN2

2.13.2.1   Description

This chapter describes the steps required to change the SIM PIN2 with AT+CPWD. The SIM PUK2 is needed after entering a wrong SIM PIN2 three times. When using AT^SPIC, please consider that its functionality is product dependent (see "General remark" in section 2.13).

2.13.2.2   Used AT commands

AT+CPIN2   -   Enter PIN2
AT^SPIC   -   Display PIN counter
AT+CPWD   -   Change password

For further details about the commands see [2].

2.13.2.3 Flow chart

Changing SIM PIN2 and retrieving PIN counter with AT^SPIC exec command
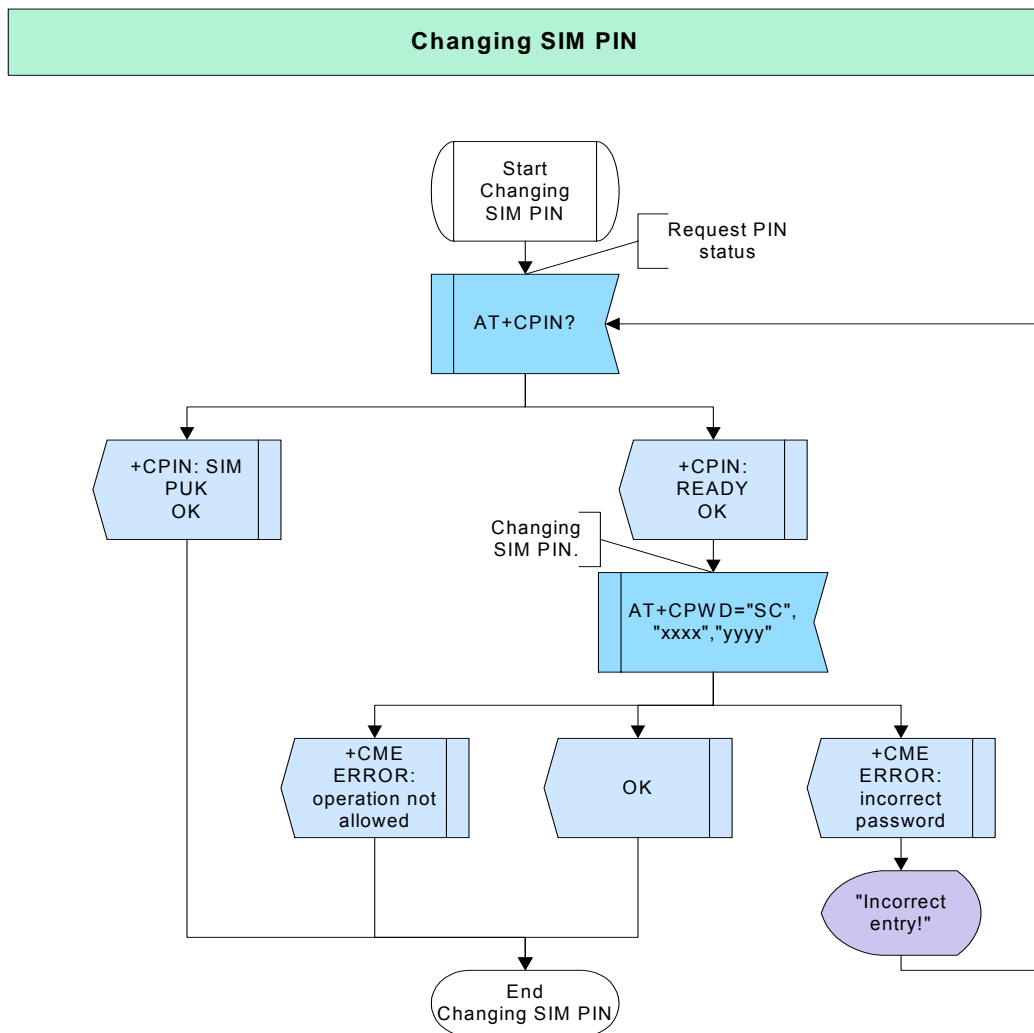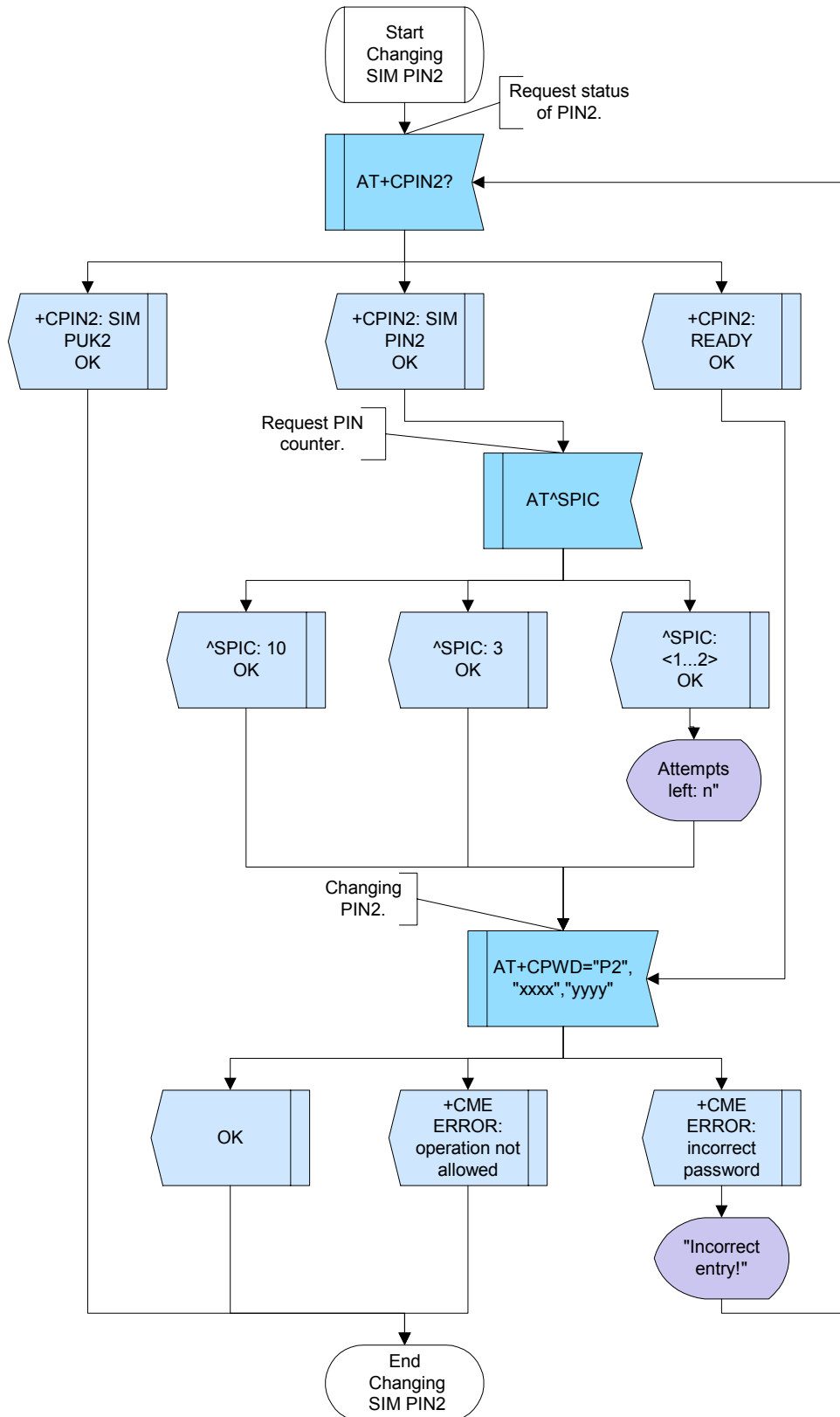

Figure 99: Changing SIM PIN2 and retrieving PIN counter with AT^SPIC exec command
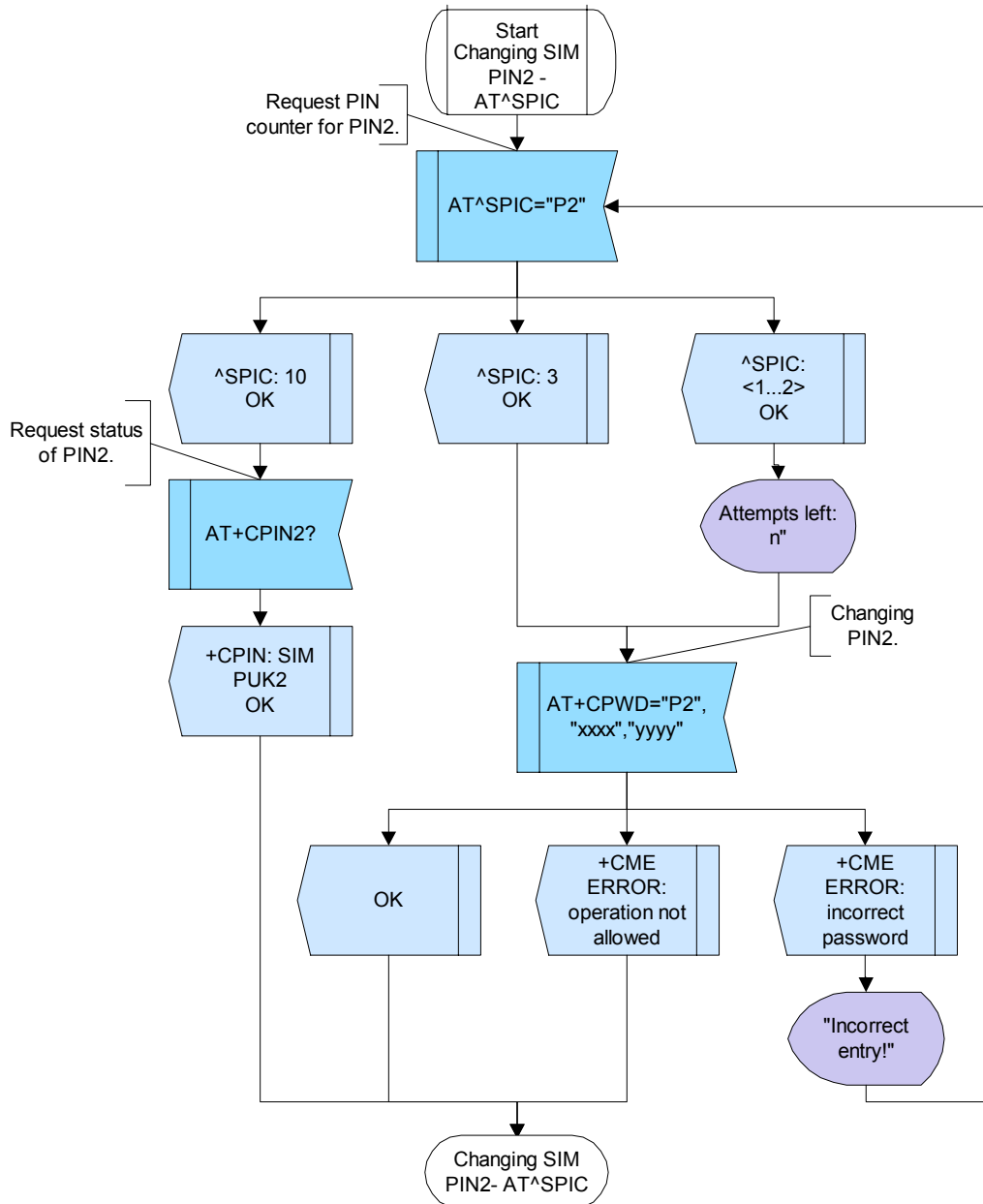
Figure 100: Changing SIM PIN2 and retrieving PIN counter with write command AT^SPIC=<facility>

2.13.2.4 Hints

- As an alternative to the AT+CPWD you can use AT^SPWD="P2"",old password",new password"
  or AT+CPIN2=<password>,<new password>"
- For unlocking a blocked SIM PIN2 see chapter 2.5.6.

2.13.2.5 Example

Example 1:

```
***************************************
Comment:  Changing SIM PIN2 (password for "P2" lock)
To request the PIN counter example 1 uses the AT^SPIC execute command supported by all
products.
***************************************
***************************************
Comment:  Request status of PIN2
***************************************


Subscr 3     Send: AT+CPIN2?
Subscr 3   Receive: AT+CPIN2?
Subscr 3   Receive: +CPIN2: SIM PIN2
Subscr 3   Receive:
Subscr 3   Receive: OK


***************************************
Comment:  Request PIN counter with AT^SPIC execute command
***************************************


Subscr 3     Send: AT^SPIC
Subscr 3   Receive: AT^SPIC
Subscr 3   Receive: ^SPIC: 3
Subscr 3   Receive:
Subscr 3   Receive: OK


***************************************
Comment:  Changing SIM PIN2
Comment:  old password=4321, new password =1234
***************************************


Subscr 3     Send: AT+CPWD="P2","4321","1234"
Subscr 3   Receive: AT+CPWD="P2","4321","1234"
Subscr 3   Receive: OK


***************************************
Comment:  Entering PIN2 (first attempt)
***************************************


Subscr 3     Send: AT+CPWD="P2","1111","4231"
Subscr 3   Receive: AT+CPWD="P2","1111","4231"
Subscr 3   Receive: +CME ERROR: incorrect password


***************************************
Comment:  Request PIN counter
***************************************


Subscr 3     Send: AT^SPIC
Subscr 3   Receive: AT^SPIC
Subscr 3   Receive: ^SPIC: 2
Subscr 3   Receive:
Subscr 3   Receive: OK


***************************************
```

Comment: Entering PIN2 (second attempt)
****

Subscr 3   Send: AT+CPWD="P2","1111","4231"
Subscr 3   Receive: AT+CPWD="P2","1111","4231"
Subscr 3   Receive: +CME ERROR: incorrect password

****
Comment: Request PIN counter
****

Subscr 3   Send: AT^SPIC
Subscr 3   Receive: AT^SPIC
Subscr 3   Receive: ^SPIC: 1
Subscr 3   Receive:
Subscr 3   Receive: OK

****
Comment: Entering PIN2 (third attempt)
****

Subscr 3   Send: AT+CPWD="P2","1111","4231"
Subscr 3   Receive: AT+CPWD="P2","1111","4231"
Subscr 3   Receive: +CME ERROR: incorrect password

****
Comment: Request required PIN2
****

Subscr 3   Send: AT+CPIN2?
Subscr 3   Receive: AT+CPIN2?
Subscr 3   Receive: +CPIN2: SIM PUK2
Subscr 3   Receive:
Subscr 3   Receive: OK

****
Comment: Enter PUK2
****

Subscr 3   Send: AT+CPIN2=87654321,4321
Subscr 3   Receive: AT+CPIN2=87654321,4321
Subscr 3   Receive:
Subscr 3   Receive: OK

Example 2:

```
***************************************
Comment:  Changing password for P2 (password for "P2" lock)
```
To request the PIN counter example 2 uses the read command AT^SPIC? and the write command AT^SPIC=<facility>. Keep in mind that both command types are not supported by all products.
```
***************************************
***************************************
Comment:  Changing Password for P2.
Comment:  old password=1234, new password =0000.
***************************************

Subscr 1    Send: AT+CPWD="P2","1234","0000"
Subscr 1  Receive: AT+CPWD="P2","1234","0000"
Subscr 1  Receive: OK


***************************************
Comment:  Which PIN is required (read command is not supported by all products).
***************************************


Subscr 1    Send: AT^SPIC?
Subscr 1  Receive: AT^SPIC?
Subscr 1  Receive: ^SPIC: SIM PIN2
Subscr 1  Receive:
Subscr 1  Receive: OK


***************************************
Comment:  Request PIN counter for P2.
***************************************


Subscr 1    Send: AT^SPIC="P2"
Subscr 1  Receive: AT^SPIC="P2"
Subscr 1  Receive: ^SPIC: 3
Subscr 1  Receive:
Subscr 1  Receive: OK


***************************************
Comment:  Entering wrong password for P2 (first attempt).
***************************************


Subscr 1    Send: AT+CPWD="P2","11113","12334"
Subscr 1  Receive: AT+CPWD="P2","11113","12334"
Subscr 1  Receive: +CME ERROR: incorrect password


***************************************
Comment:  Request PIN counter for P2-
***************************************


Subscr 1    Send: AT^SPIC="P2"
Subscr 1  Receive: AT^SPIC="P2"
Subscr 1  Receive: ^SPIC: 2
Subscr 1  Receive:
Subscr 1  Receive: OK
```

```
*****************************************
```
Comment: Entering wrong password for P2 (second attempt).
```
*****************************************
```

Subscr 1   Send: AT+CPWD="P2","3333","1255"
Subscr 1   Receive: AT+CPWD="P2","3333","1255"
Subscr 1   Receive: +CME ERROR: incorrect password


```
*****************************************
```
Comment: Request PIN counter for P2.
```
*****************************************
```

Subscr 1   Send: AT^SPIC="P2"
Subscr 1   Receive: AT^SPIC="P2"
Subscr 1   Receive: ^SPIC: 1
Subscr 1   Receive:
Subscr 1   Receive: OK


```
*****************************************
```
Comment: Entering wrong password for P2 (third attempt).
```
*****************************************
```

Subscr 1   Send: AT+CPWD="P2","4711","1331"
Subscr 1   Receive: AT+CPWD="P2","4711","1331"
Subscr 1   Receive: +CME ERROR: incorrect password


```
*****************************************
```
Comment: Request PIN counter for P2.
```
*****************************************
```

Subscr 1   Send: AT^SPIC="P2"
Subscr 1   Receive: AT^SPIC="P2"
Subscr 1   Receive: ^SPIC: 10
Subscr 1   Receive:
Subscr 1   Receive: OK


```
*****************************************
```
Comment: Enter SIM PUK2 and set new P2.
```
*****************************************
```

Subscr 1   Send: AT+CPIN2=87654321,1234
Subscr 1   Receive: AT+CPIN2=87654321,1234
Subscr 1   Receive: OK


```
*****************************************
```
Comment: Request PIN counter for P2.
```
*****************************************
```

Subscr 1   Send: AT^SPIC="P2"
Subscr 1   Receive: AT^SPIC="P2"
Subscr 1   Receive: ^SPIC: 1
Subscr 1   Receive:
Subscr 1   Receive: OK

2.13.3   Changing password for phonelock ("PS")

2.13.3.1   Description

This chapter describes the steps required to change the phonelock password and to unlock a disabled password. The command "AT+CPWD" can be used to change the phonelock password. After entering a wrong phonelock password three times in succession the master phonecode will be required. "AT^SPIC" has various options, further information see above "General remark" 2.13.

2.13.3.2   Used AT commands

AT+CPWD   -   Change password
AT^SPIC   -   Display PIN counter

For further details about the commands see [2].

2.13.3.3 Flow chart

Changing password for phonelock ("PS")
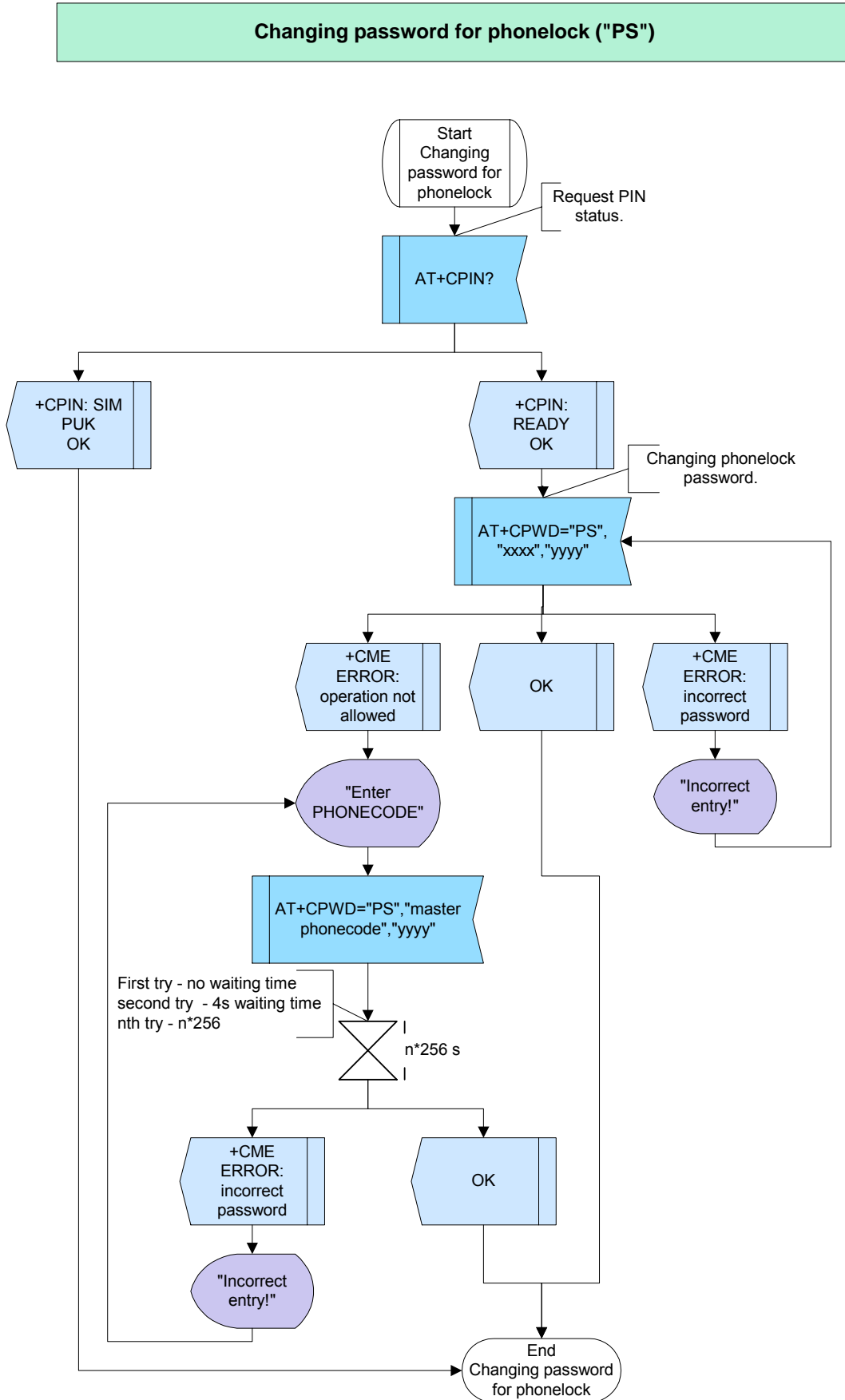
Figure 101: Changing password for phonelock

Figure 102: Changing password for phonelock and retrieving PIN counter with AT^SPIC=<facility>

2.13.3.4   Hints

- As an alternative to the AT+CPWD command you can use AT+CPIN="Master Phonecode", "new PIN" or the ATD command with GSM code (*#).

2.13.3.5   Example

Example 1:

```
****************************************
Comment:  Changing password for phonelock
****************************************
****************************************
Comment:  If "PS" has not been set before
Comment:  new password =1234
****************************************

Subscr 1     Send: AT+CPWD="PS",,"1234"
Subscr 1   Receive: AT+CPWD="PS",,"1234"
Subscr 1   Receive: OK

****************************************
Comment:  Replace existing "PS" password
Comment:  old password=1234, new password =0000
****************************************

Subscr 1     Send: AT+CPWD="PS","1234","0000"
Subscr 1   Receive: AT+CPWD="PS","1234","0000"
Subscr 1   Receive: OK

****************************************
Comment:  Attempt to replace existing "PS" password
****************************************

Subscr 1     Send: AT+CPWD="PS","1111","5555"
Subscr 1   Receive: AT+CPWD="PS","1111","5555"
Subscr 1   Receive: +CME ERROR: incorrect password

****************************************
Comment:  Attempt to replace existing "PS" password
****************************************

Subscr 1     Send: AT+CPWD="PS","1111","5555"
Subscr 1   Receive: AT+CPWD="PS","1111","5555"
Subscr 1   Receive:
Subscr 1   Receive: +CME ERROR: incorrect password

****************************************
Comment:  Attempt to replace existing "PS" password
****************************************

Subscr 1     Send: AT+CPWD="PS","1111","5555"
Subscr 1   Receive: AT+CPWD="PS","1111","5555"
Subscr 1   Receive: +CME ERROR: incorrect password
```

```
****************************************
```
Comment: Enter Master Phone Code to unlock. Result: ME is operational and PS lock is totally removed
```
****************************************
```

Subscr 1   Send: AT+CPWD="PS","70033255","0000"
Subscr 1   Receive: AT+CPWD="PS","70033255","0000"
Subscr 1   Receive:
Subscr 1   Receive: OK

```
****************************************
```
Comment: Erase the password
```
****************************************
```

Subscr 1   Send: AT+CPWD="PS","0000"
Subscr 1   Receive: AT+CPWD="PS","0000"
Subscr 1   Receive: OK

Example 2:

```
****************************************
```
Comment: Changing password for PS (password for "PS" lock)
To request the PIN counter example 2 uses the read command AT^SPIC? and the write command AT^SPIC=<facility>. Keep in mind that both command types are not supported by all products.
```
****************************************
****************************************
```
Comment: Changing Password for PS.
```
****************************************
```

Subscr 1   Send: AT+CPWD="PS","0000","1234"
Subscr 1   Receive: AT+CPWD="PS","0000","1234"
Subscr 1   Receive: OK

```
****************************************
```
Comment: Which PIN is required.
```
****************************************
```

Subscr 1   Send: AT^SPIC?
Subscr 1   Receive: AT^SPIC?
Subscr 1   Receive: ^SPIC: SIM PIN2
Subscr 1   Receive:
Subscr 1   Receive: OK

```
****************************************
```
Comment: Request PIN counter (SIM PIN2).
```
****************************************
```

Subscr 1   Send: AT^SPIC
Subscr 1   Receive: AT^SPIC
Subscr 1   Receive: ^SPIC: 3
Subscr 1   Receive:
Subscr 1   Receive: OK

```
****************************************
```
Comment: Request PIN counter for PS .
```
****************************************
```

Subscr 1   Send: AT^SPIC="PS"
Subscr 1   Receive: AT^SPIC="PS"
Subscr 1   Receive: ^SPIC: 3

Subscr 1   Receive:
Subscr 1   Receive: OK

****
Comment: Entering wrong password for PS (first attempt).
****

Subscr 1   Send: AT+CPWD="PS","1111","1334"
Subscr 1   Receive: AT+CPWD="PS","1111","1334"
Subscr 1   Receive: +CME ERROR: incorrect password

****
Comment: Request PIN counter for PS.
****

Subscr 1   Send: AT^SPIC="PS"
Subscr 1   Receive: AT^SPIC="PS"
Subscr 1   Receive: ^SPIC: 2
Subscr 1   Receive:
Subscr 1   Receive: OK

****
Comment: Request PIN counter(SIM PIN2).
****

Subscr 1   Send: AT^SPIC
Subscr 1   Receive: AT^SPIC
Subscr 1   Receive: ^SPIC: 3
Subscr 1   Receive:
Subscr 1   Receive: OK

****
Comment: Entering wrong password for PS (second attempt)
****

Subscr 1   Send: AT+CPWD="PS","3333","1255"
Subscr 1   Receive: AT+CPWD="PS","3333","1255"
Subscr 1   Receive: +CME ERROR: incorrect password

****
Comment: Request PIN counter for PS.
****

Subscr 1   Send: AT^SPIC="PS"
Subscr 1   Receive: AT^SPIC="PS"
Subscr 1   Receive: ^SPIC: 1
Subscr 1   Receive:
Subscr 1   Receive: OK

****
Comment: Request PIN counter (SIM PIN2).
****

Subscr 1   Send: AT^SPIC
Subscr 1   Receive: AT^SPIC
Subscr 1   Receive: ^SPIC: 3
Subscr 1   Receive:
Subscr 1   Receive: OK
****
Comment: Entering wrong password for PS (third attempt).

****

Subscr 1   Send: AT+CPWD="PS","4711","1331"
Subscr 1   Receive: AT+CPWD="PS","4711","1331"
Subscr 1   Receive: +CME ERROR: incorrect password

****
Comment: Request PIN counter for PS.
****

Subscr 1   Send: AT^SPIC="PS"
Subscr 1   Receive: AT^SPIC="PS"
Subscr 1   Receive: ^SPIC: 63
Subscr 1   Receive:
Subscr 1   Receive: OK

****
Comment: Request PIN counter(SIM PIN2).
****

Subscr 1   Send: AT^SPIC
Subscr 1   Receive: AT^SPIC
Subscr 1   Receive: ^SPIC: 3
Subscr 1   Receive:
Subscr 1   Receive: OK

****
Comment: Enter master phonecode and set new PS.
****

Subscr 1   Send: AT+CPWD="PS","39969009","0000"
Subscr 1   Receive: AT+CPWD="PS","39969009","0000"
Subscr 1   Receive: OK

****
Comment: Request PIN counter for PS.
****

Subscr 1   Send: AT^SPIC="PS"
Subscr 1   Receive: AT^SPIC="PS"
Subscr 1   Receive: ^SPIC: 3
Subscr 1   Receive:
Subscr 1   Receive: OK

2.13.4 Changing net password for call barring

2.13.4.1 Description

This chapter describes the steps required to change the net password.

2.13.4.2 Used AT commands

AT+CPWD   -   Change password

For further details about the commands see [2].

2.13.4.3 Flow chart
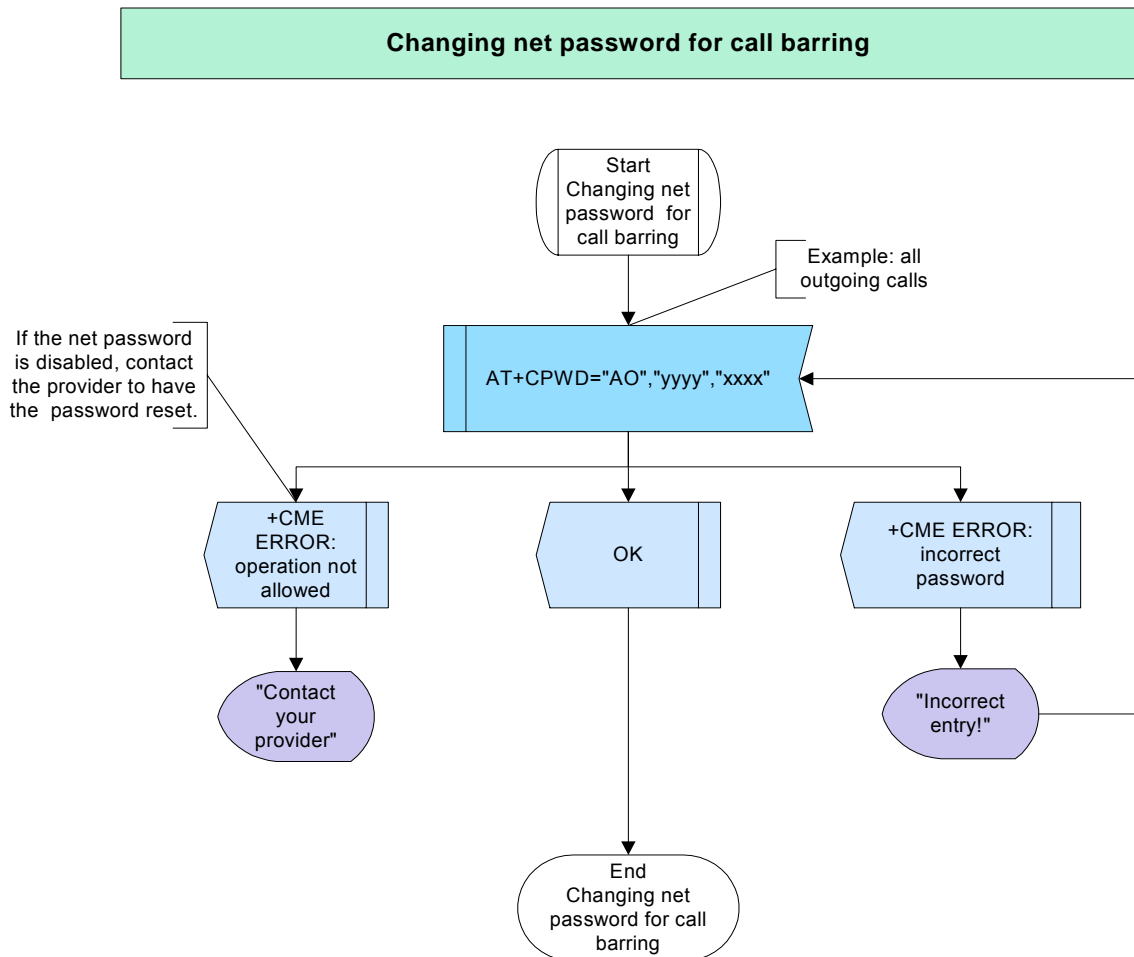
Figure 103: Changing net password for call barring

2.13.4.4 Hints

- As an alternative to the AT+CPWD you can use: AT^SPWD="AO","old password","new password"
  or the GSM code (*#).
- If a wrong Call barring password is entered three times, the client needs to contact the provider
  and ask for unlocking the service.

2.13.4.5 Example

```
****************************************
Comment:  Changing net password for Call barring
****************************************
****************************************
Comment:  Changing net password
Comment:  old password=1234, new password =0000
****************************************

Subscr 1     Send: AT+CPWD="AO","1234","0000"
Subscr 1   Receive: AT+CPWD="AO","1234","0000"
Subscr 1   Receive:
Subscr 1   Receive: OK


****************************************
Comment:  Entering wrong net password
****************************************

Subscr 1     Send: AT+CPWD="AO","0001","1224"
Subscr 1   Receive: AT+CPWD="AO","0001","1224"
Subscr 1   Receive:
Subscr 1   Receive: +CME ERROR: incorrect password
```

2.13.5   Configuring SIM card lock ("SC")

2.13.5.1   Description

This chapter describes how to set or remove a SIM card lock. If the SIM card is locked, the user will be required to enter SIM PIN1 every time the mobile is started.

To configure the SIM card lock, the SIM PIN1 must be at hand. Only three attempts are allowed. The command AT^SPIC can be used to view the number of left attempts. Use AT+CLCK="SC",2 or AT^SLCK="SC",2 to request the current state. To lock or unlock the SIM card use the commands AT+CLCK="SC",<mode>,<PIN> or AT^SLCK="SC",<mode>,<PIN>, where <mode>=1 sets the lock and <mode>=0 deactivates it.

It is recommended to check the status of the SIM PIN authentication at first. If the read command AT+CPIN? returns the response "+CPIN: SIM PUK", no changes can be made until the PUK was entered.

2.13.5.2   Used AT commands

AT+CPIN	-	Enter PIN
AT^SPIC	-	Display PIN counter
AT+CLCK	-	Facility lock
AT^SLCK	-	Facility lock

For further details about the commands see [2].

2.13.5.3 Flow chart
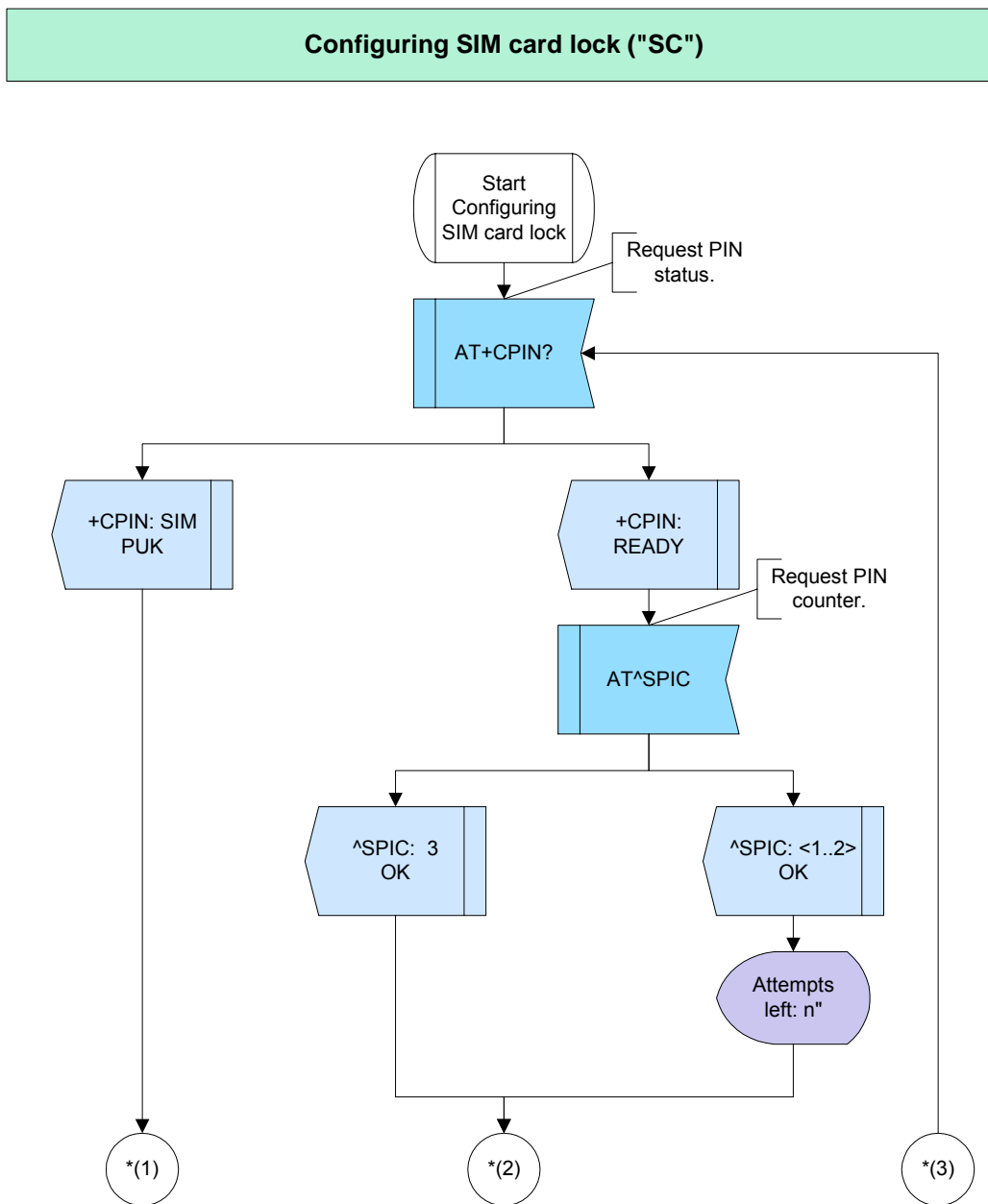
Figure 104: Configuring SIM card lock ("SC") – part 1
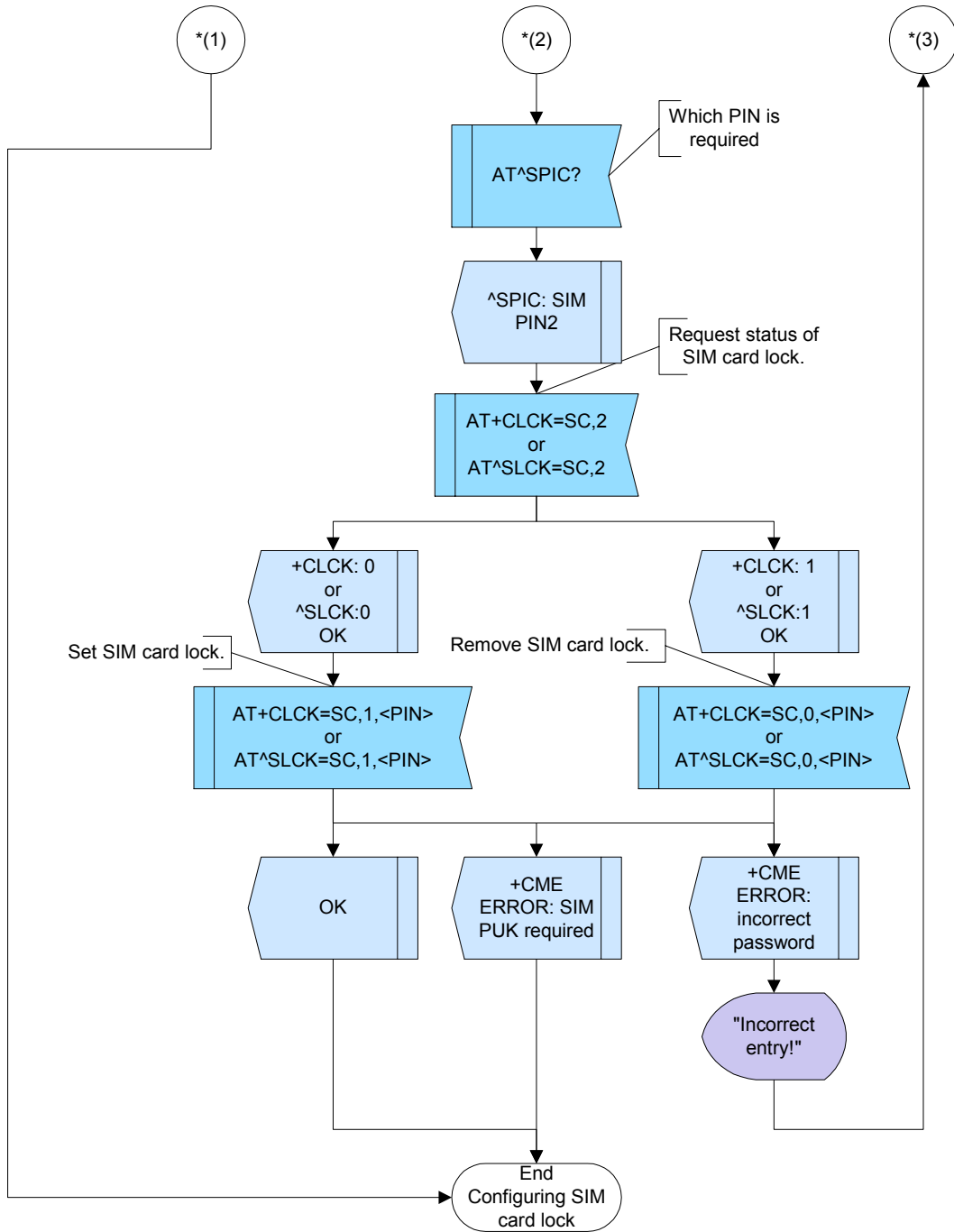
Figure 105: Configuring SIM card lock ("SC") – part 2

2.13.5.4 Hints

• As an alternative to the AT+CPWD you can use AT^SPWD="SC","old password","new password".

2.13.5.5 Example

```
***************************************
Comment:  Configuring SIM card lock ("SC")
***************************************
***************************************
Comment:  Request PIN status.
***************************************


Subscr 1    Send: AT+CPIN?
Subscr 1   Receive: AT+CPIN?
Subscr 1   Receive: +CPIN: READY
Subscr 1   Receive:
Subscr 1   Receive: OK


***************************************
Comment:  Request PIN counter.
***************************************


Subscr 1    Send: AT^SPIC
Subscr 1   Receive: AT^SPIC
Subscr 1   Receive: ^SPIC: 3
Subscr 1   Receive:
Subscr 1   Receive: OK


***************************************
Comment:  Which PIN is required (read command is not supported by all products).
***************************************


Subscr 1    Send: AT^SPIC?
Subscr 1   Receive: AT^SPIC?
Subscr 1   Receive: ^SPIC: SIM PIN2
Subscr 1   Receive:
Subscr 1   Receive: OK


***************************************
Comment:  Request status of SIM card lock (+CLCK: 0= lock is inactive).
***************************************


Subscr 1    Send: AT+CLCK=SC,2
Subscr 1   Receive: AT+CLCK=SC,2
Subscr 1   Receive: +CLCK: 0
Subscr 1   Receive:
Subscr 1   Receive: OK


***************************************
Comment:  Try to set SIM card lock with wrong PIN.
***************************************


Subscr 1    Send: AT+CLCK=SC,1,5555
Subscr 1   Receive: AT+CLCK=SC,1,5555
Subscr 1   Receive: +CME ERROR: incorrect password


***************************************
Comment:  Which PIN is required (read command is not supported by all products).
***************************************


Subscr 1    Send: AT^SPIC?
```

Subscr 1   Receive: AT^SPIC?
Subscr 1   Receive: ^SPIC: SIM PIN2
Subscr 1   Receive:
Subscr 1   Receive: OK

****
Comment: Request PIN counter.
****

Subscr 1   Send: AT^SPIC
Subscr 1   Receive: AT^SPIC
Subscr 1   Receive: ^SPIC: 3
Subscr 1   Receive:
Subscr 1   Receive: OK

****
Comment: Set SIM card lock.
****

Subscr 1   Send: AT+CLCK=SC,1,0000
Subscr 1   Receive: AT+CLCK=SC,1,0000
Subscr 1   Receive: OK

****
Comment: Request status of SIM card lock (+CLCK: 1= lock is active).
****

Subscr 1   Send: AT+CLCK=SC,2
Subscr 1   Receive: AT+CLCK=SC,2
Subscr 1   Receive: +CLCK: 1
Subscr 1   Receive:
Subscr 1   Receive: OK

****
Comment: Remove SIM card lock.
****

Subscr 1   Send: AT^SLCK=SC,0,0000
Subscr 1   Receive: AT^SLCK=SC,0,0000
Subscr 1   Receive: OK

****
Comment: Request status of SIM card lock (+CLCK: 0= lock is inactive).
****

Subscr 1   Send: AT+CLCK=SC,2
Subscr 1   Receive: AT+CLCK=SC,2
Subscr 1   Receive: +CLCK: 0
Subscr 1   Receive:
Subscr 1   Receive: OK

2.14   SIM

2.14.1   SIM access

2.14.1.1   Description

This chapter describes how to access the Elementary Files (referred to as EF) on the SIM using the command AT+CRSM=<command>[,<fileID>[,<P1>,<P2>,<P3>[,<data>]]]".

Access to the SIM database is restricted to the following operations specified with the parameter <command>:

SIM command number	Command	Function
176	READ BINARY	Reads a string of bytes, which gives information about the current transparent elementary datafield.
178	READ RECORD	Reads a complete record in a current linear or fixed elementary datafield. Four modes (CURRENT, ABSOLUTE, NEXT, PREVIOUS) are defined to read a record.
192	GET RESPONSE	Return data, which gives information about the current elementary datafield. This information includes the type of file and its size.
214	UPDATE BINARY	UPDATE BINARY updates the current transparent elementary data field with a string of bytes.
220	UPDATE RECORD	UPDATE RECORD updates one complete record in the current linear fixed or cyclic elementary data fields. For update operations there are four modes (CURRENT, ABSOLUTE, NEXT, PREVIOUS) defined, but only PREVIOUS is allowed for cyclic files.
242	STATUS	Return data which gives information about the current elementary data field.

The <fileID> is the identifier of the EF on the SIM and mandatory for every command except for STATUS. <P1>, <P2>, <P3> are parameters for the instruction.

Every command sends the ME a response with the current SIM information and response data. The response parameters <sw1> and <sw2> are delivered on successful or failed execution of the command. If the command cannot be passed to the SIM, the ME will return "+CME ERROR: <err>".

A response consists of following parts (example "READ RECORD" EF_{LND}):

Bytes	Description	Length
1 to X	Alpha Identifier	X bytes
X+1	Length of BCD number/SSC contents	1 byte
X+2	TON and NPI	1 byte
X+3 to X+12	Dialing Number/SSC String	10 byte
X+13	Capability/Configuration Identifier	1 byte
X+14	Extension1 Record Identifier	1 byte

For further details see section "Coding of commands" in [12].
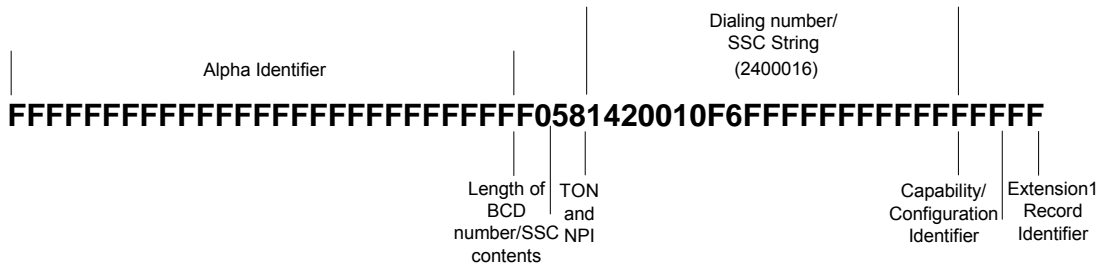
Figure 106: READ RECORD example response

Description (Example 3):
This example shows how to read a record ("last number dailed") from the SIM. First, the response "+CRSM:103,28" will be returned. The first parameter <sw1> = '103' is a decimal value, the appropriate hexadecimal value is '67' which means "incorrect parameter <P3>". The second parameter <sw2>='xx' gives the correct length (in example '28') or states that no additional information is given.

2.14.1.2   Used AT commands

AT+CRSM   -   Restricted SIM access

For further details about the commands see [2].

2.14.1.3   Flow chart
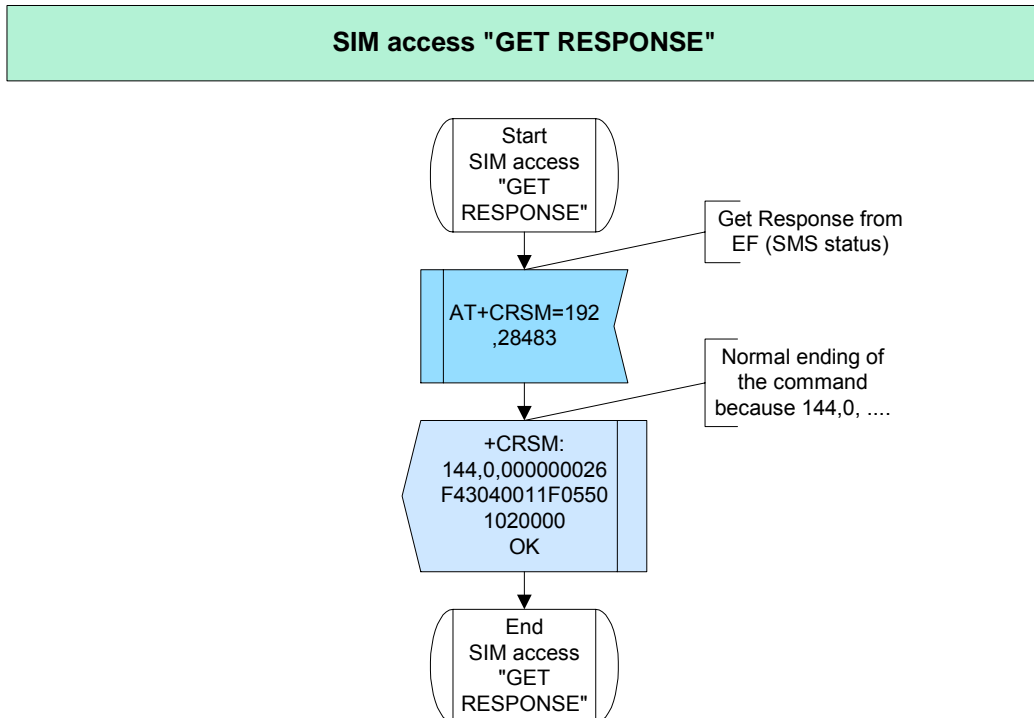
Figure 107: SIM access "GET RESPONSE"

SIM access "READ BINARY"

Start
SIM access
"READ
BINARY"

Read binary from EF
"ICC identification"

AT+CRSM=176,
12258,0,0,10

Normal ending of
the command
because 144,0, ...

+CRSM:
144,0,98000000000
0000000F3
OK

End
SIM access
"READ
BINARY"
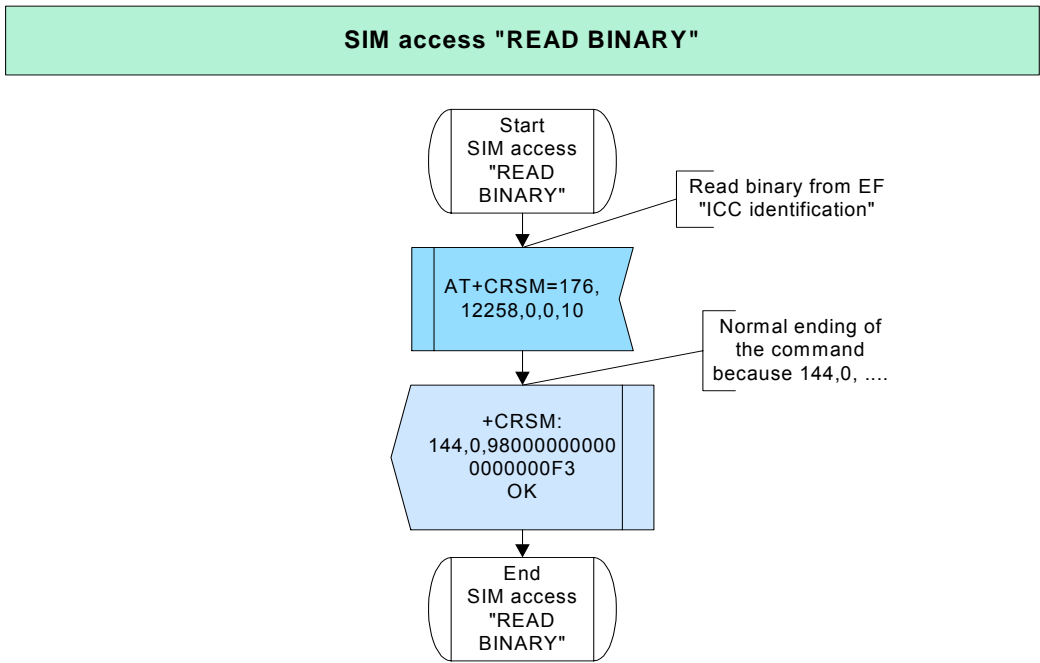
Figure 108: SIM access "READ BINARY"

SIM access "READ RECORD"

Start
SIM access
"READ
RECORD"

Read record from EF
"Last number dialed"

AT+CRSM=178,
28484,1,4,255

Incorrect parameter P3,
because 103 = Hex. 67 see
GSM 11.11 ,correct parameter
P3 =28

+CRSM:
103,28

AT+CRSM=178,
28484,1,4,28

+CRSM:
144,0,FFFFFFFFFFF
FFFFFFFFFFFFFFFF
FF0581420010F6FF
FFFFFFFFFFFFFFF

End
SIM access
"READ
RECORD"
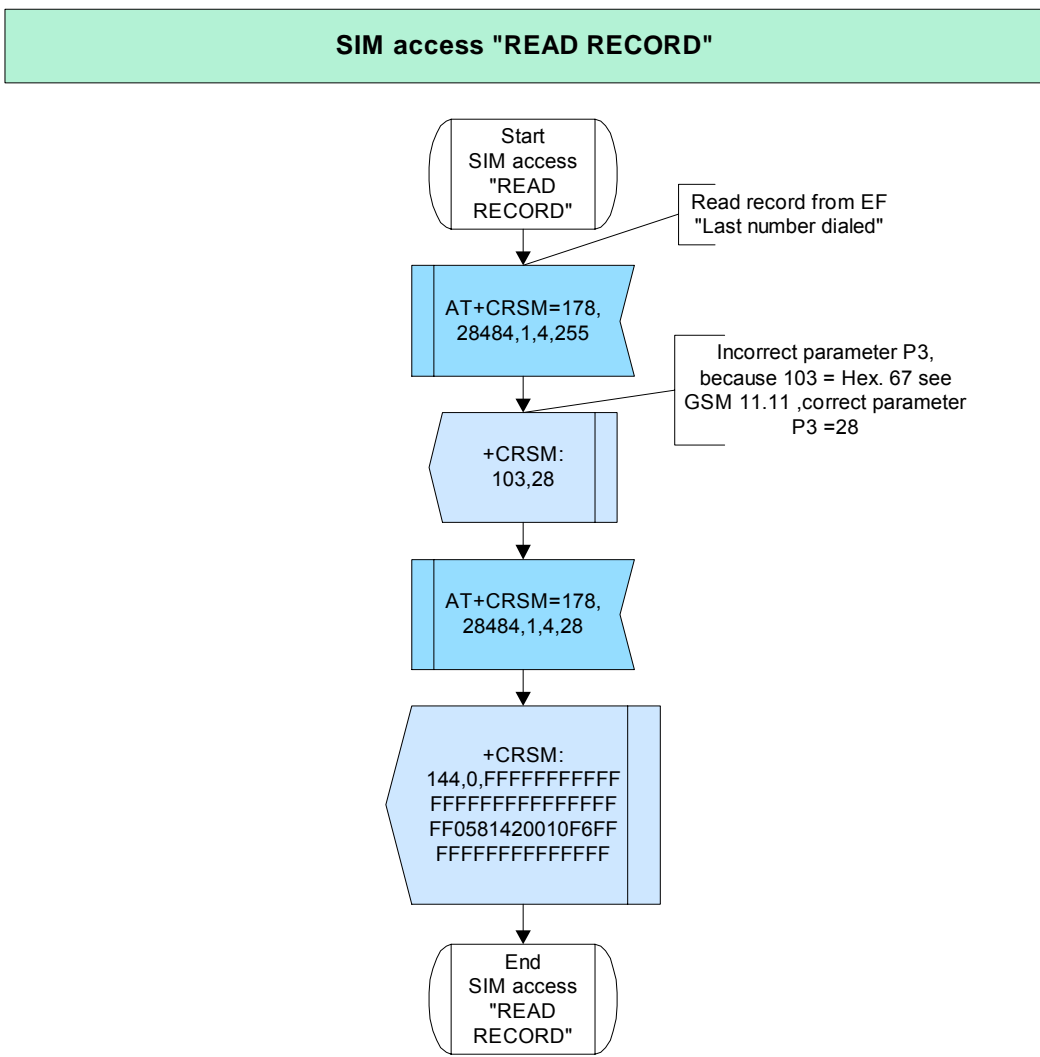
Figure 109: SIM access "READ RECORD"

SIM access "UPDATE RECORD"

Start
SIM access
"UPDATE
RECORD"

Request all entries
from the phonebook

AT+CPBR=?

+CPBR: (1-
20),20,14
OK

Read all entries of
the phonebook

AT+CPBR=1,20

+CPBR: 1,"+44563693485",145,"Tom
Jones"
+CPBR: 2,"+44987456321",145,"Tamara
Jones"
....
OK

Read record to
request P3

AT+CRSM=178
,28474,1,4,250

P3= 28

+CRSM:
103,28
OK

Read record from the
EF(Abbreviated dialling
numbers)

AT+CRSM=178,
28474,1,4,28

+CRSM:
144,0,546F6D204A6F6E
6573FFFFFFFFFFF07914
465633984F5FFFFFFFF
FFFF

Update
record

AT+CRSM=220,28474,1,4,28,4F736
361722054686F6D736F6EFF079144
65633984F5FFFFFFFFFFFFFF

+CRSM:
144,0
OK

*

Figure 110: SIM access "UPDATE RECORD"- part 1
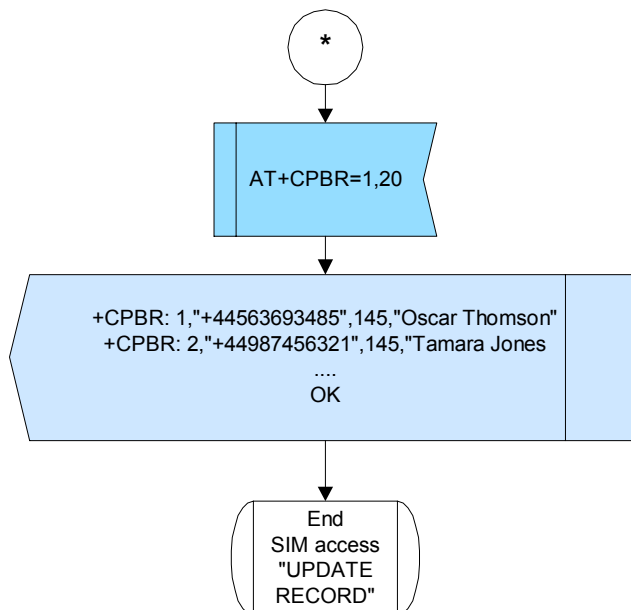
Figure 111: SIM access "UPDATE RECORD"- part 2

2.14.1.4 Hints

Not applicable.

2.14.1.5 Example

Example 1:

```
**************************************
Comment:  SIM access "GET RESPONSE"
**************************************
**************************************
Comment:  Get response from the EF(SMS status).
**************************************

Subscr 1    Send: AT+CRSM=192,28483
Subscr 1  Receive: AT+CRSM=192,28483
Subscr 1  Receive: +CRSM: 144,0,000000026F43040011F05501020000
Subscr 1  Receive:
Subscr 1  Receive: OK
```

Example 2:

```
**************************************
Comment:  SIM access "READ BINARY"
**************************************
**************************************
Comment:  Read binary from the EF (ICC identification).
**************************************

Subscr 1    Send: AT+CRSM=176,12258,0,0,10
Subscr 1  Receive: AT+CRSM=176,12258,0,0,10
Subscr 1  Receive: +CRSM: 144,0,980000000000000000F3
Subscr 1  Receive:
Subscr 1  Receive: OK
```

Example 3:

****
Comment: SIM access "READ RECORD"
****

****
Comment: Wrong entry to read record from the EF (Last number dialed).See above 2.14.1.1.
****

Subscr 1   Send: AT+CRSM=178,28484,1,4,255
Subscr 1   Receive: AT+CRSM=178,28484,1,4,255
Subscr 1   Receive: +CRSM: 103,28
Subscr 1   Receive:
Subscr 1   Receive: OK

****
Comment: Read record from the EF (Last number dialed).
****

Subscr 1   Send: AT+CRSM=178,28484,1,4,28
Subscr 1   Receive: AT+CRSM=178,28484,1,4,28
Subscr 1   Receive: +CRSM: 144,0,
FFFFFFFFFFFFFFFFFFFFFFFFFFFF0581420010F6FFFFFFFFFFFFFFFFFF
Subscr 1   Receive:
Subscr 1   Receive: OK

Example 4:

****
Comment: SIM access "UPDATE RECORD"
****

****
Comment: Request max. range of entries .
****

Subscr 1   Send: AT+CPBR=?
Subscr 1   Receive: AT+CPBR=?
Subscr 1   Receive: +CPBR: (1-254),20,14
Subscr 1   Receive:
Subscr 1   Receive: OK

****
Comment: Read all entries of the phonebook .
****

Subscr 1   Send: AT+CPBR=1,254
Subscr 1   Receive: AT+CPBR=1,254
Subscr 1   Receive: +CPBR: 1,"+44563693485",145,"Tom Jones"
Subscr 1   Receive: +CPBR: 2,"+44987456321",145,"Tamara Jones"
Subscr 1   Receive: +CPBR: 3,"+44545896638",145,"Paul Williams"
Subscr 1   Receive: +CPBR: 4,"+44545896897",145,"John Smith"
Subscr 1   Receive: +CPBR: 5,"+44321546546",145,"Alexis Wright"
Subscr 1   Receive: +CPBR: 6,"+44496857927",145,"Hannah Adams"
Subscr 1   Receive: +CPBR: 7,"+44321546547",145,"Abigail Cox"

****
Comment: Read record from the EF (Abbreviated dialing numbers) further details see 2.14.1.1.
****

Subscr 1   Send: AT+CRSM=178,28474,1,4,250
Subscr 1   Receive: AT+CRSM=178,28474,1,4,250
Subscr 1   Receive: +CRSM: 103,28
Subscr 1   Receive:
Subscr 1   Receive: OK

****
Comment: Read record from the EF (Abbreviated dialing numbers).
****

Subscr 1   Send: AT+CRSM=178,28474,1,4,28
Subscr 1   Receive: AT+CRSM=178,28474,1,4,28
Subscr 1   Receive: +CRSM:
144,0,546F6D204A6F6E6573FFFFFFFFFFFF07914465633984F5FFFFFFFFFFFF
Subscr 1   Receive:
Subscr 1   Receive: OK

****
Comment: Update record from the EF (Abbreviated dialing numbers).
Comment: Replacing Tom Jones with Oscar Thomson.
****

Subscr 1   Send:
AT+CRSM=220,28474,1,4,28,4F736361722054686F6D736F6EFF07914465633984F5FFFFFFFFFF
FF
Subscr 1   Receive:
AT+CRSM=220,28474,1,4,28,4F736361722054686F6D736F6EFF07914465633984F5FFFFFFFFFF
FF
Subscr 1   Receive:
Subscr 1   Receive: +CRSM: 144,0
Subscr 1   Receive:
Subscr 1   Receive: OK

****
Comment: Read all entries of the phonebook.
Comment: Oscar Thomson has now replaced Tom Jones.
****

Subscr 1   Send: AT+CPBR=1,254
Subscr 1   Receive: AT+CPBR=1,254
Subscr 1   Receive: +CPBR: 1,"+44563693485",145,"Oscar Thomson"
Subscr 1   Receive: +CPBR: 2,"+44987456321",145,"Tamara Jones"
Subscr 1   Receive: +CPBR: 3,"+44545896638",145,"Paul Williams"
Subscr 1   Receive: +CPBR: 4,"+44545896897",145,"John Smith"
Subscr 1   Receive: +CPBR: 5,"+44321546546",145,"Alexis Wright"
Subscr 1   Receive: +CPBR: 6,"+44496857927",145,"Hannah Adams"
Subscr 1   Receive: +CPBR: 7,"+44321546547",145,"Abigail Cox"
Subscr 1   Receive:
Subscr 1   Receive:
Subscr 1   Receive: OK

2.15   Internet Services
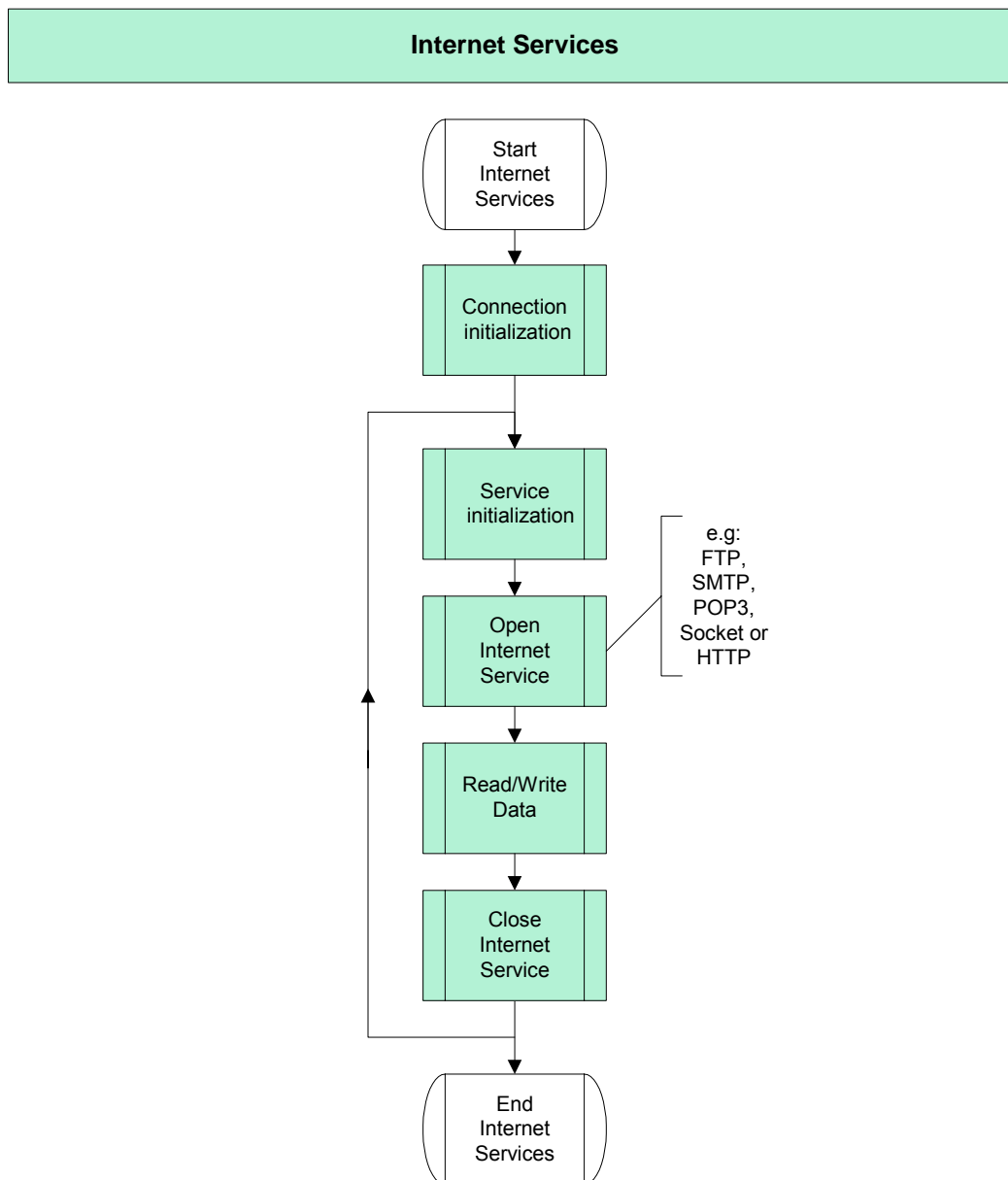
Figure 112: Internet Services

2.15.1.1   Description

- Note, that the embedded TCP/IP stack is not available for all modules.
- The embedded TCP/IP stack allows the usage of the following Internet Services:
  - a) Socket for TCP: Client and Server
  - b) Socket for UDP: Client
  - c) FTP: Client
  - d) HTTP Client
  - e) SMTP Client
  - f) POP3 Client

  over a GPRS or CSD connection. There are some differences between different modules, which will be mentioned in the following examples.
- Very important aspect in the Siemens implementation is non-blocking interface concept, which will be mentioned in the Read/Write Data chapter.
- Several examples for the usage of Internet Services are provided in the following subsections.

2.15.2   Connection Initialization
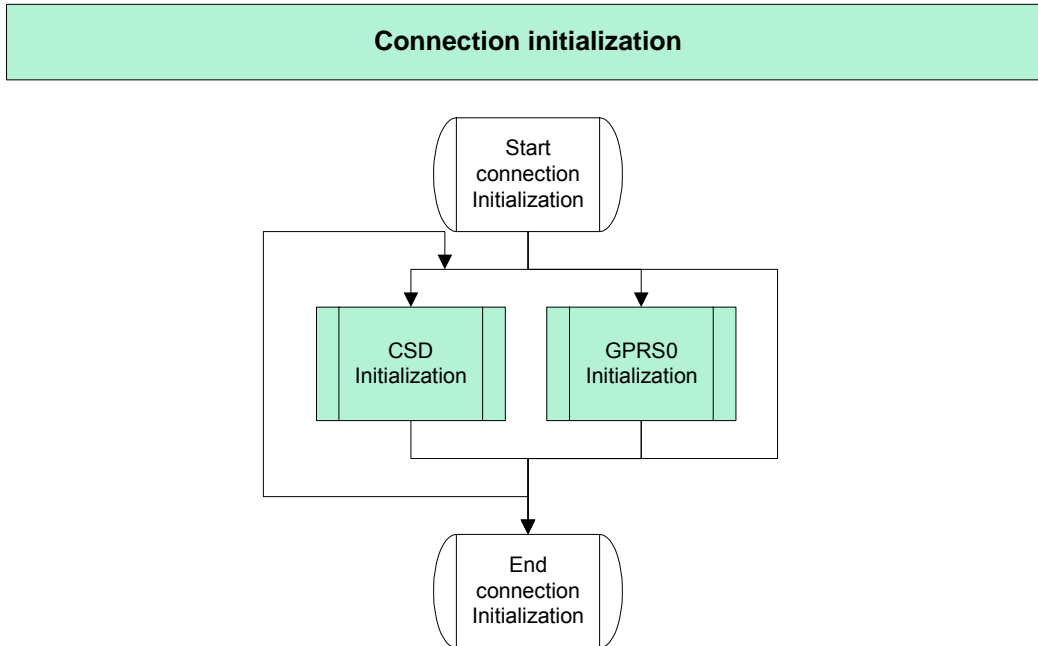
Figure 113: Connection initialization

2.15.2.1   Description

This chapter describes the two connection types: CSD and GPRS which are also referred to as bearers.

To configure the connection profiles the AT^SICS command is used. It is possible to create a maximum of 6 connection profiles. The connections are identified by the <conProfileId>.

There are differences in setting of the conection parameters relating to CSD and GPRS.

- CSD parameter description:
    a) Parameters like: <authMode>, <calledNum>, <dataRate>, <dataType> are mandatory and depend on the network providers and can be found on their websides.
    b) The <conType> parameter should be set at first.
    c) It's advisible to set the <alphabet> parameter after setting the <conType> parameter, because it selects the set of input and output of string parameters.
    d) The <authMode> parameter should be set before setting the <passwd>, because changing this parameter will restore the <passwd> parameter to its default.
    e) The other parameters can be set in any order.

- GPRS parameter description:
    a) Parameters like: <authMode> and <apn> are mandatory and depend on the network providers and can be found on their websides.
    b) The <conType> parameter should be set at first.
    c) It's advisible to set the <alphabet> parameter after setting the <conType> parameter, because it selects the set of input and output of string parameters.
    d) The <authMode> parameter should be set before setting the <passwd>, because changing this parameter will restore the <passwd> parameter to its default.
    e) The other parameters can be set in any order.

- The parameters used in this example, e.g. <user> or <apn> reflect settings for the german network provider: T-mobile.

2.15.2.2   Used AT commands

AT^SICS   -   Internet Connection Setup Profile

For further details about the commands see [2].

2.15.2.3   Flow chart – CSD and GPRS0 Initialization

GPRS0 Initialization

Start
GPRS0
Initialization

It is possible to attach value 0-5 to the <conProfileId> parameter, provided that this value has not been attached to another connection profile. Here <conProfileId> is set to 1.

AT^SICS=1,
conType,
GPRS0

OK

AT^SICS=1,
alphabet,1

OK

It's important to set the <authMod> parameter before setting the <passwd> parameter, because it will restore <passwd> to its default

AT^SICS=1,
authMode,
PAP

OK

AT^SICS=1,
user,t-d1

OK

*

*

AT^SICS=1,
passwd,
t-d1

OK

AT^SICS=1,
apn,
internet.t-d1.de

OK

AT^SICS=1,
dns1,
193.254.160.1

OK

End
GPRS0
Initialization

Figure 114: CSD initialization

GPRS0 Initialization

It is possible to attach value 0-5 to the <conProfileId> parameter, provided that this value has not been attacht to another connection profile. Here <conProfileId> is set to 1.

Start GPRS0 Initialization

AT^SICS=1, conType, GPRS0

OK

AT^SICS=1, alphabet,1

OK

It's important to set the <authMod> parameter before setting the password, because it will restore password to its default

AT^SICS=1, authMode, PAP

OK

AT^SICS=1, user,t-d1

OK

*

*

AT^SICS=1, passwd, t-d1

OK

AT^SICS=1, apn, internet.t-d1.de

OK

AT^SICS=1, dns1, 193.254.160.1

OK

End GPRS0 Initialization

Figure 115: GPRS0 initialization

2.15.2.4   Hints

- MC55/56 (version 2.5) doesn't support the CSD connection.
- MC55/56 (version 2.5) doesn't support setting of the <authMode> parameter.

2.15.2.5   Example – CSD and GPRS0 Initialization

Example 1: CSD Initialization
****
Comment Connection Setup Profile CSD
****
Subscr 1   Send: AT^SICS=0,conType,CSD
Subscr 1   Receive: AT^SICS=0,conType,CSD
Subscr 1   Receive: OK
Subscr 1   Send: AT^SICS=0,alphabet,1
Subscr 1   Receive: AT^SICS=0,alphabet,1
Subscr 1   Receive: OK
Subscr 1   Send: AT^SICS=0,authMode,PAP
Subscr 1   Receive: AT^SICS=0,authMode,PAP
Subscr 1   Receive: OK
Subscr 1   Send: AT^SICS=0,user,freenet
Subscr 1   Receive: AT^SICS=0,user,freenet
Subscr 1   Receive: OK
Subscr 1   Send: AT^SICS=0,passwd,mobil
Subscr 1   Receive: AT^SICS=0,passwd,mobil
Subscr 1   Receive: OK
Subscr 1   Send: AT^SICS=0,calledNum,22243
Subscr 1   Receive: AT^SICS=0,calledNum,22243
Subscr 1   Receive: OK
Subscr 1   Send: AT^SICS=0,dataRate,0
Subscr 1   Receive: AT^SICS=0,dataRate,0
Subscr 1   Receive: OK
Subscr 1   Send: AT^SICS=0,dataType,0
Subscr 1   Receive: AT^SICS=0,dataType,0
Subscr 1   Receive: OK

Example 2: GPRS0 Initialization
****
Comment Connection Setup Profile GPRS0
****
Subscr 1   Send: AT^SICS=1,conType,GPRS0
Subscr 1   Receive: AT^SICS=1,conType,GPRS0
Subscr 1   Receive: OK
Subscr 1   Send: AT^SICS=1,alphabet,1
Subscr 1   Receive: AT^SICS=1,alphabet,1
Subscr 1   Receive: OK
Subscr 1   Send: AT^SICS=1,authMode,PAP
Subscr 1   Receive: AT^SICS=1,authMode,PAP
Subscr 1   Receive: OK
Subscr 1   Send: AT^SICS=1,user,t-d1
Subscr 1   Receive: AT^SICS=1,user,t-d1
Subscr 1   Receive: OK
Subscr 1   Send: AT^SICS=1,passwd,t-d1
Subscr 1   Receive: AT^SICS=1,passwd,t-d1
Subscr 1   Receive: OK
Subscr 1   Send: AT^SICS=1,apn,internet.t-d1.de
Subscr 1   Receive: AT^SICS=1,apn,internet.t-d1.de
Subscr 1   Receive: OK
Subscr 1   Send: AT^SICS=1,dns1,193.254.160.1
Subscr 1   Receive: AT^SICS=1,dns1,193.254.160.1

Subscr 1   Receive: OK

2.15.3   Service Initialization
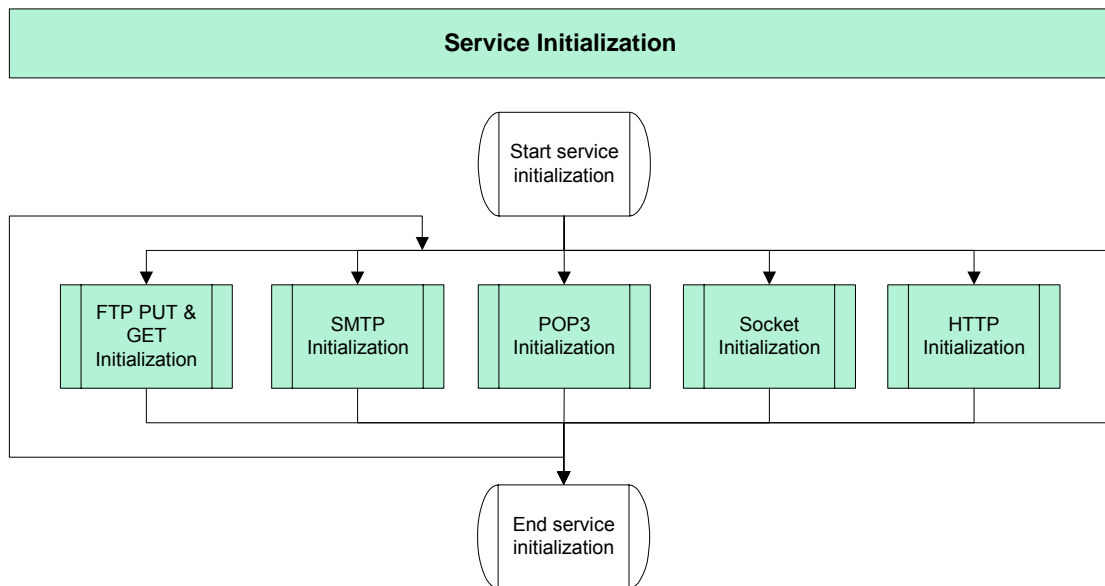
Figure 116: Service Initialization.

2.15.3.1   Description

This chapter describes basic settings recommended to configure the internet services: FTP, SMTP, POP3, Socket and HTTP.

- The command AT^SISS enables to set required parameters of a service.
- It is possible to create a maximum of 10 service profiles.
- It is allowed to configure maximum 3 HTTP, 6 Sockets (The sum of Listener Sockets and Client Sockets is 6 and the account of listener Sockets are limited by 2), 1 FTP, 1 POP3, 1 SMTP profiles within those 10 connection profiles.
- The services are identified by the <srvProfileId>.
- The services can be configured to use any of the connections which have been configured during the connection initialization by setting "conId" parameter accordingly.

2.15.3.2   Used AT commands

AT^SISS   -   Internet Service Setup Profile

For further details about the commands see [2].

2.15.3.3   Flow chart

2.15.3.3.1 FTP Initialization

- The following examples describe the configuration of the FTP GET and PUT service. FTP GET enables download of data and FTP PUT upload.
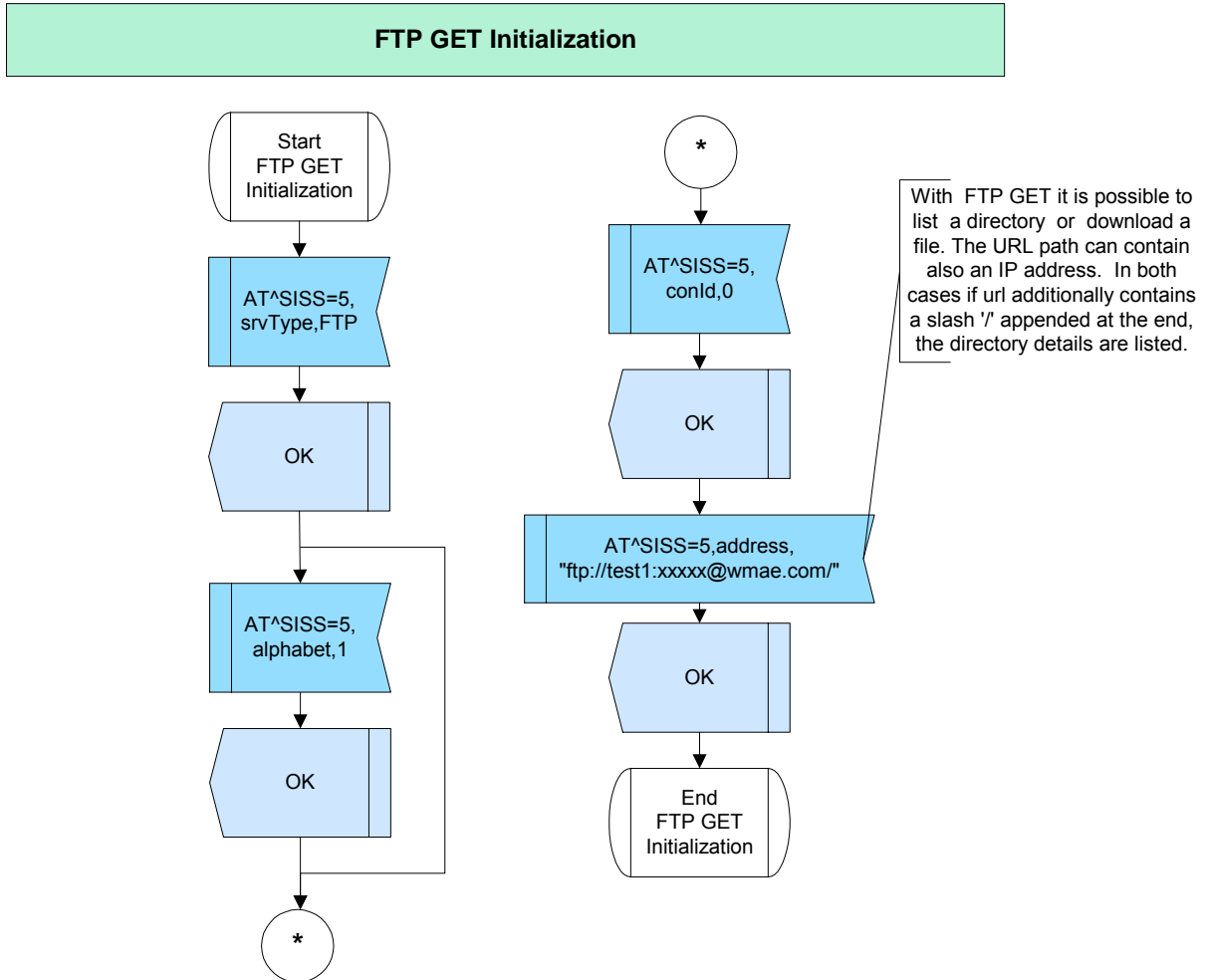
Figure 117 FTP GET Initialization

FTP PUT Initialization

Start
FTP PUT
Initialization

AT^SISS=0,
srvType,FTP

OK

AT^SISS=0,
alphabet,1

OK

AT^SISS=0,
conId,0

OK

With FTP PUT it is not possible to upload a directory.
All parameters listed after the first semicolon are optional and can be omitted. (see FTP GET example)

AT^SISS=0,address,
"ftpput://test1:xxxxx@wmae.com/
test.txt;type=a;size=3000;
mode=a"

OK

End
FTP PUT
Initialization
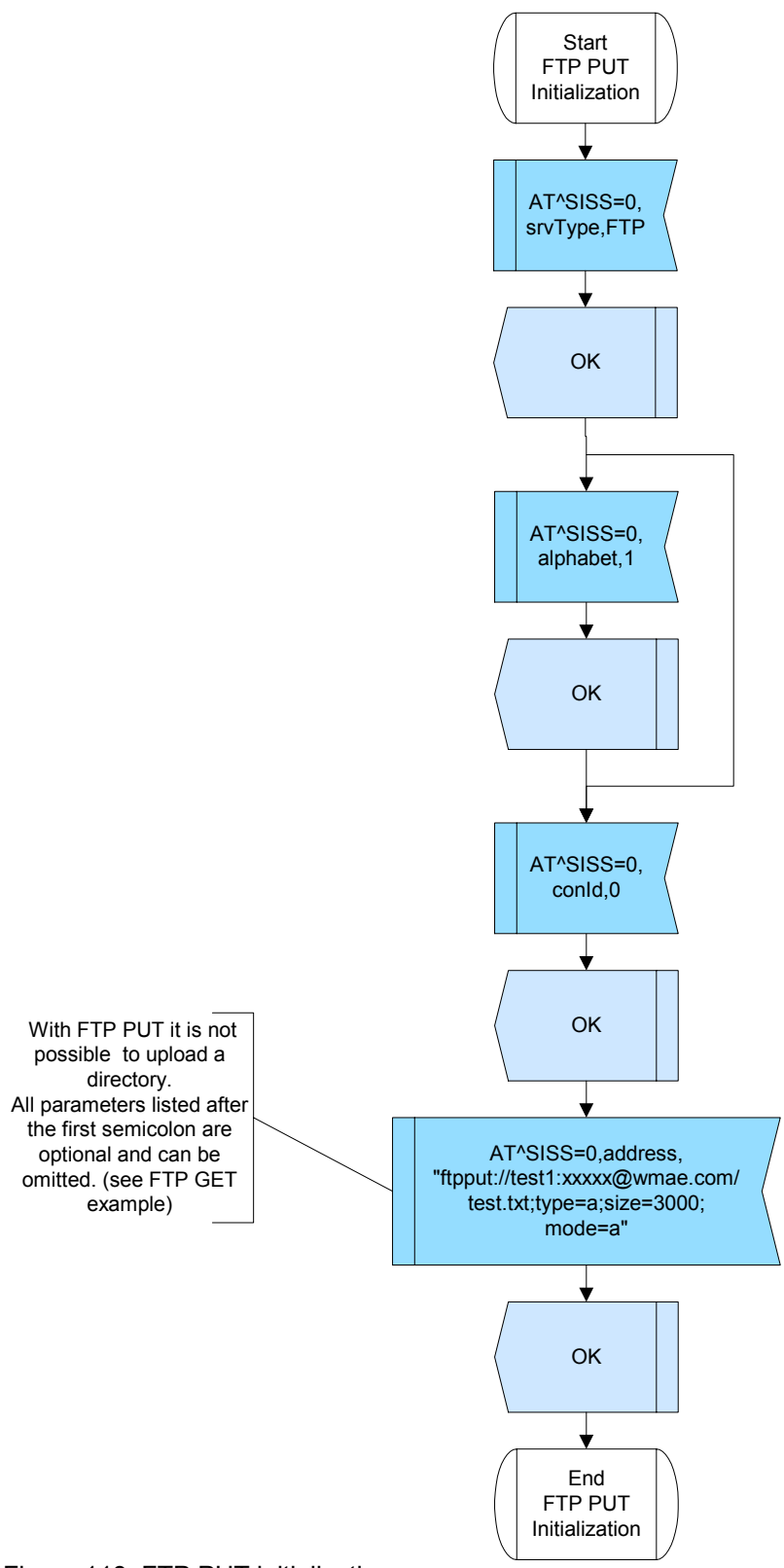
Figure 118: FTP PUT initialization

2.15.3.3.2 SMTP Initialization

- The following example describes settings, required to send an email.
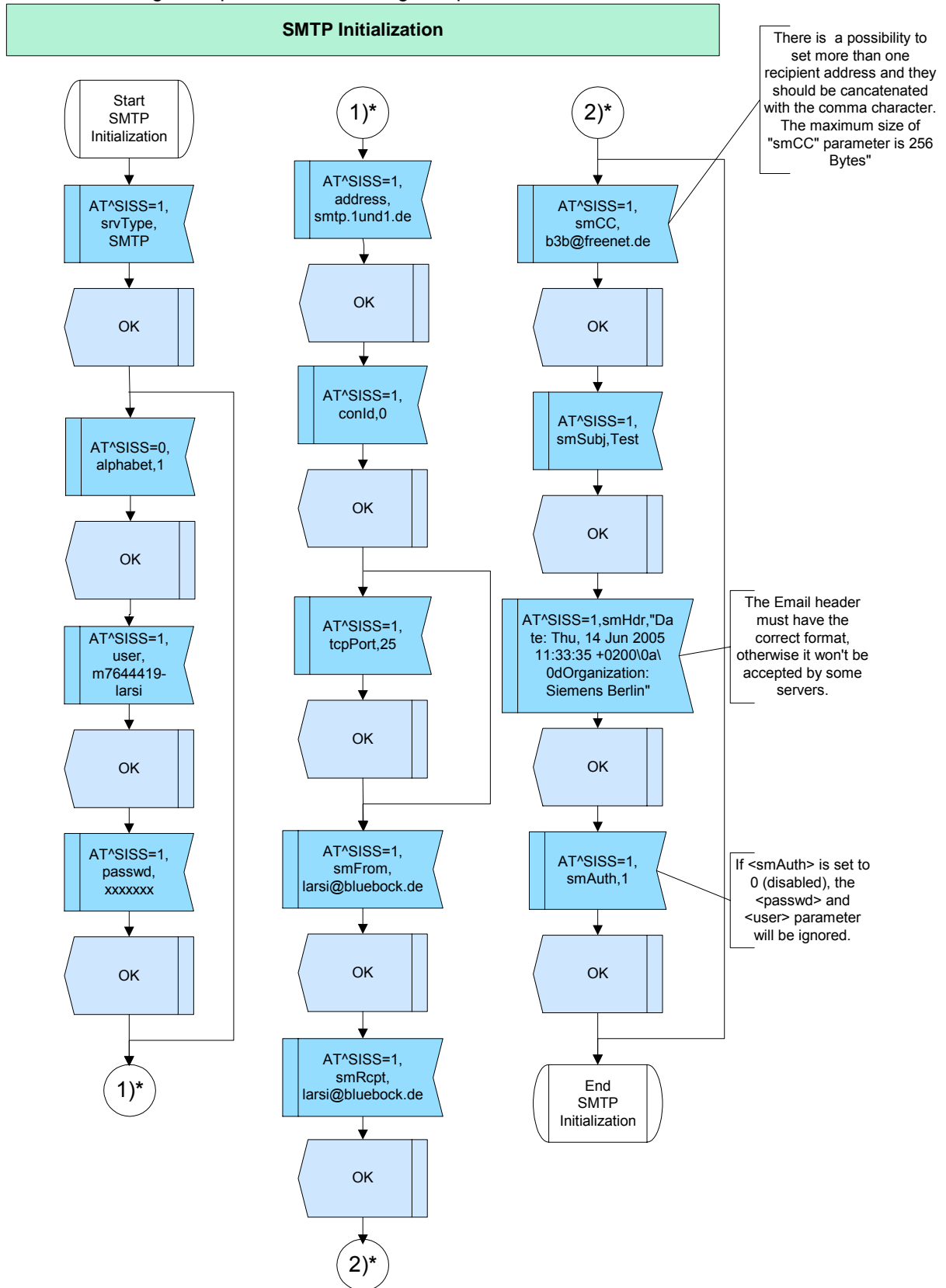
Figure 119: SMTP Initialization.

2.15.3.3.3 POP3 Initialization

- The following example describes the settings required to retrieve the chosen email specified by pNumber parameter.
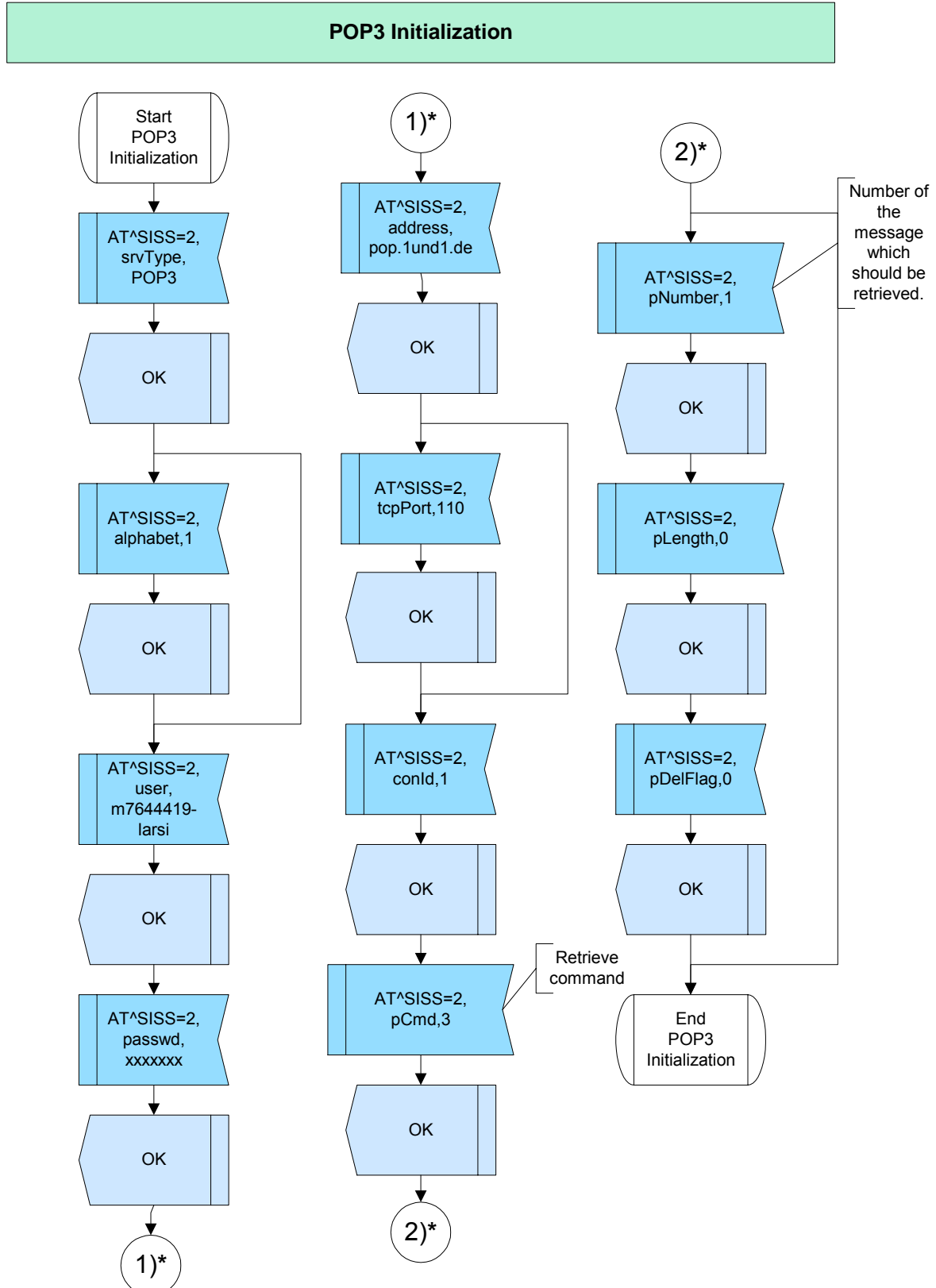
Figure 120: POP3 Initialization.

2.15.3.3.4 Socket Initialization

- In this example the socket to the echo port (7) of the given server has been configured. Echo port belongs to the well known ports.
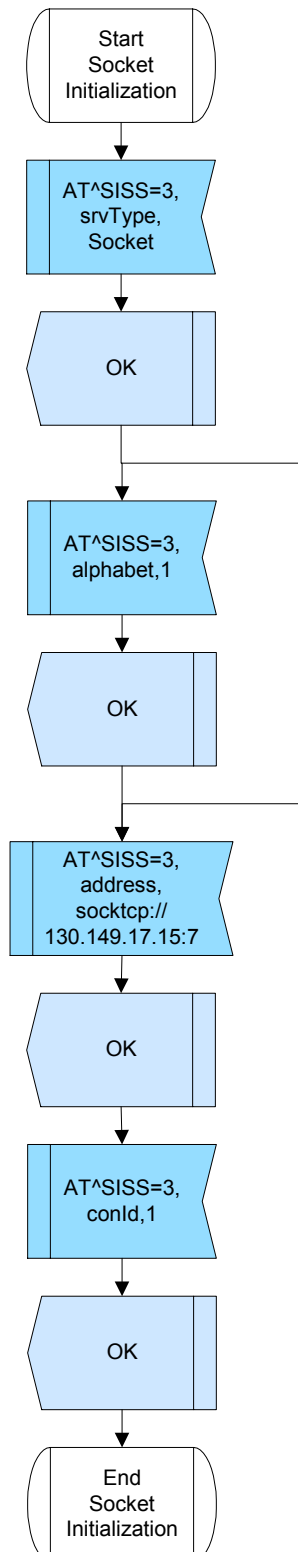
Figure 121: Socket Initialization.

2.15.3.3.5 HTTP Initialization

- In this example HTTP GET of the www.wmae.com website has been configured.
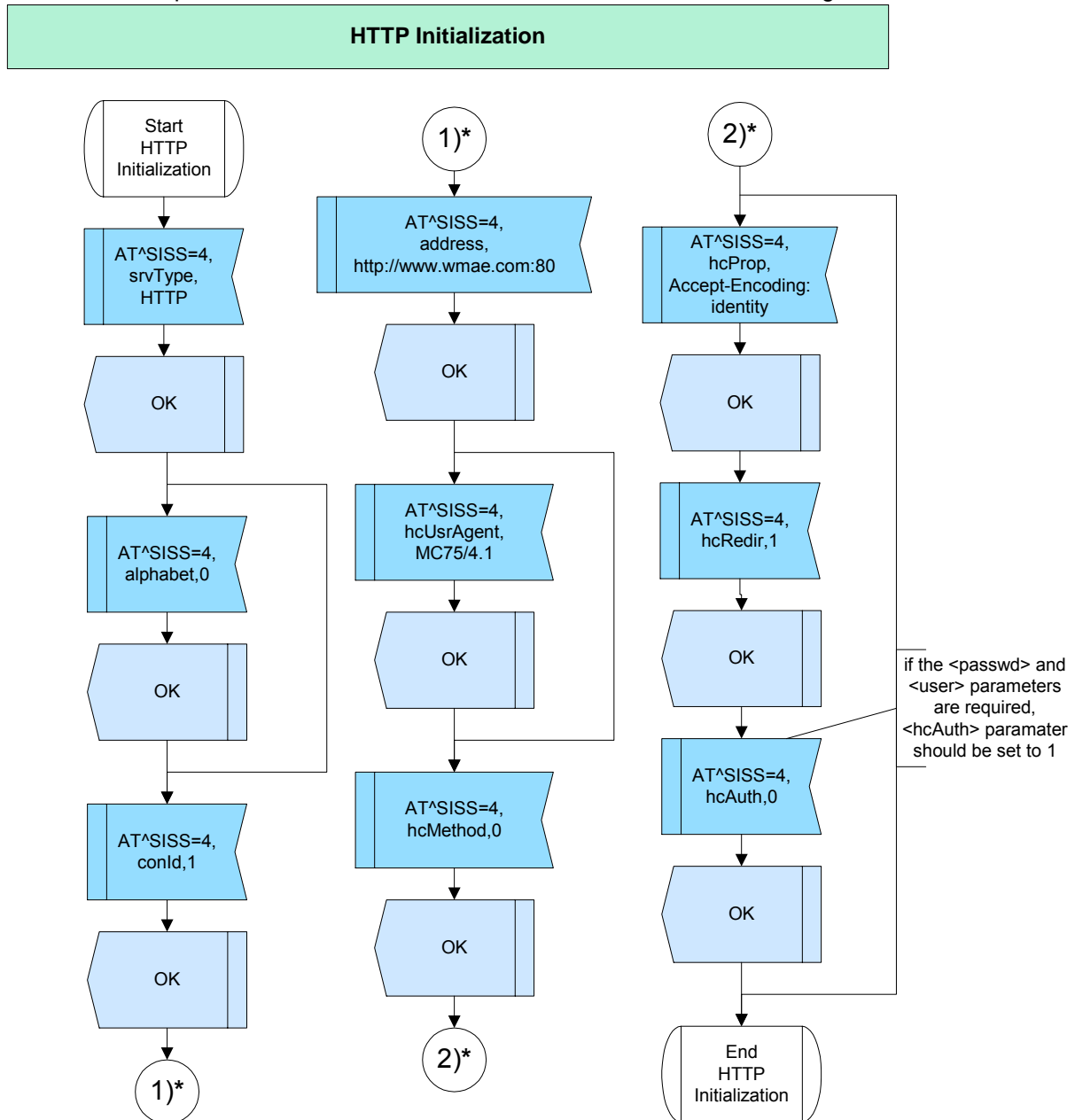
Figure 122: HTTP Initialization.

2.15.3.4 Hints

- Note that some terminals e.g. ZOC support the ASCII character set but some modules use the GSM character set per default. The problem is, that some special characters e.g. '@' are coded differently in those character sets. It is advisible to set the <alphabet> parameter to 1.
- The FTP example shows how to upload the text file. In order to upload a binary file, the type of the <address> parameter should be set to "i".
- If the <user> and <passwd> parameter shall be used for SMTP authentication, it is important to set <smAuth> to 1.
- If the website requires <passwd> and <user> in HTTP GET example, both parameters should be set and the <hcAuth> parameter should be set to 1.
- In the Socket example it is important to set the port number of the chosen server, which is really defined and not protected by e.g. firewall.

2.15.3.5   Examples

2.15.3.5.1 FTP Initialization

FTP GET

```
***************************************
```
Comment Service Setup Profile FTP GET
```
***************************************
```

Subscr 1   Send: AT^SISS=5,srvType,ftp
Subscr 1   Receive: AT^SISS=5,srvType,ftp
Subscr 1   Receive: OK
Subscr 1   Send: AT^SISS=5,alphabet,1
Subscr 1   Receive: AT^SISS=5,alphabet,1
Subscr 1   Receive: OK
Subscr 1   Send: AT^SISS=5,conId,0
Subscr 1   Receive: AT^SISS=5,conId,0
Subscr 1   Receive: OK
Subscr 1   Send: AT^SISS=5,address,"ftp://test1:xxxxx@wmae.com/"
Subscr 1   Receive: AT^SISS=5,address,"ftp://test1:xxxxx@wmae.com/"
Subscr 1   Receive: OK

FTP PUT

```
***************************************
```
Comment Service Setup Profile FTP PUT
```
***************************************
```

Subscr 1   Send: AT^SISS=0,srvType,ftp
Subscr 1   Receive: AT^SISS=0,srvType,ftp
Subscr 1   Receive: OK
Subscr 1   Send: AT^SISS=0,alphabet,1
Subscr 1   Receive: AT^SISS=0,alphabet,1
Subscr 1   Receive: OK
Subscr 1   Send: AT^SISS=0,conId,0
Subscr 1   Receive: AT^SISS=0,conId,0
Subscr 1   Receive: OK
Subscr   1   Send:
AT^SISS=0,address,"ftpput://test1:xxxxx@wmae.com/test.txt;type=a;size=3000;mode=a"
Subscr   1   Receive:
AT^SISS=0,address,"ftpput://test1:xxxxx@wmae.com/test.txt;type=a;size=3000;mode=a"
Subscr 1   Receive: OK

2.15.3.5.2 SMTP Initialization

```
***************************************
```
Comment Service Setup Profile SMTP
```
***************************************
```

Subscr 1   Send: AT^SISS=1,srvType,smtp
Subscr 1   Receive: AT^SISS=1,srvType,smtp
Subscr 1   Receive: OK
Subscr 1   Send: AT^SISS=1,alphabet,1
Subscr 1   Receive: AT^SISS=1,alphabet,1
Subscr 1   Receive: OK
Subscr 1   Send: AT^SISS=1,user,m7644419-larsi
Subscr 1   Receive: AT^SISS=1,user,m7644419-larsi
Subscr 1   Receive: OK

Subscr 1   Send: AT^SISS=1,passwd,xxxxxxx
Subscr 1   Receive: AT^SISS=1,passwd,xxxxxxx
Subscr 1   Receive: OK
Subscr 1   Send: AT^SISS=1,address,smtp.1und1.de
Subscr 1   Receive: AT^SISS=1,address,smtp.1und1.de
Subscr 1   Receive: OK
Subscr 1   Send: AT^SISS=1,conId,0
Subscr 1   Receive: AT^SISS=1,conId,0
Subscr 1   Receive: OK
Subscr 1   Send: AT^SISS=1,tcpPort,25
Subscr 1   Receive: AT^SISS=1,tcpPort,25
Subscr 1   Receive: OK
Subscr 1   Send: AT^SISS=1,smFrom,larsi@bluebock.de
Subscr 1   Receive: AT^SISS=1,smFrom,larsi@bluebock.de
Subscr 1   Receive: OK
Subscr 1   Send: AT^SISS=1,smRcpt,larsi@bluebock.de
Subscr 1   Receive: AT^SISS=1,smRcpt,larsi@bluebock.de
Subscr 1   Receive: OK
Subscr 1   Send: AT^SISS=1,smCC,b3b@freenet.de
Subscr 1   Receive: AT^SISS=1,smCC,b3b@freenet.de
Subscr 1   Receive: OK
Subscr 1   Send: AT^SISS=1,smSubj,Test
Subscr 1   Receive: AT^SISS=1,smSubj,Test
Subscr 1   Receive: OK
Subscr 1   Send: AT^SISS=1,smHdr,"Date: Thu, 14 Jun 2005 11:33:35 +0200\0a\0dOrganization: Siemens Berlin"
Subscr 1   Receive: AT^SISS=1,smHdr,"Date: Thu, 14 Jun 2005 11:33:35 +0200\0a\0dOrganization: Siemens Berlin"
Subscr 1   Receive: OK
Subscr 1   Send: AT^SISS=1,smAuth,1
Subscr 1   Receive: AT^SISS=1,smAuth,1
Subscr 1   Receive: OK

2.15.3.5.3 POP3 Initialization

****
Comment Service Setup Profile POP3
****

Subscr 1   Send: AT^SISS=2,srvType,pop3
Subscr 1   Receive: AT^SISS=2,srvType,pop3
Subscr 1   Receive: OK
Subscr 1   Send: AT^SISS=2,alphabet,1
Subscr 1   Receive: AT^SISS=2,alphabet,1
Subscr 1   Receive: OK
Subscr 1   Send: AT^SISS=2,user,m7644419-larsi
Subscr 1   Receive: AT^SISS=2,user,m7644419-larsi
Subscr 1   Receive: OK
Subscr 1   Send: AT^SISS=2,passwd,xxxxxxx
Subscr 1   Receive: AT^SISS=2,passwd,xxxxxxx
Subscr 1   Receive: OK
Subscr 1   Send: AT^SISS=2,address,pop.1und1.de
Subscr 1   Receive: AT^SISS=2,address,pop.1und1.de
Subscr 1   Receive: OK
Subscr 1   Send: AT^SISS=2,tcpPort,110
Subscr 1   Receive: AT^SISS=2,tcpPort,110
Subscr 1   Receive: OK
Subscr 1   Send: AT^SISS=2,conId,1
Subscr 1   Receive: AT^SISS=2,conId,1

Subscr 1   Receive: OK
Subscr 1   Send: AT^SISS=2,pCmd,3
Subscr 1   Receive: AT^SISS=2,pCmd,3
Subscr 1   Receive: OK
Subscr 1   Send: AT^SISS=2,pNumber,1
Subscr 1   Receive: AT^SISS=2,pNumber,1
Subscr 1   Receive: OK
Subscr 1   Send: AT^SISS=2,pLength,0
Subscr 1   Receive: AT^SISS=2,pLength,0
Subscr 1   Receive: OK
Subscr 1   Send: AT^SISS=2,pDelFlag,0
Subscr 1   Receive: AT^SISS=2,pDelFlag,0
Subscr 1   Receive: OK

2.15.3.5.4 Socket Initialization

****
Comment Service Setup Profile Socket
****

Subscr 1   Send: AT^SISS=3,srvType,socket
Subscr 1   Receive: AT^SISS=3,srvType,socket
Subscr 1   Receive: OK
Subscr 1   Send: AT^SISS=3,alphabet,1
Subscr 1   Receive: AT^SISS=3,alphabet,1
Subscr 1   Receive: OK
Subscr 1   Send: AT^SISS=3,address,socktcp://130.149.17.15:7
Subscr 1   Receive: AT^SISS=3,address,socktcp://130.149.17.15:7
Subscr 1   Receive: OK
Subscr 1   Send: AT^SISS=3,conId,1
Subscr 1   Receive: AT^SISS=3,conId,1
Subscr 1   Receive: OK

2.15.3.5.5 HTTP Initialization

****
Comment Service Setup Profile HTTP
****

Subscr 1   Send: AT^SISS=4,srvType,http
Subscr 1   Receive: AT^SISS=4,srvType,http
Subscr 1   Receive: OK
Subscr 1   Send: AT^SISS=4,alphabet,0
Subscr 1   Receive: AT^SISS=4,alphabet,0
Subscr 1   Receive: OK
Subscr 1   Send: AT^SISS=4,conId,1
Subscr 1   Receive: AT^SISS=4,conId,1
Subscr 1   Receive: OK
Subscr 1   Send: AT^SISS=4,address,http://www.wmae.com:80
Subscr 1   Receive: AT^SISS=4,address,http://www.wmae.com:80
Subscr 1   Receive: OK
Subscr 1   Send: AT^SISS=4,hcUsrAgent,MC75/4.1
Subscr 1   Receive: AT^SISS=4,hcUsrAgent,MC75/4.1
Subscr 1   Receive: OK
Subscr 1   Send: AT^SISS=4,hcMethod,0
Subscr 1   Receive: AT^SISS=4,hcMethod,0
Subscr 1   Receive: OK

Subscr 1   Send: AT^SISS=4,hcProp,Accept-Encoding: identity
Subscr 1   Receive: AT^SISS=4,hcProp,Accept-Encoding: identity
Subscr 1   Receive: OK
Subscr 1   Send: AT^SISS=4,hcRedir,1
Subscr 1   Receive: AT^SISS=4,hcRedir,1
Subscr 1   Receive: OK
Subscr 1   Send: AT^SISS=4,hcAuth,0
Subscr 1   Receive: AT^SISS=4,hcAuth,0
Subscr 1   Receive: OK

2.15.4 Open Internet Service

2.15.4.1 Description

This chapter describes how to open the service profiles configured before with the AT^SISO command. Executing of that command causes bearer (GPRS/CSD) establishment.

- The errors, which might occur after executing the AT^SISO command command can be:
  - a) Setup profile errors. They apper instead of OK answer.
  - b) Bearer (GPRS/CSD) establishment errors.
  - c) Service and server errors, which can appear between OK answer and the AT^SISC command.

2.15.4.2 Used AT commands

AT^SISO   -   Internet Service Open

2.15.4.3 Flow chart
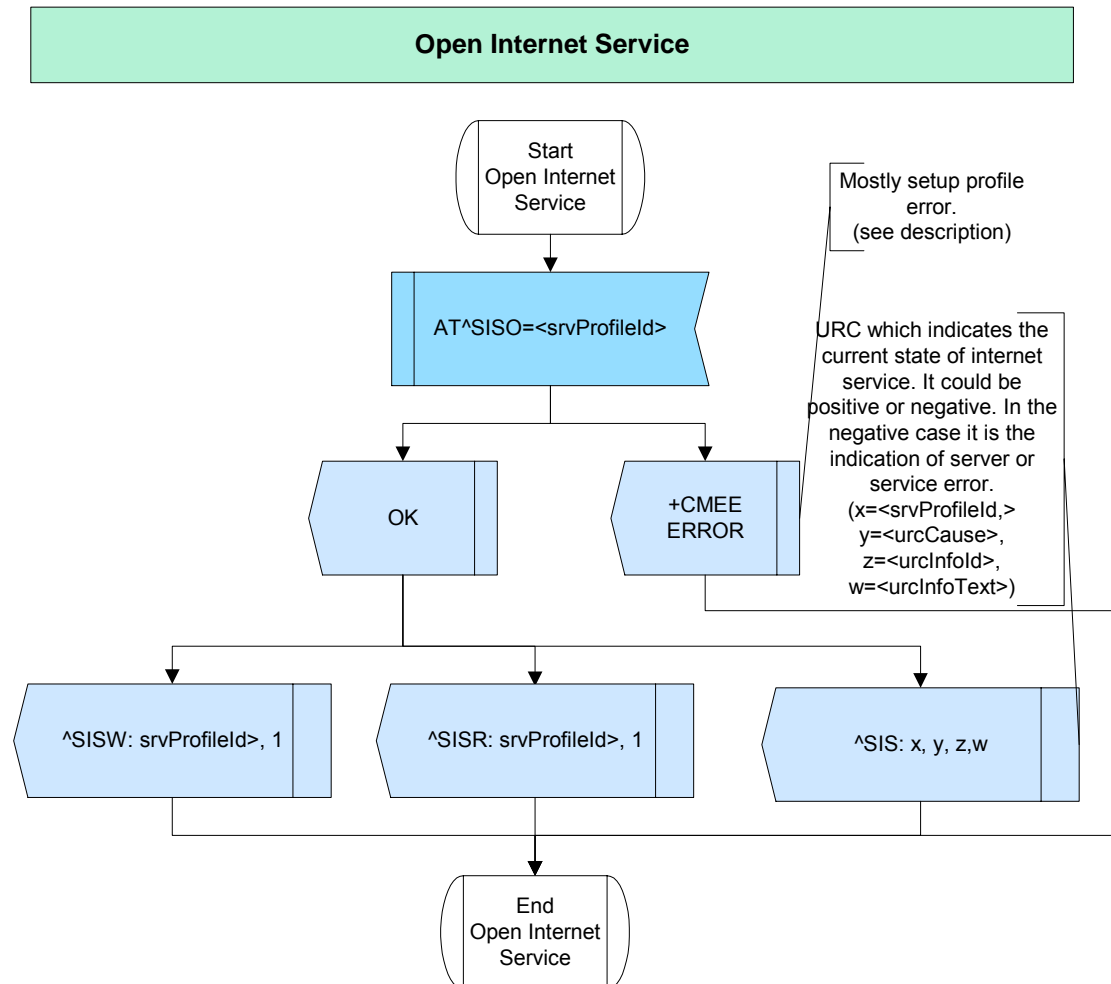
Figure 123: Open Internet Services

2.15.4.4 Examples

(see Write/Read chapter)

2.15.5   Read/Write Data

2.15.5.1   Description

This chapter describes how to use the services configured before.

- In this example the services are executed independently of each other, but some Siemens modules allow to use all of them in parallel, provided that they are running on the same connection profile. The other modules support only one service profile at the same time.
- After executing the AT^SISO command, "OK" and the response to the prior write or read command will appear (see Open Internet Service) After that the write or read command should be executed which contains <srvProfileId> and the number of bytes to read or write (<reqReadLength> / <reqWriteLength>).
- It is not possible to find out how many bytes there are to read, only if the <reqReadLength> is greater than the existing size of bytes to read, the <cnfReadLength> in the ^SISR: responce will show this actual size.
- The Read/Write procedure is quite complex. Reading or writing x bytes can be done at once or in several steps.
- The concept of non-blocking interface, mentioned in chapter 2.15.1.1 allows to intercept AT commands related to different topics into Internet Services (see Figure 124). This example shows the interceptionof the AT+CMEE command during Internet Services data transfer.

2.15.5.2   Used AT commands

AT^SISR   -   Internet Service Read Data
AT^SISW   -   Internet Service Write Data

For further details about the commands see [2].

2.15.5.3 Flow chart

- The first flow chart shows the read and write data sequenz in general.The next flow charts describes the usage of every service in details.
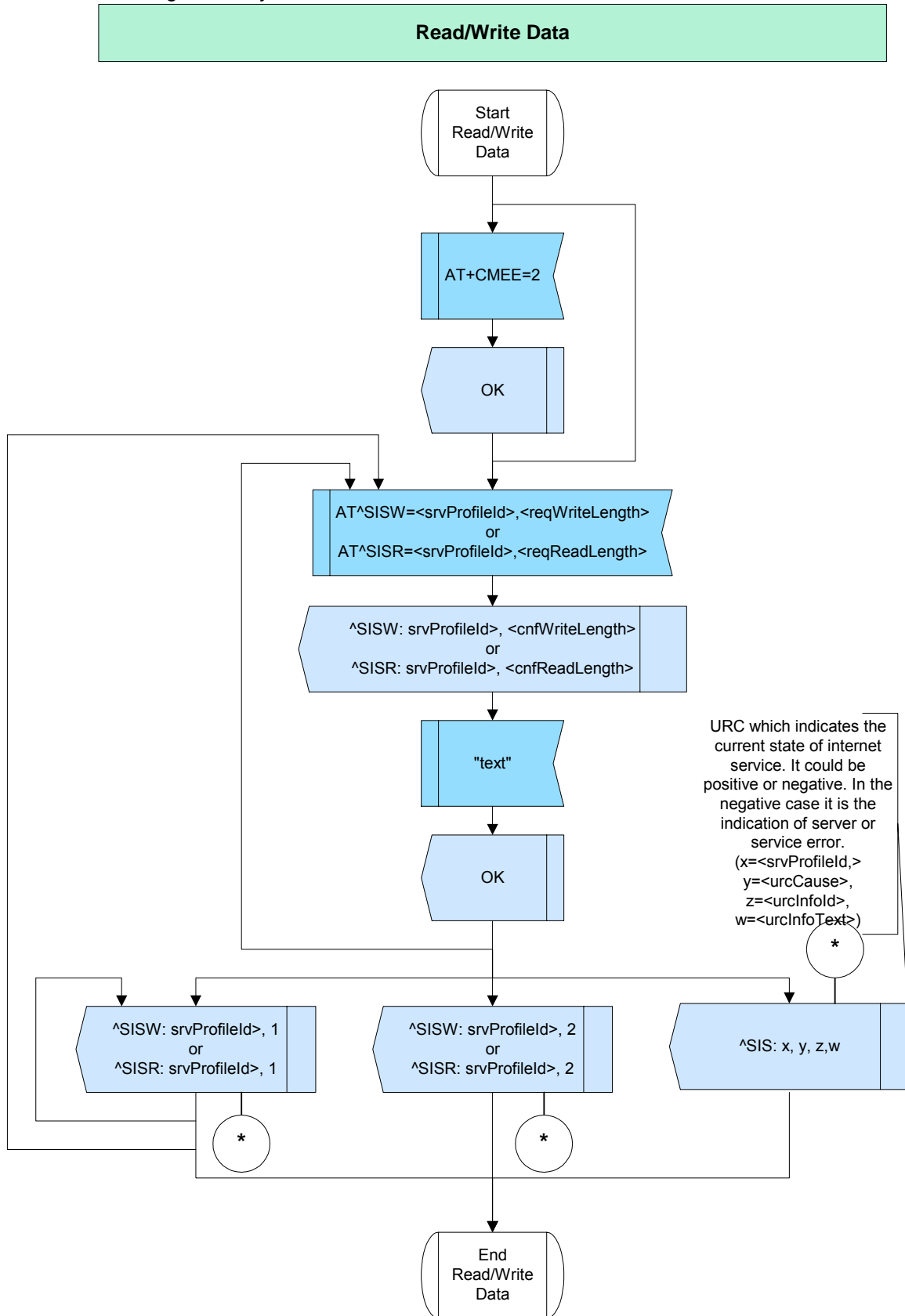
Figure 124: Read/Write Data

2.15.5.3.1 FTP

FTP GET
- The following example describes the download of the directory from the wmae.com server.
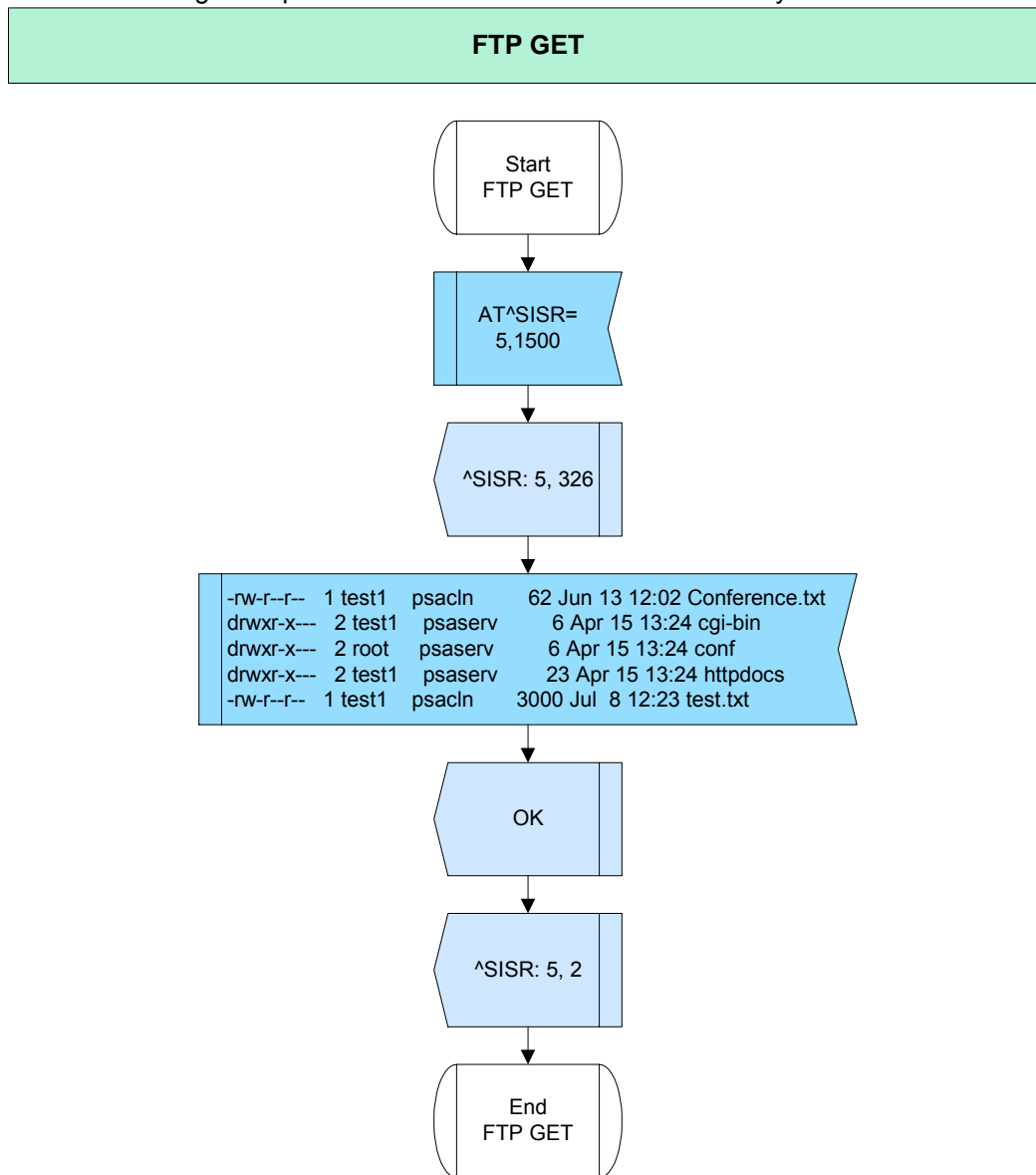
Figure 125: FTP GET

FTP PUT
- The following example describes the upload of the text file, with a size of 3000 bytes.

In the service profile the size of the file is set to 3000 bytes, but it isn't possible to write 3000 bytes at once (maximum 1500 bytes). That's why this sequence must be repeated two times.

If the size of the created file is not set in service profile this responce appears after executing AT^SISC command

Figure 126 FTP PUT

2.15.5.3.2 SMTP

- The following example describes how to send a short email.

Figure 127: SMTP

2.15.5.3.3 POP3

- The following example describes retrieving the chosen email from the POP3 server.
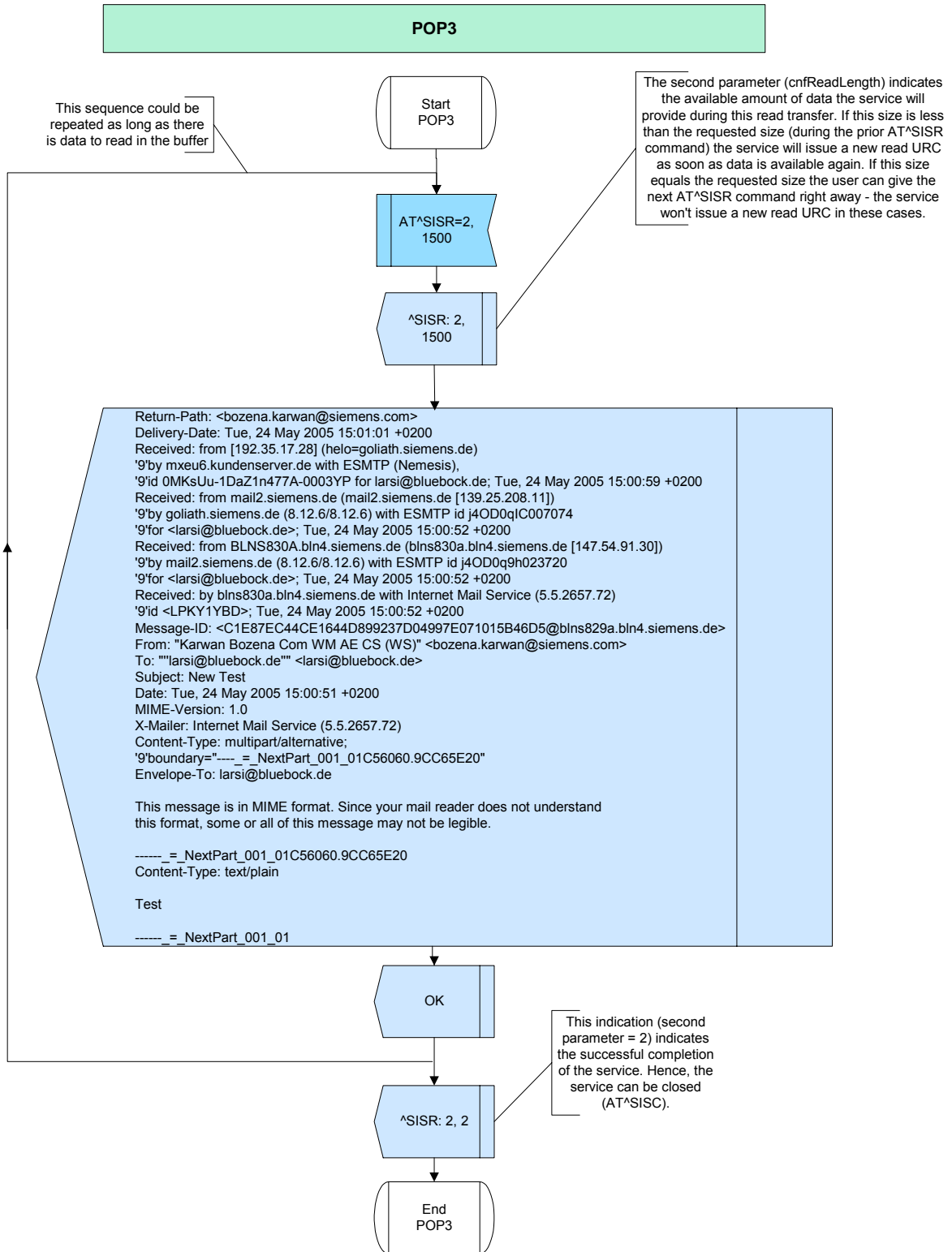
Figure 128: POP3

2.15.5.3.4 Socket

- The following example describes the socket connection to the echo port.

Socket

Start
Socket

This sequence could be
repeated several times

AT^SISW=3,
5

^SISW: 3, 5

echo!

send data
to the echo
port of the
given server

OK

^SISW: 3, 1

^SISR: 3, 1

AT^SISR=3,5

^SISR: 3, 5

echo!

get echod
data from
the echo
port of the
given server

OK

End
Socket
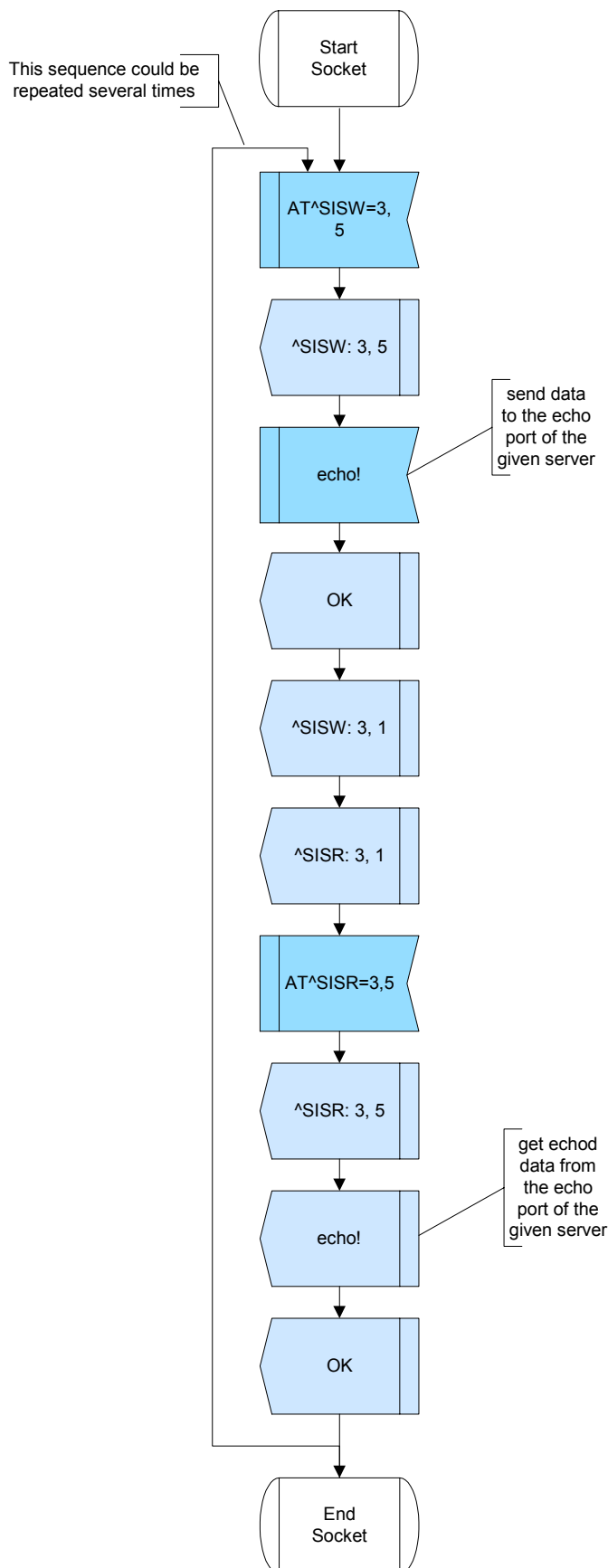
Figure 129: Socket

2.15.5.3.5 HTTP

- The following flow chart shows downloading the website with HTTP GET.

HTTP

```
Start
HTTP
```

This sequence could be repeated as long as there is data to read in the buffer

```
^SIS: 4, 3, 2201,
"HTTP
Response:HTTP/
1.1 200 OK"
```

```
^SISR: 4, 1
```

```
AT^SISR=4,
1500
```

```
^SISR: 4,
1024
```

```
*
```

```
OK
```

Indication of the end of the data transfer, which appears always before executing the AT^SISC command by HTTP, unless this command is executed before the last packet has been read.

```
^SISR: 4, 2
```

```
End
HTTP
```

```
<html>
<head>
<title> Wireless Modules - Application Engineering </title>

<style type="text/css">
body {margin-top:0px; margin-left:0px; margin-right:0px; margin-bottom:0px;
font-family:Arial,sans-serif; background-color:white;}
h1 { font-size:24px; color:white; background-color:rgb(2,0,153); padding-top:25px;
padding-bottom:25px; text-align:center;}
a { color:blue; text-decoration:underline; }
a:visited { color:blue; text-decoration:underline; }
a:hover { color:red; }
a:active { color:blue; text-decoration:underline; }
img {border:0px solid;}

.i1 {text-align: center; font-size:20px;}
.i2 {text-align: center; font-size:14px;}

</style>
</head>

<body>
<h1>
Wireless Modules - Application Engineering
</h1>
<div class="i1">
<a href="/appl/"><img src="titel.jpg" alt="title image"></a><br>
Application samples with <a href="http://www.siemens.com/wm"
target=_blank>Siemens</a> TC45 modules.<br>
</div>
'<div class="i2">
Click on the image to go to the application samples.<br>
</div>
</body>
</html>
```

```
*
```

Figure 130: HTTP

2.15.5.4 Hints

FTP
- FTP PUT uses only write commands (AT^SISW) (see the following example) and FTP GET uses only read commands (AT^SISR).
- It isn't possible to upload an already existing file. The file is created by executing the FTP service (see the following example).

SMTP
- Note, that the email is sent after sending AT^SISC command by SMTP service. Before this happens, it is possible to execute the AT^SISW command several times and thereby send any number of bytes.
- Note, that AT^SISC=<srvProfileId>,1 cancels the email send command (i.e. the email won't be stored on the remote peer SMTP server).

POP3
- Note, that indication of the end of data transfer, which appears always before executing AT^SISC command by POP3, unless this command is execuced before last packet has been read.

SOCKET
- Defining/activating and using the listener service depends on the network provider. Not all allow the usage of the service.

2.15.5.5 Examples

2.15.5.5.1 FTP

FTP GET
```
****************************************
```
Comment Download the directory from the FTP server
```
****************************************
```

```
Subscr 1     Send: AT^SISO=5
Subscr 1   Receive: AT^SISO=5
Subscr 1   Receive:
Subscr 1   Receive: OK
Subscr 1   Receive:
Subscr 1   Receive: ^SISR: 5, 1
Subscr 1     Send: AT^SISR=5,1500
Subscr 1   Receive: AT^SISR=5,1500
Subscr 1   Receive: ^SISR: 5, 326
Subscr 1   Receive: -rw-r--r--  1 test1    psacln        62 Jun 13 12:02 Conference.txt
Subscr 1   Receive: drwxr-x---   2 test1    psaserv        6 Apr 15 13:24 cgi-bin
Subscr 1   Receive: drwxr-x---   2 root     psaserv        6 Apr 15 13:24 conf
Subscr 1   Receive: drwxr-x---   2 test1    psaserv       23 Apr 15 13:24 httpdocs
Subscr 1   Receive: -rw-r--r--  1 test1    psacln      3000 Jul  8 12:23 test.txt
Subscr 1   Receive:
Subscr 1   Receive: OK
Subscr 1   Receive:
Subscr 1   Receive: ^SISR: 5, 2
Subscr 1   Receive:
Subscr 1     Send: AT^SISC=5
Subscr 1   Receive: AT^SISC=5
Subscr 1   Receive: OK
```

FTP PUT
```
****************************************
```
Comment Create and save file on the FTP server
```
****************************************
```

Subscr 1   Send: AT^SISO=0
Subscr 1   Receive:
Subscr 1   Receive: OK
Subscr 1   Receive:
Subscr 1   Receive: ^SISW: 0, 1
Subscr 1   Send: AT^SISW=0,1500
Subscr 1   Receive:
Subscr 1   Receive: ^SISW: 0, 1500
Subscr 1   Send: test test test test test test test test test test test test test test test test test test test test\test test test test test test test test test test test test test test test test test test test test\test test test test test test test test test test test test test test test test test test test test\test test test test test test test test test test test test test test test test test test test test\test test test test test test test test test test test test test test test test test test test test\test test test test test test test test test test test test test test test test test test test test\test test test test test test test test test test test test test test test test test test test test\test test test test test test test test test test test test test test test test test test test test\test test test test test test test test test test test test test test test test test test test test\test test test test test test test test test test test test test test test test test test test test\test test test test test test test test test test test test test test test test test test test test\test test test test test test test test test test test test test test test test test\
Subscr 1   Receive:
Subscr 1   Receive: OK
Subscr 1   Receive:
Subscr 1   Receive: ^SISW: 0, 1
Subscr 1   Send: AT^SISW=0,1500
Subscr 1   Receive:
Subscr 1   Receive: ^SISW: 0, 1500
Subscr 1   Send: test test test test test test test test test test test test test test test test test test test\test test test test test test test test test test test test test test test test test test test test\test test test test test test test test test test test test test test test test test test test test\test test test test test test test test test test test test test test test test test test test test\test test test test test test test test test test test test test test test test test test test test\test test test test test test test test test test test test test test test test test test test test\test test test test test test test test test test test test test test test test test test test test\test test test test test test test test test test test test test test test test test test test test\test test test test test test test test test test test test test test test test test test test test\test test test test test test test test test test test test test test test test test test test test\test test test test test test test test test test test test test test test test test test test test\test test test test test test test test test test test test test test test test test\
Subscr 1   Receive:
Subscr 1   Receive: OK
Subscr 1   Receive:
Subscr 1   Receive: ^SISW: 0, 1
Subscr 1   Receive:
Subscr 1   Receive: ^SISW: 0, 2
Subscr 1   Receive:
Subscr 1   Send: AT^SISC=0
Subscr 1   Receive:
Subscr 1   Receive: OK

2.15.5.5.2 SMTP

****

Comment Sending an email
****

Subscr 1   Send: AT^SISO=1

Subscr 1   Receive: AT^SISO=1
Subscr 1   Receive:
Subscr 1   Receive: OK
Subscr 1   Receive:
Subscr 1   Receive: ^SISW: 1, 1
Subscr 1   Send: AT^SISW=1,5
Subscr 1   Receive: AT^SISW=1,5
Subscr 1   Receive: ^SISW: 1, 5
Subscr 1   Send: Hello
Subscr 1   Receive:
Subscr 1   Receive: OK
Subscr 1   Send: AT^SISC=1
Subscr 1   Receive: AT^SISC=1
Subscr 1   Receive: OK
Subscr 1   Receive:
Subscr 1   Receive: ^SISW: 1, 2

2.15.5.5.3 POP3

****

Comment Reading an email

****

Subscr 1   Send: AT^SISO=2
Subscr 1   Receive: AT^SISO=2
Subscr 1   Receive:
Subscr 1   Receive: OK
Subscr 1   Receive:
Subscr 1   Receive: ^SISR: 2, 1
Subscr 1   Send: AT^SISR=2,1500
Subscr 1   Receive: AT^SISR=2,1500
Subscr 1   Receive: ^SISR: 2, 1500
Subscr 1   Receive: Return-Path: <bozena.karwan@siemens.com>
Subscr 1   Receive: Delivery-Date: Tue, 24 May 2005 15:01:01 +0200
Subscr 1   Receive: Received: from [192.35.17.28] (helo=goliath.siemens.de)
Subscr 1   Receive: '9'by mxeu6.kundenserver.de with ESMTP (Nemesis),
Subscr 1   Receive: '9'id 0MKsUu-1DaZ1n477A-0003YP for larsi@bluebock.de; Tue, 24 May 2005
               15:00:59 +0200
Subscr 1   Receive: Received: from mail2.siemens.de (mail2.siemens.de [139.25.208.11])
Subscr 1   Receive: '9'by goliath.siemens.de (8.12.6/8.12.6) with ESMTP id j4OD0qIC007074
Subscr 1   Receive: '9'for <larsi@bluebock.de>; Tue, 24 May 2005 15:00:52 +0200
Subscr 1   Receive: Received: from BLNS830A.bln4.siemens.de (blns830a.bln4.siemens.de
               [147.54.91.30])
Subscr 1   Receive: '9'by mail2.siemens.de (8.12.6/8.12.6) with ESMTP id j4OD0q9h023720
Subscr 1   Receive: '9'for <larsi@bluebock.de>; Tue, 24 May 2005 15:00:52 +0200
Subscr 1   Receive: Received: by blns830a.bln4.siemens.de with Internet Mail Service (5.5.2657.72)
Subscr 1   Receive: '9'id <LPKY1YBD>; Tue, 24 May 2005 15:00:52 +0200
Subscr 1   Receive: Message-ID:
               <C1E87EC44CE1644D899237D04997E071015B46D5@blns829a.bln4.siemens.de>
Subscr 1   Receive: From: "Karwan Bozena Com WM AE CS (WS)" <bozena.karwan@siemens.com>
Subscr 1   Receive: To: ""larsi@bluebock.de"" <larsi@bluebock.de>
Subscr 1   Receive: Subject: New Test
Subscr 1   Receive: Date: Tue, 24 May 2005 15:00:51 +0200
Subscr 1   Receive: MIME-Version: 1.0
Subscr 1   Receive: X-Mailer: Internet Mail Service (5.5.2657.72)
Subscr 1   Receive: Content-Type: multipart/alternative;
Subscr 1   Receive: '9'boundary="----_=_NextPart_001_01C56060.9CC65E20"
Subscr 1   Receive: Envelope-To: larsi@bluebock.de
Subscr 1   Receive:

Subscr 1   Receive: This message is in MIME format. Since your mail reader does not understand
Subscr 1   Receive: this format, some or all of this message may not be legible.
Subscr 1   Receive:
Subscr 1   Receive: ------_=_NextPart_001_01C56060.9CC65E20
Subscr 1   Receive: Content-Type: text/plain
Subscr 1   Receive:
Subscr 1   Receive: Test
Subscr 1   Receive:
Subscr 1   Receive: ------_=_NextPart_001_01
Subscr 1   Receive: OK
Subscr 1   Send: AT^SISR=2,1500
Subscr 1   Receive: AT^SISR=2,1500
Subscr 1   Receive: ^SISR: 2, 415
Subscr 1   Receive: C56060.9CC65E20
Subscr 1   Receive: Content-Type: text/html
Subscr 1   Receive:
Subscr 1   Receive: <!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 3.2//EN">
Subscr 1   Receive: <HTML>
Subscr 1   Receive: <HEAD>
Subscr 1   Receive: <META HTTP-EQUIV="Content-Type" CONTENT="text/html; charset=US-ASCII">
Subscr 1   Receive: <META NAME="Generator" CONTENT="MS Exchange Server version
           5.5.2654.45">
Subscr 1   Receive: <TITLE>New Test</TITLE>
Subscr 1   Receive: </HEAD>
Subscr 1   Receive: <BODY>
Subscr 1   Receive:
Subscr 1   Receive: <P><FONT SIZE=2 FACE="Arial">Test</FONT>
Subscr 1   Receive: </P>
Subscr 1   Receive:
Subscr 1   Receive: </BODY>
Subscr 1   Receive: </HTML>
Subscr 1   Receive: ------_=_NextPart_001_01C56060.9CC65E20--
Subscr 1   Receive: .
Subscr 1   Receive:
Subscr 1   Receive: OK
Subscr 1   Receive:
Subscr 1   Receive: ^SISR: 2, 2
Subscr 1   Send: AT^SISC=2
Subscr 1   Receive: AT^SISC=2
Subscr 1   Receive: OK

2.15.5.5.4 Socket

****
Comment Socket connection with the port 7 (echo port)
****

Subscr 1   Send: AT^SISO=3
Subscr 1   Receive: AT^SISO=3
Subscr 1   Receive: OK
Subscr 1   Receive:
Subscr 1   Receive: ^SISW: 3, 1
Subscr 1   Send: AT^SISW=3,5
Subscr 1   Receive: AT^SISW=3,5
Subscr 1   Receive: ^SISW: 3, 5
Subscr 1   Send: echo!
Subscr 1   Receive:
Subscr 1   Receive: OK

Subscr 1   Receive:
Subscr 1   Receive: ^SISW: 3, 1
Subscr 1   Receive:
Subscr 1   Receive: ^SISR: 3, 1
Subscr 1   Send: AT^SISR=3,5
Subscr 1   Receive: AT^SISR=3,5
Subscr 1   Receive: ^SISR: 3, 5
Subscr 1   Receive: echo!
Subscr 1   Receive: OK
Subscr 1   Send: AT^SISC=3
Subscr 1   Receive: AT^SISC=3
Subscr 1   Receive: OK

2.15.5.5.5 HTTP

****
Comment HTTP Get
****

Subscr 1   Send: AT^SISO=4
Subscr 1   Receive: AT^SISO=4
Subscr 1   Receive: OK
Subscr 1   Receive:
Subscr 1   Receive: ^SIS: 4, 3, 2201, "HTTP Response:HTTP/1.1 200 OK"
Subscr 1   Receive:
Subscr 1   Receive: ^SISR: 4, 1
Subscr 1   Send: AT^SISR=4,1500
Subscr 1   Receive: AT^SISR=4,1500
Subscr 1   Receive: ^SISR: 4, 1024
Subscr 1   Receive: <html>
Subscr 1   Receive: <head>
Subscr 1   Receive: <title> Wireless Modules - Application Engineering </title>
Subscr 1   Receive:
Subscr 1   Receive: <style type="text/css">
Subscr 1   Receive: body {margin-top:0px; margin-left:0px; margin-right:0px; margin-bottom:0px;
Subscr 1   Receive: font-family:Arial,sans-serif; background-color:white;}
Subscr 1   Receive: h1 { font-size:24px; color:white; background-color:rgb(2,0,153); padding-top:25px;
           padding-bottom:25px; text-align:center;}
Subscr 1   Receive: a { color:blue; text-decoration:underline; }
Subscr 1   Receive: a:visited { color:blue; text-decoration:underline; }
Subscr 1   Receive: a:hover { color:red; }
Subscr 1   Receive: a:active { color:blue; text-decoration:underline; }
Subscr 1   Receive: img {border:0px solid;}
Subscr 1   Receive:
Subscr 1   Receive: .i1 {text-align: center; font-size:20px;}
Subscr 1   Receive: .i2 {text-align: center; font-size:14px;}
Subscr 1   Receive:
Subscr 1   Receive: </style>
Subscr 1   Receive: </head>
Subscr 1   Receive:
Subscr 1   Receive: <body>
Subscr 1   Receive: <h1>
Subscr 1   Receive: Wireless Modules - Application Engineering
Subscr 1   Receive: </h1>
Subscr 1   Receive: <div class="i1">
Subscr 1   Receive: <img src="titel.jpg" alt="title image">
Subscr 1   Receive: Application samples with <a href="http://www.siemens.com/wm"
           target=_blank>Siemens TC45 modules.
Subscr 1   Receive: </div>

Subscr 1   Receive: <div class="i2">
Subscr 1   Receive: Click on the image to go to the application samples.
Subscr 1   Receive: </div>
Subscr 1   Receive: </body>
Subscr 1   Receive: </html>
Subscr 1   Receive:
Subscr 1   Receive: OK
Subscr 1   Receive:
Subscr 1   Receive: ^SISR: 4, 2
Subscr 1   Send: AT^SISC=4
Subscr 1   Receive: AT^SISC=4
Subscr 1   Receive: OK

2.15.6   Close Internet Service
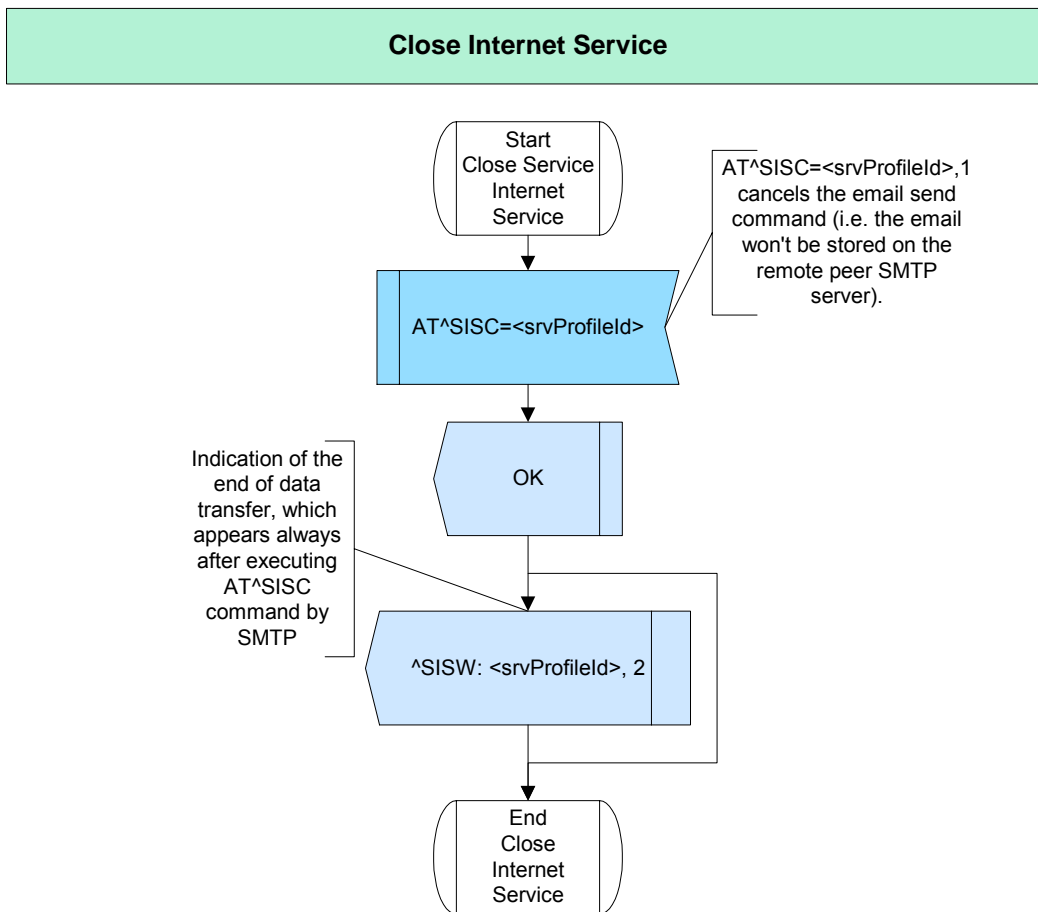
Figure 131: Close Internet Service

2.15.6.1   Description

This chapter describes how to close the service with the AT^SISC command.
- It's important always to close the service if it isn't used any more.
- The profiles cost resources, therefore they need to be closed before new profiles can be defined.

2.15.6.2   Used AT commands

AT^SISC   -   Internet Service Close

2.15.6.3   Examples

(see Write/Read chapter)

2.16   Remote SIM Access

The feature Remote SIM Access (RSA) allows the ME to access a remote SIM card via the serial interface of the ME in addition to the SIM card locally attached via the dedicated lines on the local SIM interface connector. The SIM Access Profile (SAP) offers the possibility to share SIM card information between different mobile devices. For further information see [13].

A SAP setup consists of a remote SIM card connected to an SAP server, a SAP client with an optional local SIM card and the application, which connects the client and server. Either the client or the server or both can be SAP-capable ME.
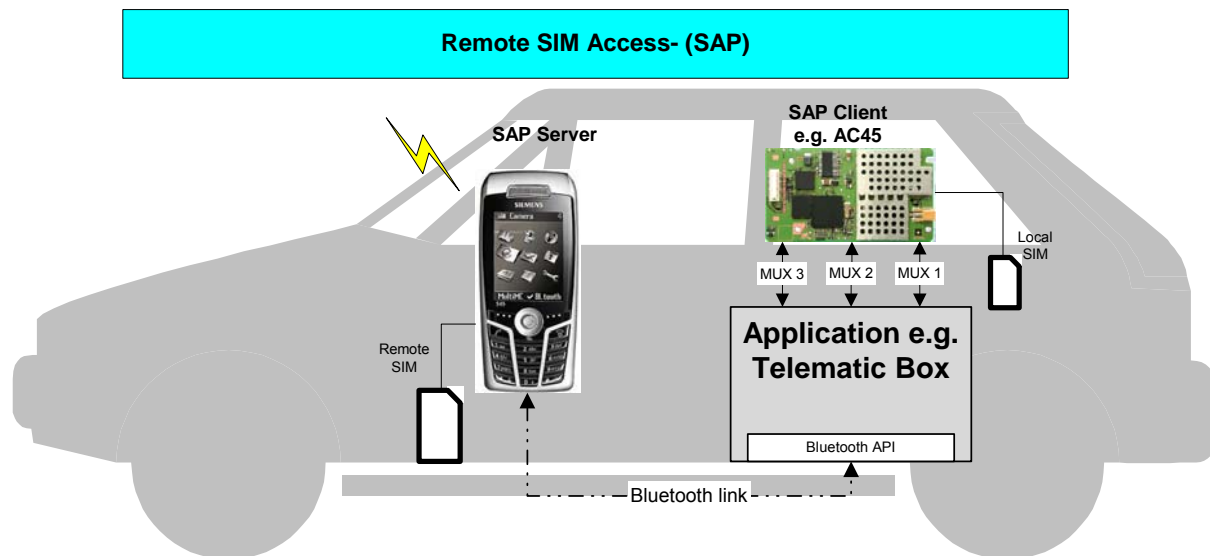
Figure 132: Remore SIM Access (SAP)

The typical example of an SAP server is a cellular phone; it has direct access to a SIM card. The SAP server assists the client in accessing and controlling the SIM card via the serial link. In the example above the SAP Client is connected via a serial link to the application. The application establishes and controls the Bluetooth connection with the SAP Server. The SAP Client accesses and controls the SIM card inside the SAP Server via the application.

In addition to Bluetooth, SAP can be executed with other protocols or interfaces (e.g. RS232) on the underlying layer. There is the possibility to use one ME as client and another as a server connected via serial interface.

Two data formats are available to exchange SIM data and to set up a RSA connection:

- XSAP ASCII coded string format
- SAP binary format

It depends on the application whether the data will be transmitted in XSAP (connection between two SAP-capable ME) or in SAP (connection between one SAP-capable ME and another SAP-capable device) format. For further details see [13].

Please note that for the Remote SIM Access the Mux driver is absolutely necessary. For further information on the recommended installation see [13].

2.16.1   Intialization of RSA

2.16.1.1   Description

This chapter describes the initialization of Remote SIM Access (RSA). The following AT commands might be of interest when using the RSA feature:

- The AT+CMEE command chooses the format of result codes for mobile equipment errors. By factory default (AT+CMEE=0), simply "ERROR" will be returned. For better error detection, we recommend to select either the numeric format (AT+CMEE=1) or the extended text format (AT+CMEE=2). For further details see 2.2.2 or [2].
- The AT^SCKS command is used to check the current status of the SIM (local or remote).
- The AT^SM20 command specifies two call setup response modes, i.e. two different modes of responses returned when dialing voice call numbers with ATD.
  AT^SM20=1 (factory default) causes the ME to respond once the call setup is completed either successfully ("OK") or unsuccessfully ("NO CARRIER", "NO DIAL TONE", "BUSY").
  AT^SM20=0 causes the ME to return "OK" immediately after dialing was completed (i.e. before call setup terminates successfully or unsuccessfully).
- The AT^SSET command controlls the "^SSIM READY" URC indicating that the SIM data reading process (e.g. reading the SIM phonebook) has been completed. You may watch the reading of the SIM phonebook by sending the "AT^SIND=adnread,1" command. After sending this command every read SIM phonebook entry will be reported as an URC.

2.16.1.2   Used AT commands

AT+CMEE   -   Report Mobile Equipment Error
AT^SCKS   -   Set SIM connection presentation mode
AT^SM20   -   Set M20 Compatibility
AT^SSET   -   Indicate SIM data ready

For further details about the commands see [2].

2.16.1.3 Flow chart
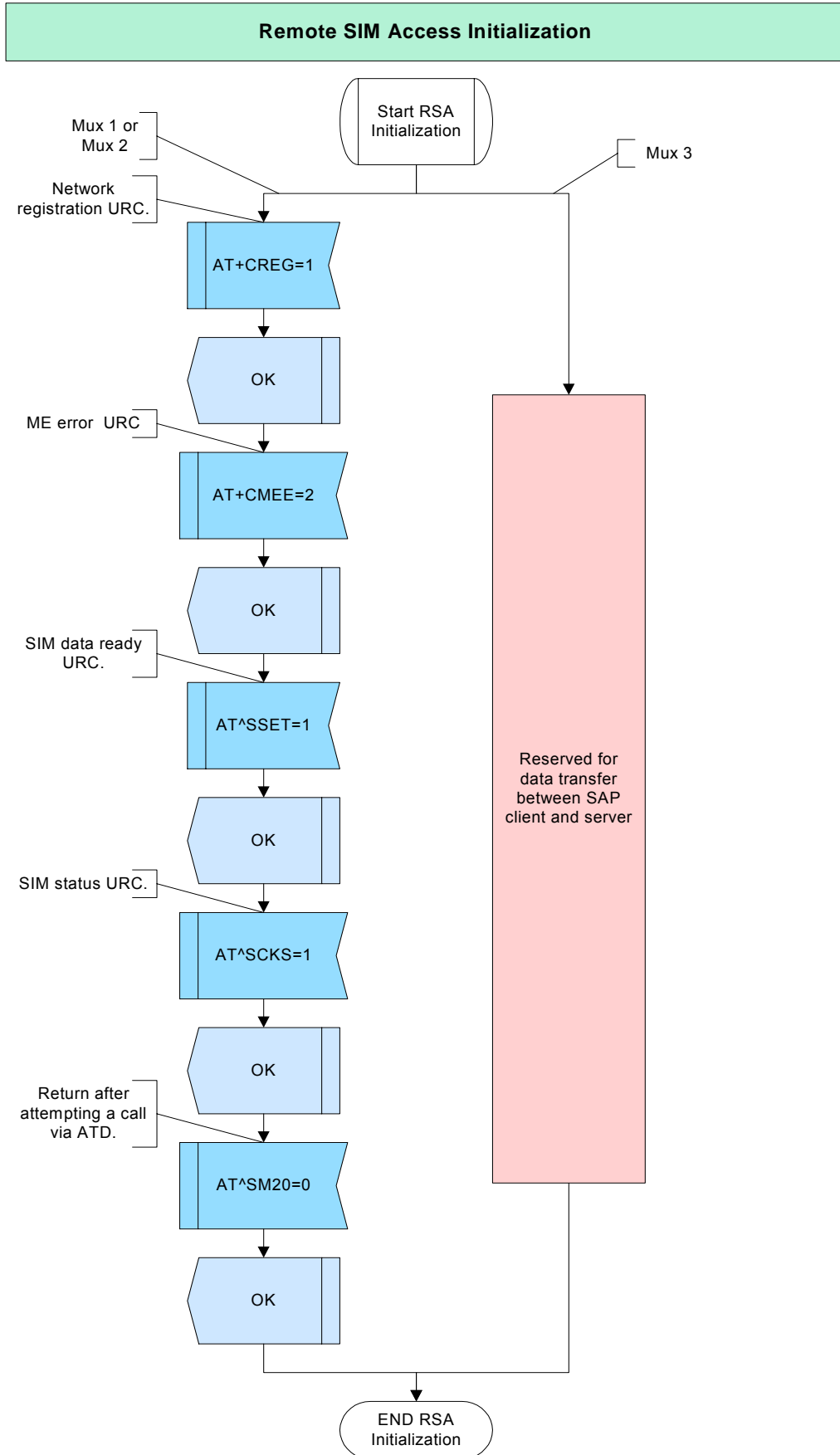
Figure 133: RSA initialization

2.16.1.4   Hints

- Note, that all RSA URC's will be displayed on all active serial channels.

2.16.1.5   Example

```
****************************************
Comment:  Remote SIM Access Initialization
****************************************

****************************************
Comment:  Query SIM PIN status (valid Mux 1 and Mux 2).
****************************************


Subscr 3    Send: AT+CPIN?
Subscr 3   Receive: AT+CPIN?
Subscr 3   Receive: +CPIN: READY
Subscr 3   Receive:
Subscr 3   Receive: OK


****************************************
Comment:  Initialization of Mux 1.
Comment:  Switch on network registration URC.
****************************************


Subscr 3    Send: AT+CREG=1
Subscr 3   Receive: AT+CREG=1
Subscr 3   Receive: OK


****************************************
Comment:  Mobile equipment errors in text format URC.
****************************************


Subscr 3    Send: AT+CMEE=2
Subscr 3   Receive: AT+CMEE=2
Subscr 3   Receive: OK


****************************************
Comment:  Switch on SIM data ready URC.
****************************************


Subscr 3    Send: AT^SSET=1
Subscr 3   Receive: AT^SSET=1
Subscr 3   Receive: OK


****************************************
Comment:  Switch on SIM status URC.
****************************************


Subscr 3    Send: AT^SCKS=1
Subscr 3   Receive: AT^SCKS=1
Subscr 3   Receive: OK


****************************************
Comment:  Return after attempting a call via ATD.
****************************************


Subscr 3    Send: AT^SM20=0
Subscr 3   Receive: AT^SM20=0
Subscr 3   Receive: OK
```

****
Comment: Initialization of Mux 2.
Comment: Switch on network registration URC.
****

Subscr 4   Send: AT+CREG=1
Subscr 4   Receive: AT+CREG=1
Subscr 4   Receive: OK

****
Comment: Mobile equipment errors in text format URC.
****

Subscr 4   Send: AT+CMEE=2
Subscr 4   Receive: AT+CMEE=2
Subscr 4   Receive: OK

****
Comment: Switch on SIM data ready URC.
****

Subscr 4   Send: AT^SSET=1
Subscr 4   Receive: AT^SSET=1
Subscr 4   Receive: OK

****
Comment: Switch on SIM status URC.
****

Subscr 4   Send: AT^SCKS=1
Subscr 4   Receive: AT^SCKS=1
Subscr 4   Receive: OK

****
Comment: Return after attempting a call via ATD.
****

Subscr 4   Send: AT^SM20=0
Subscr 4   Receive: AT^SM20=0
Subscr 4   Receive: OK

2.16.2   RSA Connection via Bluetooth

2.16.2.1   Description

This chapter describes how to activate and terminate the RSA connection between a ME which acts as SAP client and an SAP server which communicates with the application via Bluetooth.

The example below describes the steps, which are required to enable and disable the RSA connection (SAP client):

- The AT+COPS command is used to query or select the network operator.
- An RSA session can be activated or terminated with the AT^SRSA command. Please note that since the ME can act as SAP Server or SAP Client, different parameters are required for this command:

  - SAP Client activation: AT^SRSA=2,2,3,1
  - SAP Server activation: AT^SRSA=2,1,3,1

  If the connection is started successfully the URC ^SRSA: 2,2,0 is issued. After connecting to an SAP peer the URC will be ^SRSA: 2,2,1.
  There are different ways to terminate the SAP connection:
  - The first option is to disable the SAP connection but the ME remains in SAP mode and is ready to re-establish a connection (AT^SRSA=2,0,,,,0).
  - The second option is to disable the SAP connection and make the ME return to the local SIM mode (AT^SRSA=2,0,,,,1). In this case all calls or active GRPS contexts via a remote SIM will be terminated.
- After activation of RSA connection you must enter the SAP Server SIM PIN (See chapter 2.5 for details).

2.16.2.2   Used AT commands

AT+COPS   -   Operator selection
AT+CPIN   -   Enter PIN
AT^SRSA   -   Remote SIM Access Activation

For further details about the commands see [2].

2.16.2.3 Flow chart
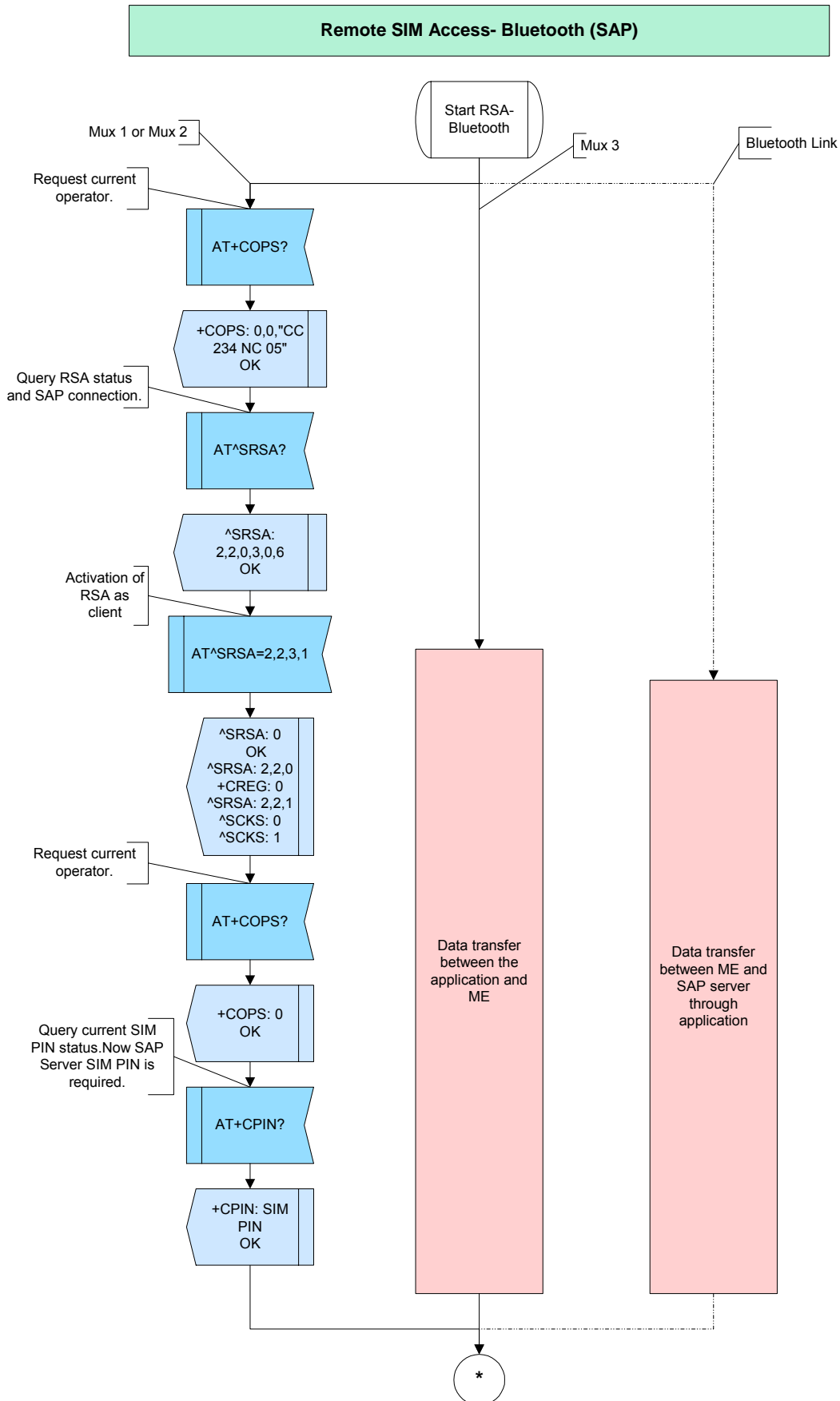
Figure 134: RSA Connection via Bluetooth part 1
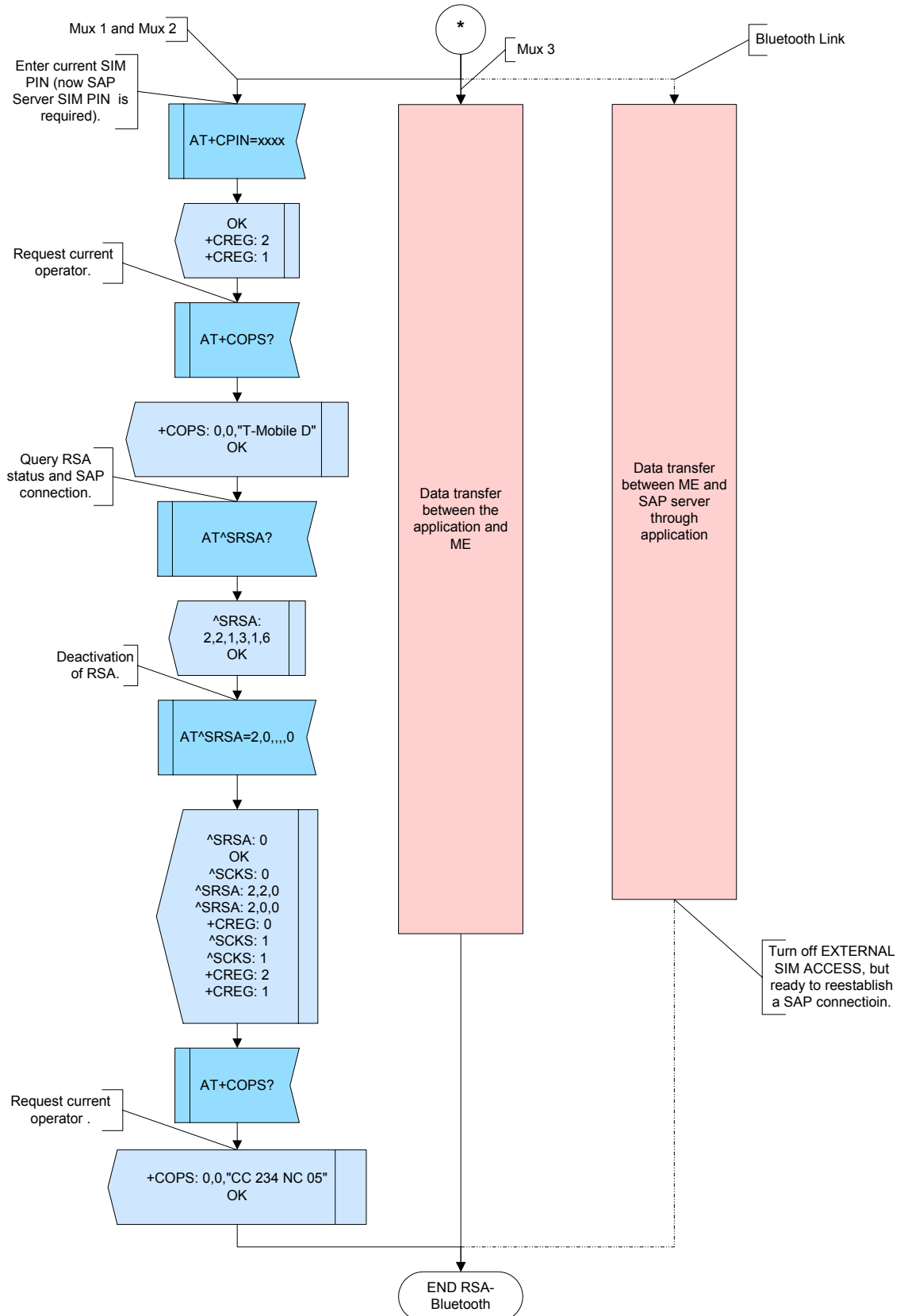
Figure 135: RSA Connection via Bluetooth part 2

2.16.2.4   Hints

* Note, that all RSA URCs will be displayed on all active serial channels.

2.16.2.5 Example

```
**************************************
Comment:  Remote SIM Access (Bluetooth)
**************************************
**************************************
Comment:  Request current operator.
**************************************

Subscr 3    Send: AT+COPS?
Subscr 3  Receive: AT+COPS?
Subscr 3  Receive: +COPS: 0,0,"CC 234 NC 05"
Subscr 3  Receive:
Subscr 3  Receive: OK


**************************************
Comment:  Query RSA status and SAP connection .
**************************************

Subscr 3    Send: AT^SRSA?
Subscr 3  Receive: AT^SRSA?
Subscr 3  Receive:
Subscr 3  Receive:
Subscr 3  Receive: OK


**************************************
Comment:  Activation of RSA.
**************************************

Subscr 3    Send: AT^SRSA=2,2,3,1
Subscr 3  Receive: AT^SRSA=2,2,3,1
Subscr 3  Receive: ^SRSA: 0
Subscr 3  Receive:
Subscr 3  Receive: OK
Subscr 3  Receive:
Subscr 3  Receive: ^SRSA: 2,2,0
Subscr 3  Receive:
Subscr 3  Receive: +CREG: 0
Subscr 3  Receive:
Subscr 3  Receive: ^SRSA: 2,2,1
Subscr 3  Receive:
Subscr 3  Receive: ^SCKS: 0
Subscr 3  Receive:
Subscr 3  Receive: ^SCKS: 1



**************************************
Comment:  Request current operator.
**************************************

Subscr 3    Send: AT+COPS?
Subscr 3  Receive: AT+COPS?
Subscr 3  Receive: +COPS: 0
Subscr 3  Receive:
Subscr 3  Receive: OK


**************************************
Comment: Query current SIM PIN status.
**************************************

Subscr 3    Send: AT+CPIN?
```

Subscr 3   Receive: AT+CPIN?
Subscr 3   Receive: +CPIN: SIM PIN
Subscr 3   Receive:
Subscr 3   Receive: OK

****
Comment: Enter current SIM PIN (now SIM PIN from the mobile phone is requiered).
****

Subscr 3   Send: AT+CPIN=2529
Subscr 3   Receive: AT+CPIN=2529
Subscr 3   Receive:
Subscr 3   Receive: OK
Subscr 3   Receive:
Subscr 3   Receive: +CREG: 2
Subscr 3   Receive:
Subscr 3   Receive: +CREG: 1
Subscr 3   Receive:
Subscr 3   Receive: ^SSIM READY

****
Comment: Request current operator.
****

Subscr 3   Send: AT+COPS?
Subscr 3   Receive: AT+COPS?
Subscr 3   Receive: +COPS: 0,0,"T-Mobile D"
Subscr 3   Receive:
Subscr 3   Receive: OK

****
Comment: Query RSA status and SAP connection .
****

Subscr 3   Send: AT^SRSA?
Subscr 3   Receive: AT^SRSA?
Subscr 3   Receive: ^SRSA: 2,2,1,3,1,6
Subscr 3   Receive:
Subscr 3   Receive:
Subscr 3   Receive: OK

****
Comment: Deactivation of RSA.
****

Subscr 3   Send: AT^SRSA=2,0,,,,0
Subscr 3   Receive: AT^SRSA=2,,,,0
Subscr 3   Receive: ^SRSA: 0
Subscr 3   Receive:
Subscr 3   Receive: OK
Subscr 3   Receive:
Subscr 3   Receive: ^SCKS: 0
Subscr 3   Receive:
Subscr 3   Receive: ^SRSA: 2,2,0
Subscr 3   Receive:
Subscr 3   Receive: ^SRSA: 2,0,0
Subscr 3   Receive:
Subscr 3   Receive: +CREG: 0
Subscr 3   Receive:

Subscr 3   Receive: ^SCKS: 1
Subscr 3   Receive:
Subscr 3   Receive: ^SCKS: 1
Subscr 3   Receive:
Subscr 3   Receive: +CREG: 2
Subscr 3   Receive:
Subscr 3   Receive: +CREG: 1

****
Comment: Request current operator.
****

Subscr 3   Send: AT+COPS?
Subscr 3   Receive: AT+COPS?
Subscr 3   Receive: +COPS: 0,0,"CC 234 NC 05"
Subscr 3   Receive:
Subscr 3   Receive: OK

2.16.3   RSA connection via serial interface

2.16.3.1   Description

This chapter describes how to activate and terminate the RSA connection between two ME via serial interface. One of them acts as SAP server, the other as SAP client. Both are connected to the PC, which runs the application "ComBridge" [14]. This application connects two serial interfaces (left I/O and right I/O) of the PC in such a way, that the output of left I/O is forwarded to the input of the right I/O and vice versa.
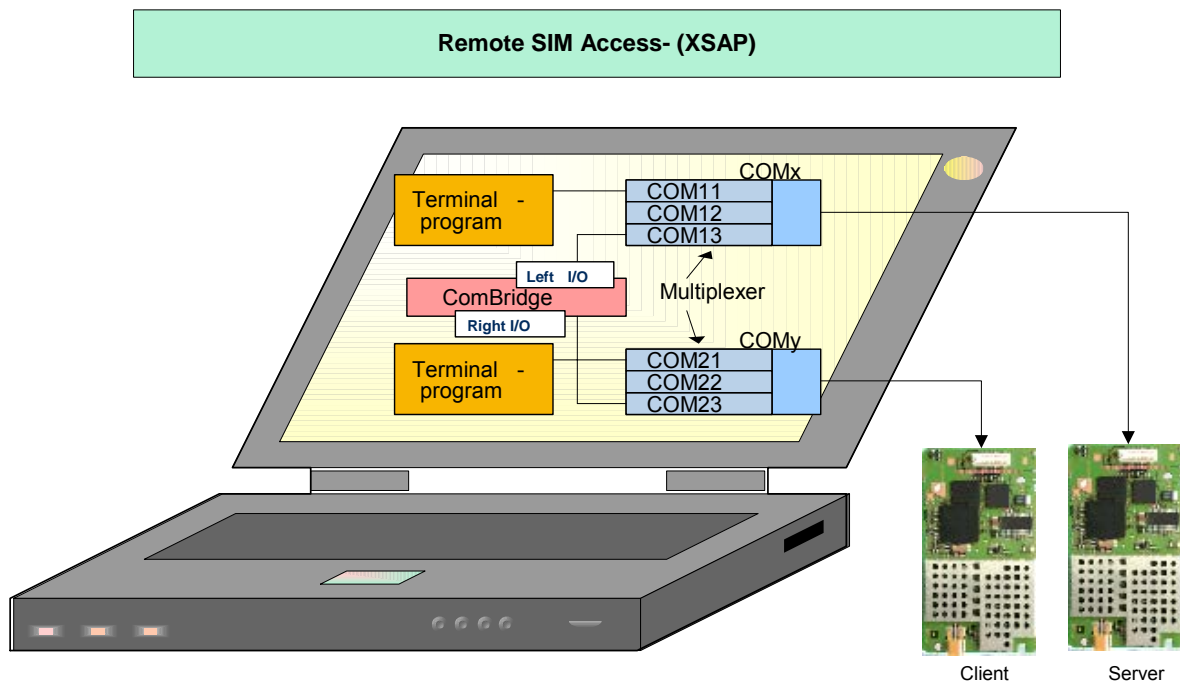
Figure 136: Remore SIM Access (XSAP)

The example below describes the steps, which are required to enable and disable the RSA connection (SAP client and SAP server).

- The AT+COPS command is used to query or select the network operator.
- An RSA session can be activated or terminated with the AT^SRSA command. Please note that as the ME acts as SAP server or SAP client different parameters are required for this command:

    - SAP Client activation: AT^SRSA=2,2,3,0
    - SAP Server activation: AT^SRSA=1,1,3,0

If the connection is started successfully the URC ^SRSA: 2,2,0 for client and ^SRSA:2,1,0 for server is issued. After connecting to an SAP peer the URC will be ^SRSA: 2,2,1 for client and ^SRSA: 2,1,1 for server.
There are two different ways to terminate the SAP connection. The first option is to disable the SAP connection but the ME remains in SAP mode and is ready to re-establish a connection (AT^SRSA=2,0,,,,0). Furthermore, the SAP connection is disabled and the ME returns to the local SIM mode (AT^SRSA=2,0,,,,1). In this case all calls or active GRPS contexts via a remote SIM will be terminated. This command is identical for client and server.

- After activation of RSA connection you must enter the SAP server SIM PIN (See chapter 2.5 for details).

2.16.3.2 Used AT commands

AT+COPS	-	Operator selection
AT+CPIN	-	Enter PIN
AT^SRSA	-	Remote SIM Access Activation
AT^SCKS	-	Query SIM and chip card holder status

For further details about the commands see [2].

2.16.3.3 Flow chart

Remote SIM Access-via serial Interface (XSAP)

Start RSA via serial interface

client Mux 1 or Mux 2

Mux Channel 3

server

Request current operator.

AT+COPS?

query SIM status

AT^SCKS?

+COPS: 0,0,"CC 234 NC 05"
OK

SIM inserted, URCs enabled

^SCKS: 1,1
OK

Query RSA status and SAP connection.

AT^SRSA?

Activation of RSA as server

AT^SRSA=2,1,3,0

^SRSA: 2,2,0,3,0,6
OK

^SRSA: 0
OK
^SRSA: 2,1,0
^SRSA: 2,1,1

Activation of RSA as client

AT^SRSA=2,2,3,0

server has no access to his SIM

^SRSA: 0
OK
^SRSA: 2,2,0
+CREG: 0
^SRSA: 2,2,1

^SCKS: 0

now client has access to the SIM of the server

^SCKS: 1

Request current operator.

AT+COPS?

Data transfer between the client and the server via ComBridge

+COPS: 0
OK

Query current SIM PIN status.Now SAP Server SIM PIN is required.

AT+CPIN?

+CPIN: SIM PIN
OK

*

Figure 137: RSA Connection via serial interface part 1

client
Mux 1 or
Mux 2

Mux
Channel 3

*

server

Enter current SIM PIN
(now SAP Server SIM
PIN is required).

AT+CPIN=xxxx

OK
+CREG: 2
+CREG: 1

Request current
operator.

AT+COPS?

+COPS: 0,0,"T-Mobile D"
OK

Query RSA
status and SAP
connection.

AT^SRSA?

^SRSA:
2,2,1,3,0,6
OK

Deactivation
of RSA.

AT^SRSA=2,0,,,,1

^SRSA: 0
OK
^SCKS: 0
^SRSA: 2,2,0
^SRSA: 2,0,0
+CREG: 0
^SCKS: 1
^SCKS: 1
+CREG: 2
+CREG: 1

Request current
operator .

AT+COPS?

+COPS: 0,0,"CC 234 NC 05"
OK

Data transfer
between client and
server via
ComBridge

Query RSA
status and SAP
connection.

AT^SRSA?

^SRSA:
2,1,1,3,0,6
OK

Turn off EXTERNAL
SIM ACCESS,
terminate the SAP
operation.

AT^SRSA=2,0,,,,1

^SRSA: 0
OK
^SRSA: 2,0,0
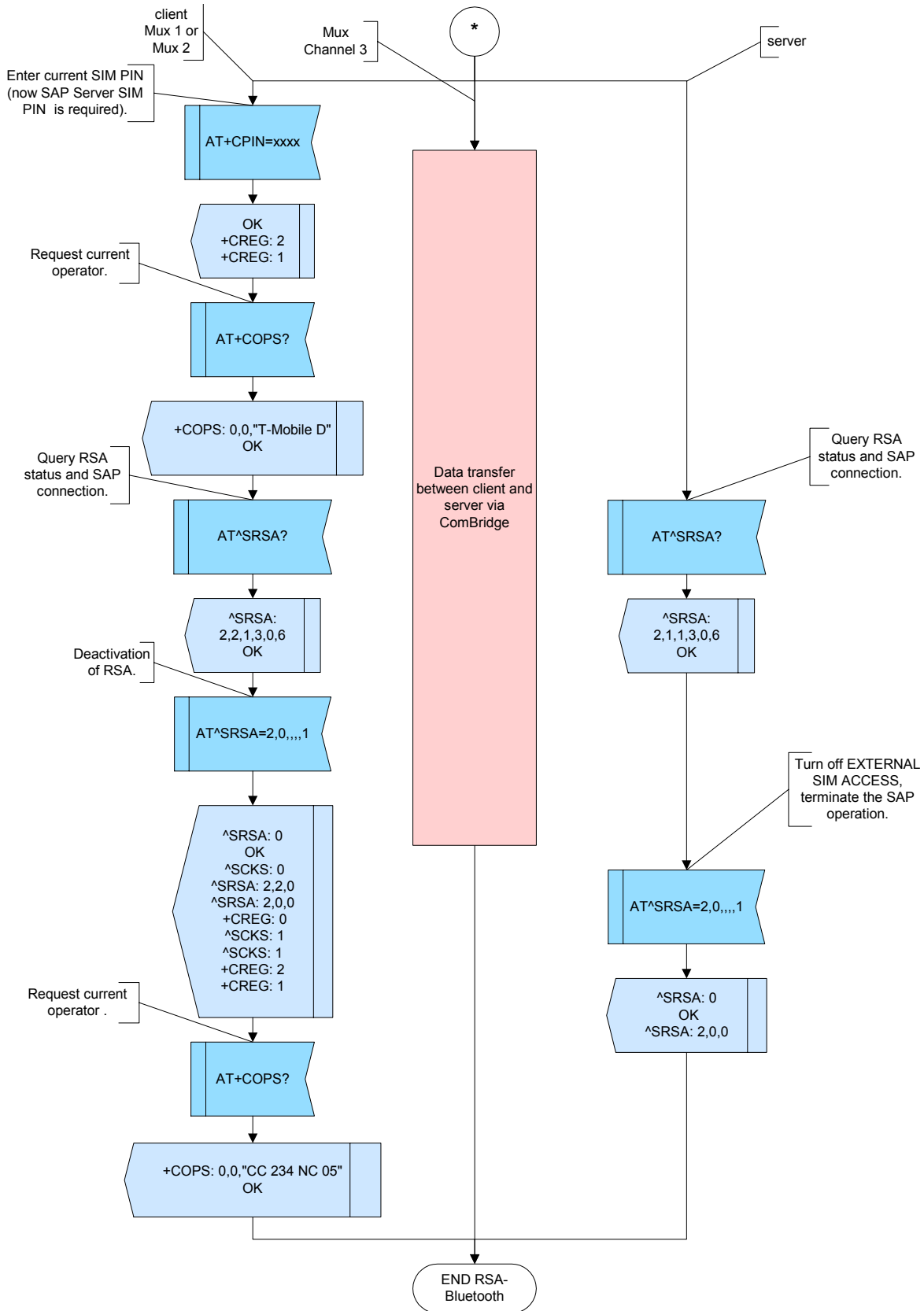
END RSA-
Bluetooth

Figure 138: RSA Connection via serial interface part 2

2.16.3.4 Hints

- Note, that all RSA URC's will be displayed on all active serial channels.

2.16.3.5 Example

```
***************************************
Comment  Remote SIM Access (RS232)
Comment
Comment  reset client
***************************************


Subscr 1    Send: AT+CMEE=2
Subscr 1  Receive: AT+CMEE=2
Subscr 1  Receive: OK
Subscr 1    Send: AT^SCKS=1
Subscr 1  Receive: AT^SCKS=1
Subscr 1  Receive: OK


***************************************
Comment  reset server
***************************************


Subscr 2    Send: AT^SCKS=1
Subscr 2  Receive: AT^SCKS=1
Subscr 2  Receive: OK


***************************************
Comment  client: Request current operator
***************************************


Subscr 1    Send: AT+COPS?
Subscr 1  Receive: AT+COPS?
Subscr 1  Receive: +COPS: 0
Subscr 1  Receive:
Subscr 1  Receive: OK


***************************************
Comment  client: Query RSA status and SAP connection
***************************************


Subscr 1    Send: AT^SRSA?
Subscr 1  Receive: AT^SRSA?
Subscr 1  Receive:
Subscr 1  Receive:
Subscr 1  Receive: OK


***************************************
Comment  server: Query SIM status
***************************************


Subscr 2    Send: AT^SCKS?
Subscr 2  Receive: AT^SCKS?
Subscr 2  Receive: ^SCKS: 1,1
Subscr 2  Receive:
Subscr 2  Receive: OK


***************************************
Comment  client: Query SIM status
***************************************
```

Subscr 1   Send: AT^SCKS?
Subscr 1   Receive: AT^SCKS?
Subscr 1   Receive: ^SCKS: 1,0
Subscr 1   Receive:
Subscr 1   Receive: OK

****

Comment Activation of RSA as server
****

Subscr 2   Send: AT^SRSA=2,1,3,0
Subscr 2   Receive: AT^SRSA=2,1,3,0
Subscr 2   Receive: ^SRSA: 0
Subscr 2   Receive:
Subscr 2   Receive: OK
Subscr 2   Receive:
Subscr 2   Receive: ^SRSA: 2,1,0

****

Comment Activation of RSA as client
****

Subscr 1   Send: AT^SRSA=2,2,3,0
Subscr 1   Receive: AT^SRSA=2,2,3,0
Subscr 1   Receive: ^SRSA: 0
Subscr 1   Receive:
Subscr 1   Receive: OK
Subscr 1   Receive:
Subscr 1   Receive: ^SRSA: 2,2,0
Subscr 2   Receive:
Subscr 2   Receive: ^SCKS: 0
Subscr 2   Receive:
Subscr 2   Receive: ^SRSA: 2,1,1
Subscr 1   Receive:
Subscr 1   Receive: ^SRSA: 2,2,1
Subscr 1   Receive:
Subscr 1   Receive: ^SCKS: 1

****

Comment client: Request current operator
****

Subscr 1   Send: AT+COPS?
Subscr 1   Receive: AT+COPS?
Subscr 1   Receive: +COPS: 0
Subscr 1   Receive:
Subscr 1   Receive: OK

****

Comment client: Query current SIM PIN status. Now SAP Server SIM PIN is required.
****

Subscr 1   Send: AT+CPIN?
Subscr 1   Receive: AT+CPIN?
Subscr 1   Receive: +CPIN: SIM PIN
Subscr 1   Receive:
Subscr 1   Receive: OK

****

Comment client: Enter current SIM PIN (now SAP server SIM PIN is required).
****

Subscr 1   Send: AT+CPIN=0000
Subscr 1   Receive: AT+CPIN=0000
Subscr 1   Receive:
Subscr 1   Receive: OK
Subscr 1   Receive:
Subscr 1   Receive: +CREG: 2

****
Comment client: Request current operator
****

Subscr 1   Send: AT+COPS?
Subscr 1   Receive: AT+COPS?
Subscr 1   Receive: +COPS: 0,0,"T-Mobile D"
Subscr 1   Receive:
Subscr 1   Receive: OK

****
Comment client: Query RSA status and SAP connection
****

Subscr 1   Send: AT^SRSA?
Subscr 1   Receive: AT^SRSA?
Subscr 1   Receive: ^SRSA: 2,2,1,3,0,6
Subscr 1   Receive:
Subscr 1   Receive:
Subscr 1   Receive: OK

****
Comment server: Query RSA status and SAP connection
****

Subscr 2   Send: AT^SRSA?
Subscr 2   Receive: AT^SRSA?
Subscr 2   Receive: ^SRSA: 2,1,1,3,0,6
Subscr 2   Receive:
Subscr 2   Receive:
Subscr 2   Receive: OK

****
Comment client: Deactivation of RSA.
****

Subscr 1   Send: AT^SRSA=2,0,,,,1
Subscr 2   Receive:
Subscr 2   Receive: ^SRSA: 2,1,0
Subscr 2   Receive:
Subscr 2   Receive: ^SCKS: 1
Subscr 1   Receive: AT^SRSA=2,0,,,,1
Subscr 1   Receive: ^SRSA: 0
Subscr 1   Receive:
Subscr 1   Receive: OK
Subscr 1   Receive:
Subscr 1   Receive: ^SCKS: 0
Subscr 1   Receive:
Subscr 1   Receive: ^SRSA: 2,2,0
Subscr 1   Receive:

Subscr 1   Receive: ^SRSA: 2,0,0

****

Comment server: Turn off EXTERNAL SIM ACCESS, terminate the SAP operation.

****

Subscr 2   Send: AT^SRSA=2,0,,,,1
Subscr 1   Receive:
Subscr 1   Receive: ^SCKS: 1
Subscr 2   Receive: AT^SRSA=2,0,,,,1
Subscr 2   Receive: ^SRSA: 0
Subscr 2   Receive:
Subscr 2   Receive: OK
Subscr 2   Receive:
Subscr 2   Receive: ^SRSA: 2,0,0

****

Comment client: Request current operator

****

Subscr 1   Send: AT+COPS?
Subscr 1   Receive: AT+COPS?
Subscr 1   Receive: +COPS: 0
Subscr 1   Receive:
Subscr 1   Receive: OK
Subscr 1   Receive:
Subscr 1   Receive: ^SCKS: 0
Subscr 1   Receive:
Subscr 1   Receive: +CREG: 0

2.17   SIM Application Toolkit (SAT)

Note Lars: Kapitel einfügen, wie man im Menu zurückspringen kann, d.h. wie erreicht man das Hauptmenu wieder?
1. SAT und Remote SAT erklären und fortan auseinanderhalten, am besten Bild mit allen Schnittstellen

SAT allows the flexibility to update the SIM to alter services and download new services over the air. It defines a set of fairly simply operations to extend the functionality of a SIM card. SAT is an AT interface (nein !!!), which establishes the link between the SIM application running on the SIM card and the customer application (e.g., PDA, laptop etc.). The SIM cards store user specific data (e.g. phonebook etc.), but they can also provide a lot of value added mobile application. Typical examples are online banking, news, weather or other information services.

2.17.1   Initialization of Remote SAT

2.17.1.1   Description

This chapter describes the initialization of Remote SAT. Usually an SMS is send to the network provider containing service requests, e.g. send latest news. Please set follow parameters to receive messages: the SMS text mode (AT+CMGF=1), active display of an URC on every received SMS (AT+CNMI=1,1). In case of more detailed header information use (AT+CSDH=1).

2.17.1.2   Used AT commands

AT+CMGF   -   Select SMS message format
AT+CNMI   -   New SMS message indications
AT+CSDH   -   Show SMS text mode parameters

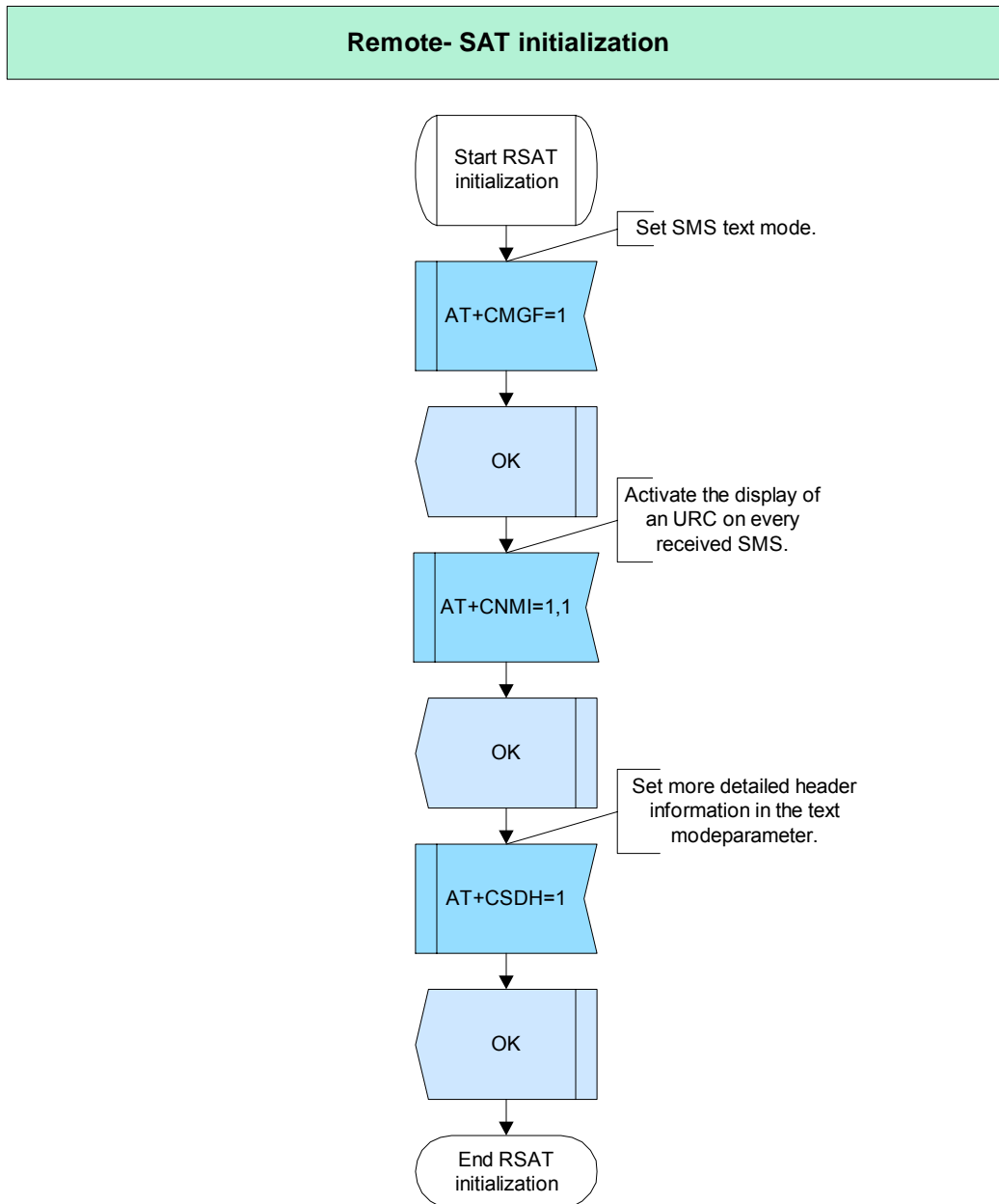For further details about the commands see [2].

2.17.1.3   Flow chart

Figure 139: RSAT initialization

2.17.1.4   Hints

Not applicable.

2.17.1.5   Example

2.17.2 Menu: Order Newsletter

2.17.2.1 Description

Note Lars:
2. Sinn von SAT erklären, am besten Beispiel
3. Proactive Commands erklären
4. AT Kommando Dialog erklären

This chapter gives a brief example of using the SIM Application Toolkit (SAT) commands.
The example below describes the steps, which are required to use SAT. For more information see [13].

The commands (Welche Schnittstelle ???) fall into two catogories:

• Proactive commands- sent from the SIM Application to the module's SAT e.g. DISPLAY TEXT.

Note Lars:
Deutlicher auf ein Beispiel beziehen (z.B. Flow Chart). Was bedeutet denn eigentlich DISPLAY TEXT?

• Envelope commands- sent from the module's SAT to the SIM Application, e.g. MENU SELECTION

Note Lars:
Deutlich zwischen Initialisierungsphase (Main Menu) und der Wahl weiterer Menus trennen

1. Setup Main Menu
With AT^SSTA? you can request the current operation status and the used alphabet of the Remote-SAT interface. To activate the Remote-SAT and to set the alphabet, use the command AT^SSTA=1,0. The response ^SSTN:37 is the first proactive command, it provides the main menu of the SIM application. Please acknowledge the proactive command with AT^SSGTI=37. The result will be the parameter details (e.g. News, Mails, Money etc.). Please acknowledge the proactive command again. The URC ^SSTN:254 shows us that the ME enters the main menu. The selection of a main menu item will be executed with AT^SSTR=211,0,1. The response ^SSTN:36 will be again a proactive command. Please acknowledge the proactive command with AT^SSGTI=36. You will get the next parameters. Please acknowledge them and select an item with AT^SSTR=36,0,1.
2. Select further Menu Items

2.17.2.2 Used AT commands

AT^SSTA   -   SAT Interface Activation
AT^SSTGI   -   SAT Get Information
AT^SSTR   -   SAT Response
^SSTN   -   SAT Notification

For further details about the commands see [2].
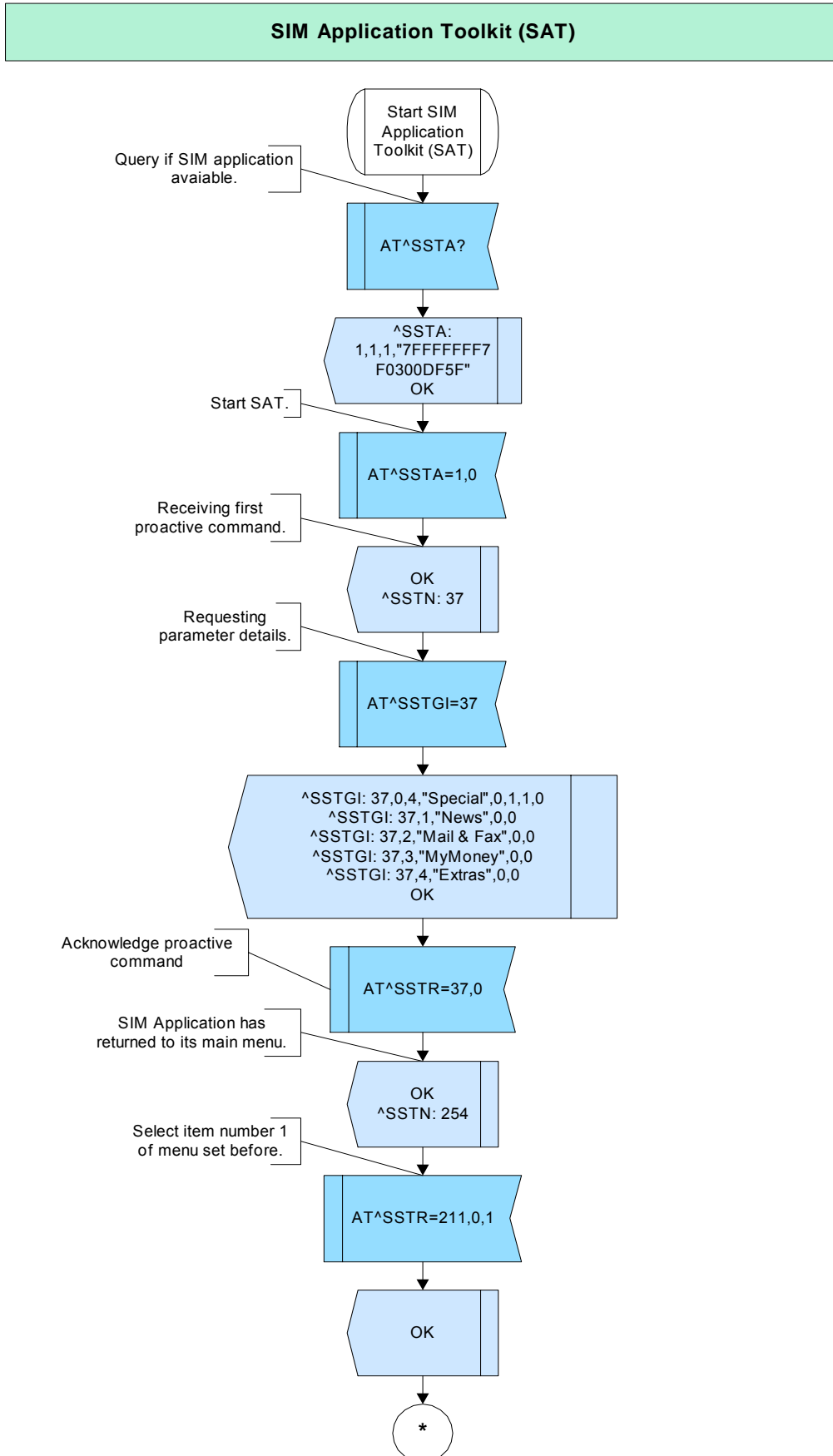
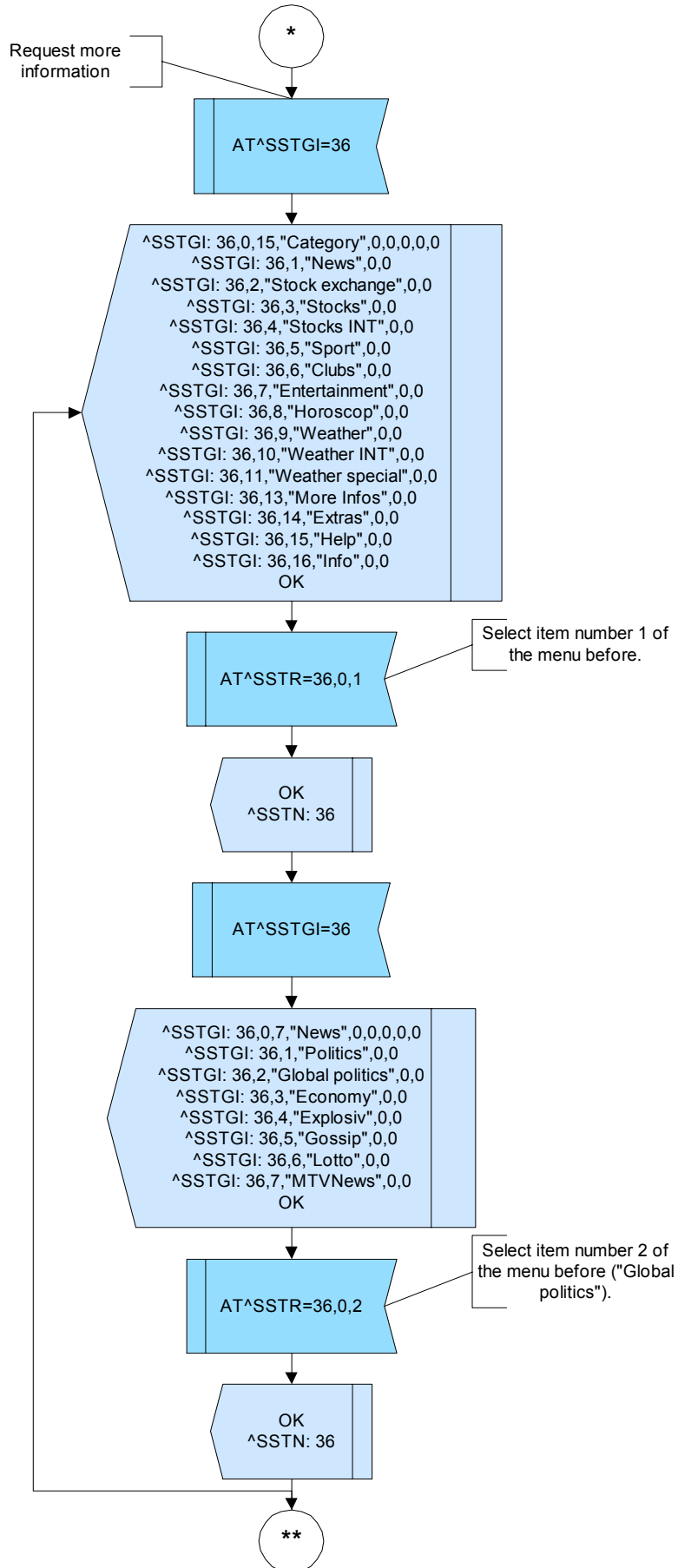## 2.17.2.3 Flow chart

Figure 140: SAT- part1

Request more
information

*

AT^SSTGI=36

^SSTGI: 36,0,15,"Category",0,0,0,0,0
^SSTGI: 36,1,"News",0,0
^SSTGI: 36,2,"Stock exchange",0,0
^SSTGI: 36,3,"Stocks",0,0
^SSTGI: 36,4,"Stocks INT",0,0
^SSTGI: 36,5,"Sport",0,0
^SSTGI: 36,6,"Clubs",0,0
^SSTGI: 36,7,"Entertainment",0,0
^SSTGI: 36,8,"Horoscop",0,0
^SSTGI: 36,9,"Weather",0,0
^SSTGI: 36,10,"Weather INT",0,0
^SSTGI: 36,11,"Weather special",0,0
^SSTGI: 36,13,"More Infos",0,0
^SSTGI: 36,14,"Extras",0,0
^SSTGI: 36,15,"Help",0,0
^SSTGI: 36,16,"Info",0,0
OK

AT^SSTR=36,0,1

Select item number 1 of
the menu before.

OK
^SSTN: 36

AT^SSTGI=36

^SSTGI: 36,0,7,"News",0,0,0,0,0
^SSTGI: 36,1,"Politics",0,0
^SSTGI: 36,2,"Global politics",0,0
^SSTGI: 36,3,"Economy",0,0
^SSTGI: 36,4,"Explosiv",0,0
^SSTGI: 36,5,"Gossip",0,0
^SSTGI: 36,6,"Lotto",0,0
^SSTGI: 36,7,"MTVNews",0,0
OK

AT^SSTR=36,0,2

Select item number 2 of
the menu before ("Global
politics").

OK
^SSTN: 36

**

Figure 141: SAT- part 2

**

AT^SSTGI=36

^SSTGI: 36,0,5,"Order:",0,0,0,0,0
^SSTGI: 36,1,"One time",0,0
^SSTGI: 36,2,"10-Day-Subscription",0,0
^SSTGI: 36,3,"Subscription",0,0
^SSTGI: 36,4,"Subscription-Status",0,0
^SSTGI: 36,5,"Subscription-Chancelation",0,0
OK

AT^SSTR=36,0,1 —— Select item number 1 of the menu before.

OK
^SSTN: 36

AT^SSTGI=36

^SSTGI: 36,0,2,"Acknowledge:",0,0,0,0,0
^SSTGI: 36,1,"Order",0,0
^SSTGI: 36,2,"Chancel",0,0
OK

AT^SSTR=36,0,1 —— Order one time an information about Global politics.

OK
^SSTN: 19

AT^SSTGI=19 —— The SIM application is sending a SMS and the Modul informed of this.

^SSTGI: 19,0,"Please wait...",1,0
OK

End SIM
Application Toolkit
(SAT)

Figure 142: SAT- part 3

2.17.2.4 Hints

Not applicable.

2.17.2.5 Example

```
***************************************
Comment  SIM Application Toolkit
***************************************
***************************************
Comment  Query SIM application is available and has start now .
***************************************


Subscr 3     Send: AT^SSTA?
Subscr 3   Receive: AT^SSTA?
Subscr 3   Receive: ^SSTA: 1,1,1,"7FFFFFFF7F0300DF5F"
Subscr 3   Receive:
Subscr 3   Receive: OK


***************************************
Comment  Intressted in SAT, switch to IDLE state.
***************************************


Subscr 3     Send: AT^SSTA=1,0
Subscr 3   Receive: AT^SSTA=1,0
Subscr 3   Receive:
Subscr 3   Receive: OK
Subscr 3   Receive:
Subscr 3   Receive: ^SSTN: 37


***************************************
Comment  Requesting parameter detail.
***************************************


Subscr 3     Send: AT^SSTGI=37
Subscr 3   Receive: AT^SSTGI=37
Subscr 3   Receive: ^SSTGI: 37,0,4,"Special",0,1,1,0
Subscr 3   Receive: ^SSTGI: 37,1,"News",0,0
Subscr 3   Receive: ^SSTGI: 37,2,"Mail & Fax",0,0
Subscr 3   Receive: ^SSTGI: 37,3,"MyMoney",0,0
Subscr 3   Receive: ^SSTGI: 37,4,"Extras",0,0
Subscr 3   Receive:
Subscr 3   Receive: OK


***************************************
Comment  Acknowledge the proactive command.
***************************************


Subscr 3     Send: AT^SSTR=37,0
Subscr 3   Receive: AT^SSTR=37,0
Subscr 3   Receive: OK
Subscr 3   Receive:
Subscr 3   Receive: ^SSTN: 254


***************************************
Comment  Select item number 1 of the menu sent before.
***************************************


Subscr 3     Send: AT^SSTR=211,0,1
Subscr 3   Receive: AT^SSTR=211,0,1
```

Subscr 3 Receive: OK
Subscr 3 Receive:
Subscr 3 Receive: ^SSTN: 36

****

Comment Requesting information.
****

Subscr 3   Send: AT^SSTGI=36
Subscr 3 Receive: AT^SSTGI=36
Subscr 3 Receive: ^SSTGI: 36,0,15,"Category",0,0,0,0,0
Subscr 3 Receive: ^SSTGI: 36,1,"News",0,0
Subscr 3 Receive: ^SSTGI: 36,2,"Stock exchange",0,0
Subscr 3 Receive: ^SSTGI: 36,3,"Stocks",0,0
Subscr 3 Receive: ^SSTGI: 36,4,"Stocks INT",0,0
Subscr 3 Receive: ^SSTGI: 36,5,"Sport",0,0
Subscr 3 Receive: ^SSTGI: 36,6,"Clubs",0,0
Subscr 3 Receive: ^SSTGI: 36,7,"Entertainment",0,0
Subscr 3 Receive: ^SSTGI: 36,8,"Horoscop",0,0
Subscr 3 Receive: ^SSTGI: 36,9,"Weather",0,0
Subscr 3 Receive: ^SSTGI: 36,10,"Weather INT",0,0
Subscr 3 Receive: ^SSTGI: 36,11,"Weather special",0,0
Subscr 3 Receive: ^SSTGI: 36,13,"More Infos",0,0
Subscr 3 Receive: ^SSTGI: 36,14,"Extras",0,0
Subscr 3 Receive: ^SSTGI: 36,15,"Help",0,0
Subscr 3 Receive: ^SSTGI: 36,16,"Info",0,0
Subscr 3 Receive:
Subscr 3 Receive: OK

****

Comment Select item number 1 of the menu before.
****

Subscr 3   Send: AT^SSTR=36,0,1
Subscr 3 Receive: AT^SSTR=36,0,1
Subscr 3 Receive: OK
Subscr 3 Receive:
Subscr 3 Receive: ^SSTN: 36

****

Comment Requesting information.
****

Subscr 3   Send: AT^SSTGI=36
Subscr 3 Receive: AT^SSTGI=36
Subscr 3 Receive: ^SSTGI: 36,0,7,"News",0,0,0,0,0
Subscr 3 Receive: ^SSTGI: 36,1,"Politics",0,0
Subscr 3 Receive: ^SSTGI: 36,2,"Global politics",0,0
Subscr 3 Receive: ^SSTGI: 36,3,"Economy",0,0
Subscr 3 Receive: ^SSTGI: 36,4,"Explosiv",0,0
Subscr 3 Receive: ^SSTGI: 36,5,"Gossip",0,0
Subscr 3 Receive: ^SSTGI: 36,6,"Lotto",0,0
Subscr 3 Receive: ^SSTGI: 36,7,"MTVNews",0,0
Subscr 3 Receive:
Subscr 3 Receive: OK

****

Comment Select item number 2 of the menu before.
****

Subscr 3   Send: AT^SSTR=36,0,2
Subscr 3   Receive: AT^SSTR=36,0,2
Subscr 3   Receive: OK
Subscr 3   Receive:
Subscr 3   Receive: ^SSTN: 36

****
Comment Requesting information.
****

Subscr 3   Send: AT^SSTGI=36
Subscr 3   Receive: AT^SSTGI=36
Subscr 3   Receive: ^SSTGI: 36,0,5,"Order:",0,0,0,0,0
Subscr 3   Receive: ^SSTGI: 36,1,"One time",0,0
Subscr 3   Receive: ^SSTGI: 36,2,"10-Day-Subscription",0,0
Subscr 3   Receive: ^SSTGI: 36,3,"Subscription",0,0
Subscr 3   Receive: ^SSTGI: 36,4,"Subscription-Status",0,0
Subscr 3   Receive: ^SSTGI: 36,5,"Subscription-Chancelation",0,0
Subscr 3   Receive:
Subscr 3   Receive: OK

****
Comment Select item number 1 of the menu before.
****

Subscr 3   Send: AT^SSTR=36,0,1
Subscr 3   Receive: AT^SSTR=36,0,1
Subscr 3   Receive: OK
Subscr 3   Receive:
Subscr 3   Receive: ^SSTN: 36

****
Comment Requesting information.
****

Subscr 3   Send: AT^SSTGI=36
Subscr 3   Receive: AT^SSTGI=36
Subscr 3   Receive: ^SSTGI: 36,0,2,"Acknowledge:",0,0,0,0,0
Subscr 3   Receive: ^SSTGI: 36,1,"Order",0,0
Subscr 3   Receive: ^SSTGI: 36,2,"Chancel",0,0
Subscr 3   Receive:
Subscr 3   Receive: OK

****
Comment Select item number 1 of the menu before.
****

Subscr 3   Send: AT^SSTR=36,0,1
Subscr 3   Receive: AT^SSTR=36,0,1
Subscr 3   Receive: OK
Subscr 3   Receive:
Subscr 3   Receive: ^SSTN: 19

****
Comment SAT Get information- send SMS.
****

Subscr 3   Send: AT^SSTGI=19
Subscr 3   Receive: AT^SSTGI=19
Subscr 3   Receive: ^SSTGI: 19,0,"Please wait...",1,0

Subscr 3   Receive:
Subscr 3   Receive: OK

2.18   Switch off the ME

2.18.1   Power down the ME

2.18.1.1   Description

The best and safest approach to turn off the ME is using the AT command AT^SMSO. This procedure lets the ME log off from the network and allows the software to enter a safe state before disconnecting the power supply. Low level of the ME's output pin VDD indicates that the procedure has completed and the ME has entered the POWER DOWN mode. If supported by the type of GSM module, the URC "^SHUTDOWN" will additionally notify that the ME is about to enter the POWER DOWN mode.

From POWER DOWN mode, the ME can be restarted to normal operation when the corresponding hardware pin is tied to ground. Depending on the type of module, this is either the IGT pin or the KEY7 pin. See also Chapter 2.19.3.

For further details on the POWER DOWN mode and instructions of how to enter and quit the mode see [1] and [2].

2.18.1.2   Used AT commands

AT^SMSO   -   Switch off mobile station

For further details about the commands see [2].

2.18.1.3   Flow chart
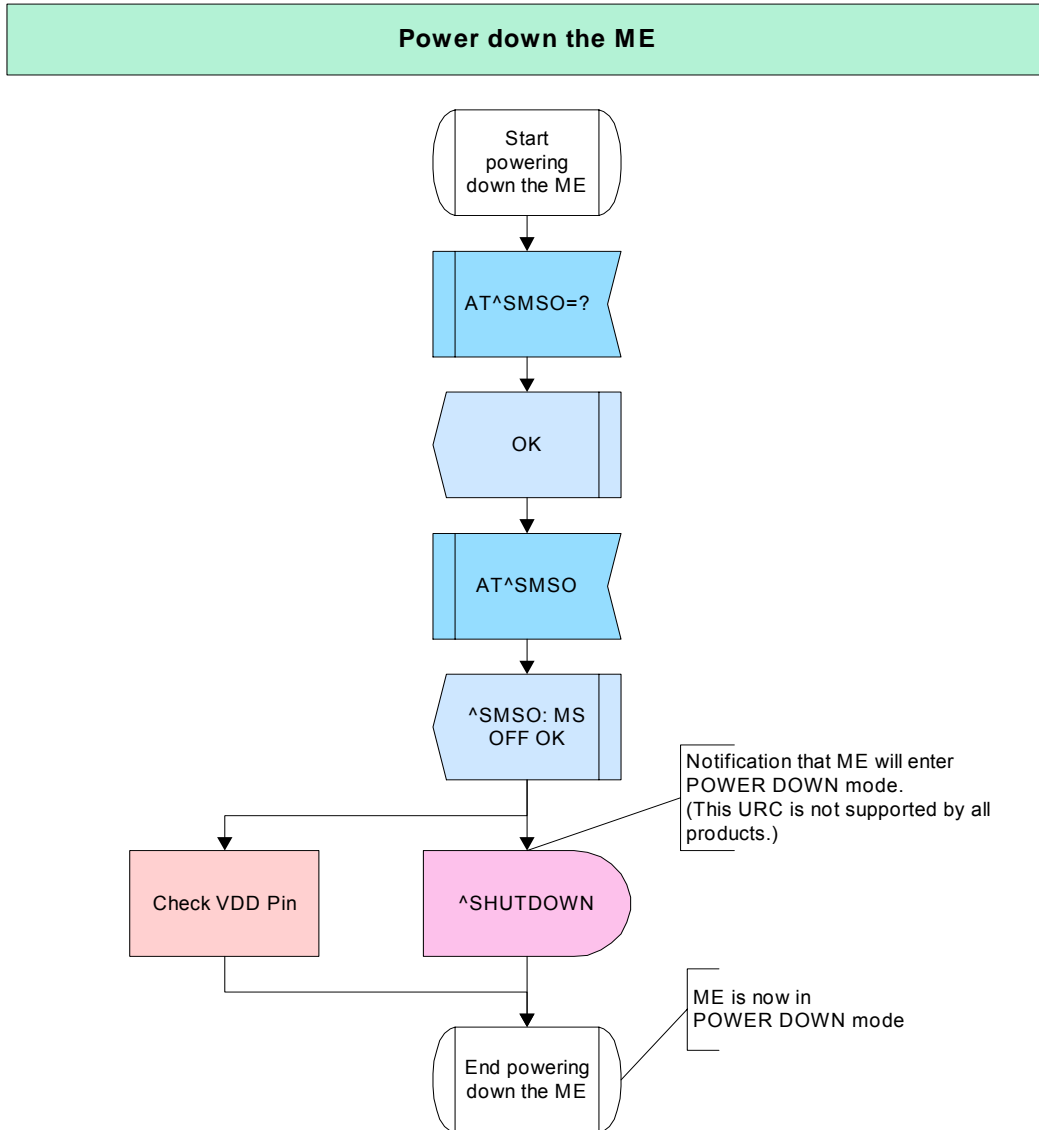
Figure 143: Power down the ME

2.18.1.4   Hints

- After using the command AT^SMSO it is not possible to send any other AT commands.
- The second way to verify that the ME is turned off, is to monitor the VDD pin.
- The low state of the VDD pin definitely indicates that the modul ist switched off.

2.18.1.5   Example

```
*************************************
Comment:  Power down the ME
*************************************
Subscr 1    Send: AT^SMSO
Subscr 1   Receive: AT^SMSO
Subscr 1   Receive: ^SMSO: MS OFF
Subscr 1   Receive:
Subscr 1   Receive: OK
Subscr 1   Receive: ^SHUTDOWN (not supported by all products)
```

2.19   Restart ME

This chapter discusses ways of restarting the ME: manual restart, cyclic restart and restart via the physical pin IGT or KEY7.
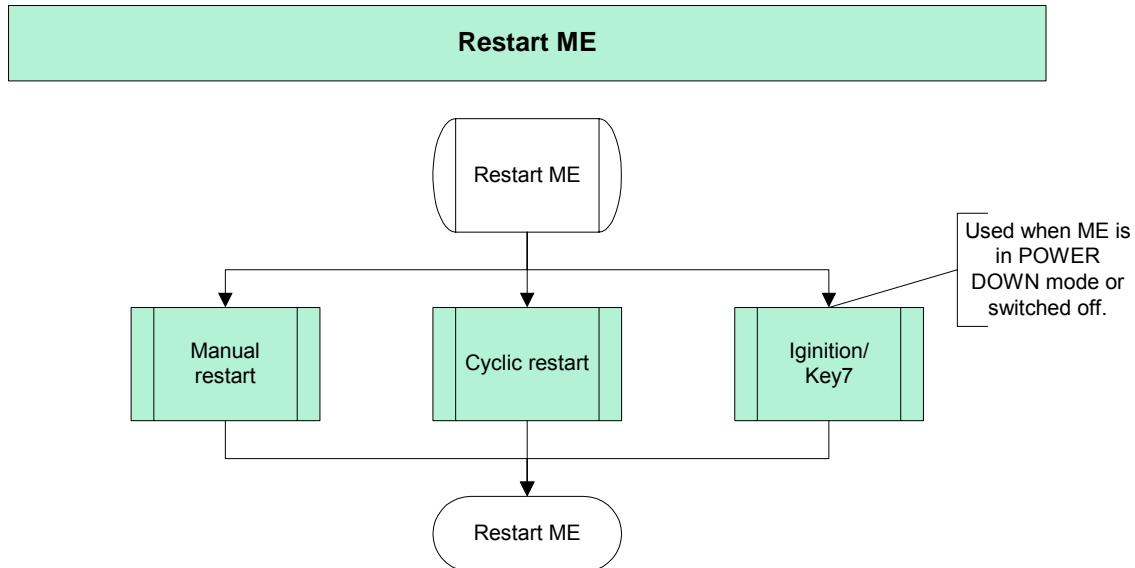
Figure 144: Restart ME

2.19.1   Manual restart

2.19.1.1   Description

To reset and restart the ME use the command AT+CFUN. If configured to a fix baud rate (AT+IPR≠0), the ME will send the URC "^SYSSTART" to notify that it is ready to operate. If autobauding is enabled (AT+IPR=0) there will be no notification. In this case, it is recommended to wait 3 to 5 seconds before entering the first AT command. To register to the network SIM PIN authentication is necessary after restart.

2.19.1.2   Used AT commands

AT+CFUN   -   Set phone functionality

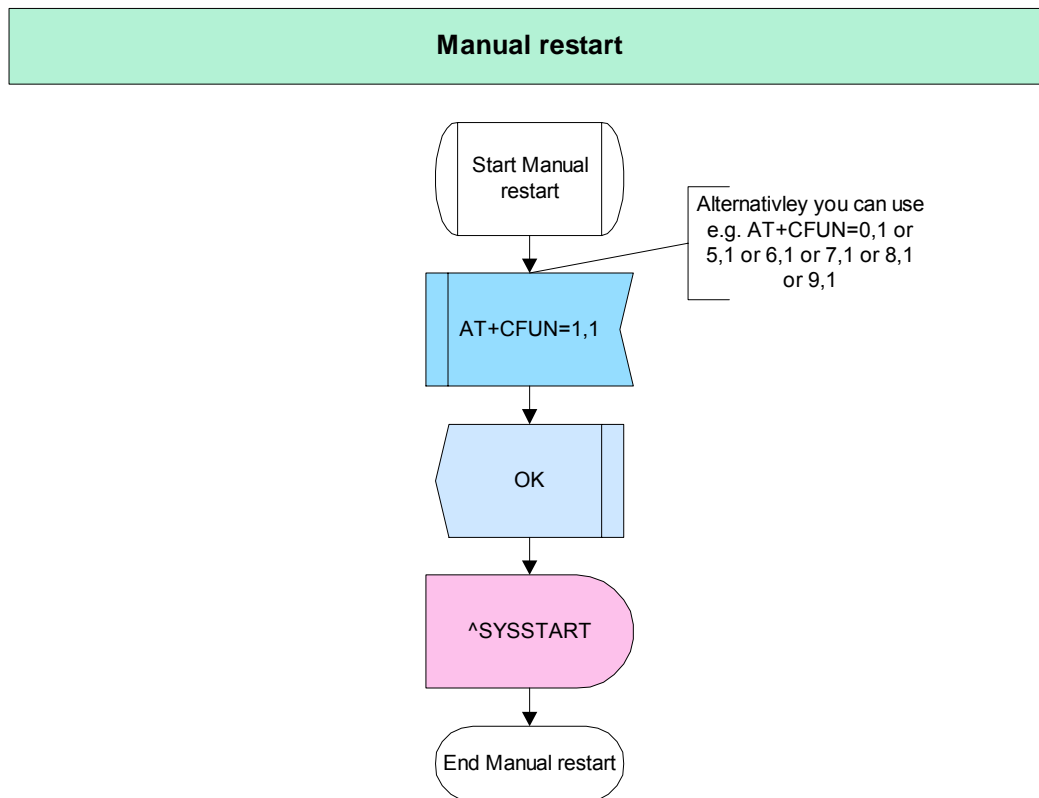For further details about the commands see [2].

2.19.1.3 Flow chart

Figure 145: Manual restart

2.19.1.4 Hints

Not applicable.

2.19.1.5 Example

```
**************************************
Comment:  Manual restart
**************************************
**************************************
Comment:  Restart and reset the ME
**************************************

Subscr 1    Send: AT+CFUN=1,1
Subscr 1   Receive: AT+CFUN=1,1
Subscr 1   Receive: OK
Subscr 1   Receive: ^SYSSTART
```

2.19.2 Cyclic restart

2.19.2.1 Description

This chapter describes how to schedule a cyclic restart of the ME by using the "AutoExec" option of the AT^SCFG command. Cyclic restart is an effective solution for industrial mobile applications (such as telemetry and remote metering) in the event the GSM network deregisters the mobile due to inactivity.

The "AutoExec" option enables the ME to automatically execute any AT command or sequence of AT commands, either when a timer expires or when the DTR signal is toggled. For cyclic restart, the timer driven mode applies. To configure cyclic restart, use the AT^SCFG command to set the timer (maximum 240 hours) and specify the reset command to be executed when the time stamp is reached, in the example below this is the command AT+CFUN=1,1.

IMPORTANT: The "AutoExec" feature is not supported by all Siemens wireless modules. Please refer to [2] for details.

2.19.2.2 Used AT commands

AT+CFUN   -   Set phone functionality
AT^SCFG   -   Extended Configuration Settings (not supported by all products)

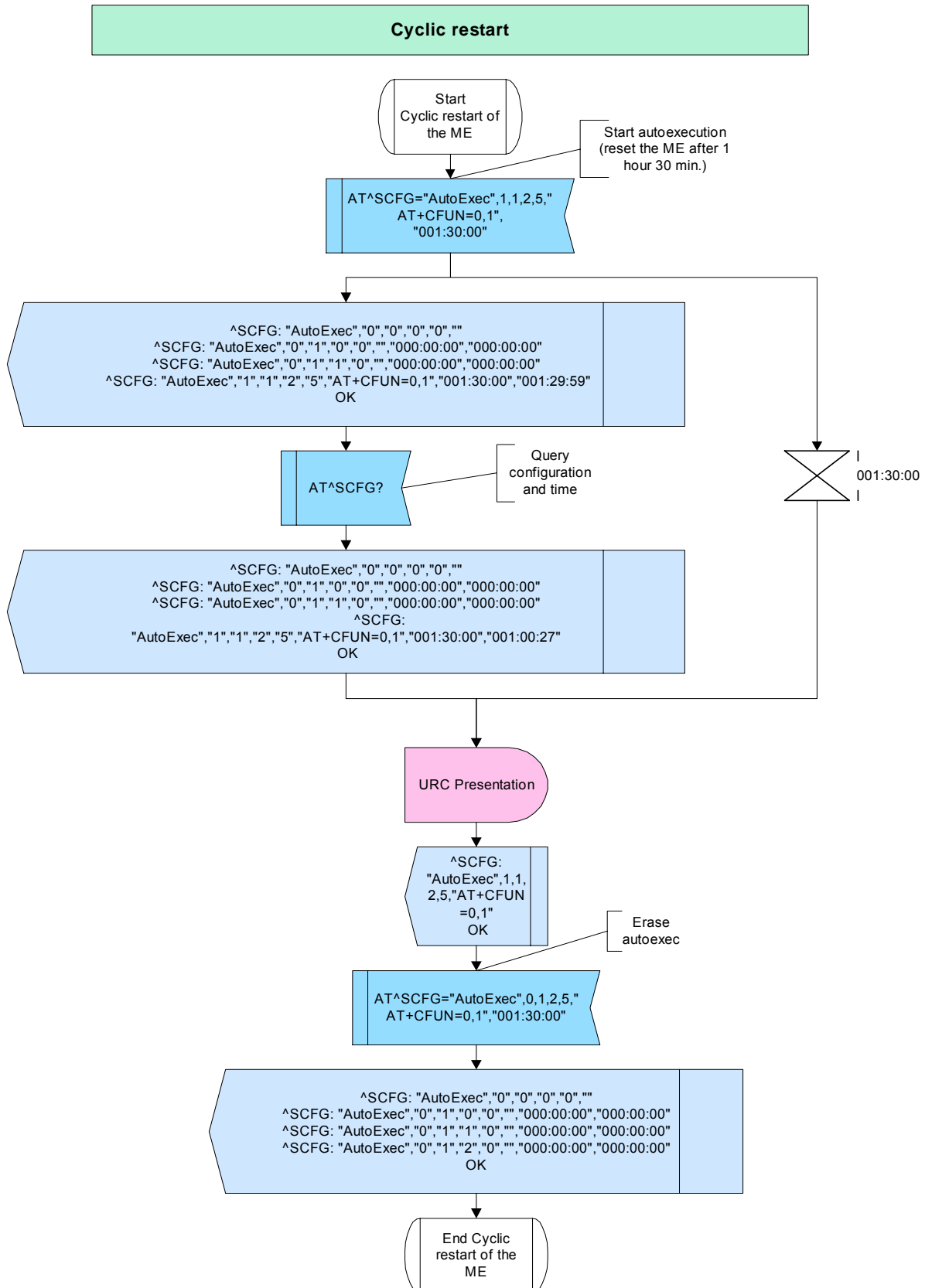For further details about the commands see [2].

2.19.2.3   Flow chart

Figure 146: Cyclic restart

2.19.2.4 Hints

• Be careful with small period values to shut down or reset the ME, because only little time remains to change these settings again after restart the ME.

2.19.2.5 Example

```
****************************************
Comment:  Cyclic restart (not supported by all products)
****************************************

****************************************
Comment:  Reset ME after 1 hour 30 min.
****************************************


Subscr 2     Send: AT^SCFG="AutoExec",1,1,2,5,"AT+CFUN=0,1","001:30:00"
Subscr 2   Receive: AT^SCFG="AutoExec",1,1,2,5,"AT+CFUN=0,1","001:30:00"
Subscr 2   Receive: ^SCFG: "AutoExec","0","0","0","0",""
Subscr 2   Receive: ^SCFG: "AutoExec","0","1","0","0","","000:00:00","000:00:00"
Subscr 2   Receive: ^SCFG: "AutoExec","0","1","1","0","","000:00:00","000:00:00"
Subscr 2   Receive: ^SCFG: "AutoExec","1","1","2","5","AT+CFUN=0,1","001:30:00","001:29:59"
Subscr 2   Receive:
Subscr 2   Receive: OK


****************************************
Comment:   Query configuration and time.
****************************************


Subscr 2     Send: AT^SCFG?
Subscr 2   Receive: AT^SCFG?
Subscr 2   Receive: ^SCFG: "AutoExec","0","0","0","0",""
Subscr 2   Receive: ^SCFG: "AutoExec","0","1","0","0","","000:00:00","000:00:00"
Subscr 2   Receive: ^SCFG: "AutoExec","0","1","1","0","","000:00:00","000:00:00"
Subscr 2   Receive: ^SCFG: "AutoExec","1","1","2","5","AT+CFUN=0,1","001:30:00","001:00:27"
Subscr 2   Receive:
Subscr 2   Receive: OK


****************************************
Comment:   Query configuration and time.
****************************************


Subscr 2     Send: AT^SCFG?
Subscr 2   Receive: AT^SCFG?
Subscr 2   Receive: ^SCFG: "AutoExec","0","0","0","0",""
Subscr 2   Receive: ^SCFG: "AutoExec","0","1","0","0","","000:00:00","000:00:00"
Subscr 2   Receive: ^SCFG: "AutoExec","0","1","1","0","","000:00:00","000:00:00"
Subscr 2   Receive: ^SCFG: "AutoExec","1","1","2","5","AT+CFUN=0,1","001:30:00","000:29:09"
Subscr 2   Receive:
Subscr 2   Receive: OK


****************************************
Comment:   Query configuration and time.
****************************************


Subscr 2     Send: AT^SCFG?
Subscr 2   Receive: AT^SCFG?
Subscr 2   Receive: ^SCFG: "AutoExec","0","0","0","0",""
Subscr 2   Receive: ^SCFG: "AutoExec","0","1","0","0","","000:00:00","000:00:00"
Subscr 2   Receive: ^SCFG: "AutoExec","0","1","1","0","","000:00:00","000:00:00"
Subscr 2   Receive: ^SCFG: "AutoExec","1","1","2","5","AT+CFUN=0,1","001:30:00","000:00:01"
Subscr 2   Receive:
```

Subscr 2 Receive: OK
Subscr 2 Receive:
Subscr 2 Receive: ^SCFG: "AutoExec",1,1,2,5,"AT+CFUN=0,1"
Subscr 2 Receive:
Subscr 2 Receive: OK

****

Comment: Erase autoexec.
****

Subscr 2   Send: AT^SCFG="AutoExec",0,1,2,5,"AT+CFUN=0,1","001:30:00"
Subscr 2 Receive: AT^SCFG="AutoExec",0,1,2,5,"AT+CFUN=0,1","001:30:00"
Subscr 2 Receive: ^SCFG: "AutoExec","0","0","0","0",""
Subscr 2 Receive: ^SCFG: "AutoExec","0","1","0","0","","000:00:00","000:00:00"
Subscr 2 Receive: ^SCFG: "AutoExec","0","1","1","0","","000:00:00","000:00:00"
Subscr 2 Receive: ^SCFG: "AutoExec","0","1","2","0","","000:00:00","000:00:00"
Subscr 2 Receive:
Subscr 2 Receive: OK

2.19.3 Restart via Ignition / Key 7

2.19.3.1 Description

When the ME is in POWER DOWN mode or switched off, it can be restarted to normal operation when the corresponding hardware pin is tied to ground for at least 100ms. Depending on the type of module, this is either the /IGT pin or the KEY7 pin. If the ME is in Charge-only mode the pin needs to be tied to ground for 1s. See also [1].

2.19.3.2 Used AT commands

Not applicable.

2.19.3.3 Flow chart

Not applicable.

2.19.3.4 Hints

Not applicable.

2.19.3.5 Example

In some applications without battery it may be useful to switch on the module immediately after applying battery power. Figure 147 shows a sample circuit which considers the timing conditions of /IGT with respect to BATT+ as specified in [1].

BATT+ (or VBATT+) is the main power supply of the module. The capacitors and resistors form a special delay line. The transistor forms a digital pulse for /IGT.

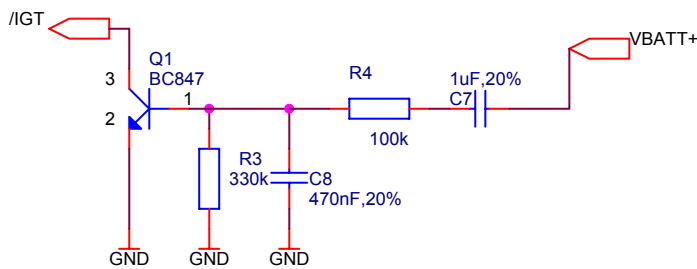Autoignition can be used for automatic switch-on after applying power.

Figure 147: Autoignition